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Initiating anticipatory action in the Ministry of Defence through the use of systems methodologies to assess organisational health

This is a redacted version of the full dissertation, as agreed by the candidate, the supervisors and Defence Science and Technology Laboratory as the industrial sponsor of this Engineering Doctorate studentship in the Faculty of Engineering. The redactions cover key information that was deemed too sensitive to be published. The redactions have been kept to the minimum level necessary, so that the dissertation can still show the research excellence of the candidate.

Initiating anticipatory action in the Ministry of Defence through the use of systems methodologies to assess organisational health

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A dissertation submitted to the University of Bristol in accordance with the requirements for award of the degree of Engineering Doctorate in Systems in the Faculty of Engineering

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Abstract

The vast majority of organisational decisions are made in reaction to poor performance. In this thesis I establish the potential for organisational health assessments to highlight the key issues underlying an organisation's performance so that it can take the anticipatory action necessary to maintain strong performance. In particular I establish how the use of these assessments can bring the enhanced levels of 'mindful organising' associated with High Reliability Organisations through integration with existing business processes.

My findings are based upon three years of Action Research conducted within the United Kingdom Ministry of Defence (MOD) where I led internal consultancy teams focused in the areas of infrastructure, acquisition and operational management. This thesis provides detailed accounts of how I developed innovative organisational health assessment methods in each of these areas. This thesis also describes how I conducted cross-sectional and longitudinal evaluations to reflect on the efficacy and effectiveness of these assessments.

In this thesis I make three main contributions against knowledge gaps in the published literature. First, I highlight methodological lessons for how to leverage system methodologies in assessing organisational health in complex, multi-stakeholder settings. Second, I provide empirical evidence for how organisational health assessments can be used to initiate action in anticipation of issues that have yet to manifest themselves – or at least not fully manifest themselves – in ways that can be readily observed. Third, I offer insights for how repeating organisational assessments in a process of monitoring can sustain the anticipatory behaviour needed for organisational resilience.

I also make a significant contribution by increasing the accessibility of the Viable System Model that provides a powerful framework for diagnosing organisations. In this thesis I describe how I developed and demonstrated a set of constitutive rules – including an explicit epistemology that is expressed as a performative model – to guide its use.

Author Declaration

I declare that the work in this dissertation was carried out in accordance with the requirements of the University's Regulations and Code of Practice for Research Degree Programmes and that it has not been submitted for any other academic award. Except where indicated by specific reference in the text, the work is the candidate's own work. Work done in collaboration with, or with the assistance of, others, is indicated as such. Any views expressed in the dissertation are those of the author.

SIGNED:.. DATE:.........................

My Publications

Lowe, D., Martingale, L. and Yearworth, M. (2016). Guiding interventions in a multi-organisational context: combining the Viable System Model and Hierarchical Process Modelling for use as a Problem Structuring Method. Journal of the Operational Research Society (2016) 1–15.

Lowe, D. and Yearworth, M. (2016). Ensuring Continued Enterprise Resilience: Developing a Method for Monitoring Health. In 2016 Conference on Systems Engineering Research, Elsevier.

Lowe, D., Porrett, C. and Yearworth, M. (2016). Designing for a distributed Group Support System process: A case study from UK Ministry of Defence. In Group Decision Making and Negotiation Conference, Springer.

Lowe, D., Oliver, P., Midgley, G. and Yearworth, M. (2017). Evaluating how system health assessment can trigger anticipatory action for resilience. In 2017 Conference on Systems Engineering Research, Elsevier.

Lowe, D., Espinosa E. and Yearworth, M. (2018) Constitutive rules for using the Viable System Model: Reflections on practice. In review with the European Journal of Operational Research.

My Presentations

MOD seeks SBP for Long Term Relationship, International Society of Military Operational Research (ISMOR), July 2014.

Applying the Viable System Model to Inform Defence Transformation, Operational Research Society Annual Conference (OR56), September 2014.

Lessons identified from assessing organisational health within the UK Ministry of Defence, European Operational Research Conference (EURO2015), July 2015.

Engineering an Anticipatory System: Methods for Monitoring Organisational Health, Anticipation, November 2015.

Guiding interventions in a Multi-Organisational Context: Adapting VSM for use as a PSM, Metaphorum, November 2015.

Ensuring Continued Enterprise Resilience: Developing a Method for Monitoring Health, Conference for Systems Engineering Research (CSER), March 2016

Designing for a distributed Group Support System process: A case study from UK Ministry of Defence, Group Decision Making and Negotiation, June 2016.

Evaluating how system health assessment can trigger anticipatory action for resilience, Conference for Systems Engineering Research (CSER), March 2017.

Reflecting on the use of the VSM in Real World Applications, Metaphorum, November 2017.

Dealing With Uncertainty In Decision Analysis Using Hierarchical Process Modelling, Military Operations Research Society Annual Symposium, June 2018.

Examining the case for the routine use of Problem Structuring Methods as a stimulus for anticipatory organisational change, European Operational Research Conference (EURO2018), July 2018.

Using organisational health assessments as epistemological devices for anticipatory intervention, Operational Research Society Annual Conference (OR60), September 2018.

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Glossary

AAB	Acquisition Architecture Board
ASA	Acquisition System Authority
ASH	Acquisition System Health
ASOM	Acquisition System Model
AR	Action Research
BTE	Bespoke Trading Entity
CASP	Command Acquisition Support Plans
CJO	Commander Joint Operations
CSP	Critical Systems Practice
DARA	Defence Audit Risk and Assurance
DEA	Defence Enterprise Analysis
Dstl	Defence Science and Technology Laboratory
DG	Director General
DIGA	Defence Infrastructure Governance Authority
DIA	Defence Internal Audit
DIO	Defence Infrastructure Organisation
DE&S	Defence Equipment and Support
DLOD	Defence Line of Development
DoD	Department of Defense
DISP	Defence Infrastructure System Programme
DOM	Defence Operating Model
DPandA	Director Performance and Analysis
DTU	Defence Transformation Unit
DRU	Defence Reform Unit
EOM	Enhanced Operating Model (for the DIO)
EngD	Engineering Doctorate
FLC	Front Line Command
GCD	Generic Constitutive Definition
GOCO	Government Owned Contractor Operated
GSS	Group Support System
HO	Head Office
HOCS	Head Office and Commissioning Services
HPM	Hierarchical Process Modelling
HRO	High Reliability Organisation
IAR	Individual Assessment Returns (for ASH)
IDRC	International Development Research Centre (Canada)
ISP	Information Service Plans
ISS	Information Systems and Services

JFC	Joint Forces Command
LGIM	Large Group Intervention Method
MGBC	Main Gate Business Case
MOD	Ministry of Defence
MSD	Ministry for Social Development (New Zealand)
NAO	National Audit Office
NAT	Normal Accident Theory
OHI	Organisational Health Index
OR	Operational Research
OSCR	Organisation Self-Assessment and Corporate Report (for ASH)
PJHQ	Permanent Joint Head Quarters
PSM	Problem Structuring Method
PUS	Permanent Under Secretary
QCA	Qualitative Comparative Analysis
RQ	Research Question
SBP	Strategic Business Partner (for DIO)
SCA	Strategic Choice Approach
SODA	Strategic Options Development and Analysis
SOSM	System of System Methodologies
SSM	Soft Systems Methodology
TLB	Top Level Budget
UK	United Kingdom
US	United States
VSM	Viable System Model

Chapter 1 – Introducing my research

1.1   Introduction

The vast majority of organisational change is triggered in reaction to performance issues that threaten the viability of the organisation. In terms of the Inception – Growth – Maturity – Decline sigmoidal curve model for the organisational lifecycle (see Figure 1.1), reactionary change occurs at Point B when the organisation is in full decline (and when there is a clear and present danger to its survival) (Handy, 1994). The key to sustained organisational performance is to initiate anticipatory change when the organisation is approaching maturity at Point A, whilst there are sufficient resources and time provided by the first trajectory to begin the second.
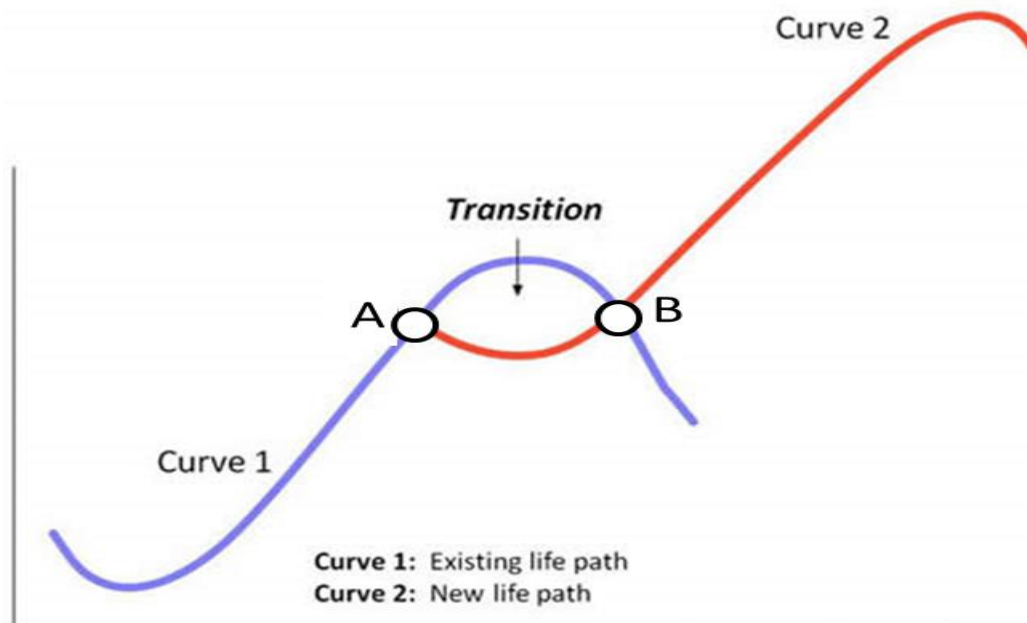
Figure 1.1 - Sigmoidal curve for organisational lifecycle redrawn from Handy (1994)

My thesis examines how assessing organisational health can initiate and sustain anticipatory change in the United Kingdom Ministry of Defence. It is based upon three years of Action Research carried out in my role as a Technical Consultant working for the Defence Science and Technology Laboratory (Dstl), followed up with longitudinal evaluations. This Action Research involved the development and application of innovative assessment methods to target interventions in four separate areas, with methodological learning supported via evaluations based on data drawn from both researcher and stakeholder communities.

1.2   Setting the context

The Ministry of Defence (MOD) is a large government department that is charged with the mission to *"protect the security, independence and interests of our country at home and abroad"[1]*. It has an annual budget of £35B (FY16/17), comprises a mix of more than 250,000 military and civilian personnel and is supported by more than 30 agencies and public bodies. Figure 1.2, taken from the open publication *How Defence Works*[2], depicts the Defence Operating Model and shows how responsibility for delivering the seven core functions (Direct, Operate, Develop, Generate, Enable, Acquire and Account) are distributed across the key components of the organisation.
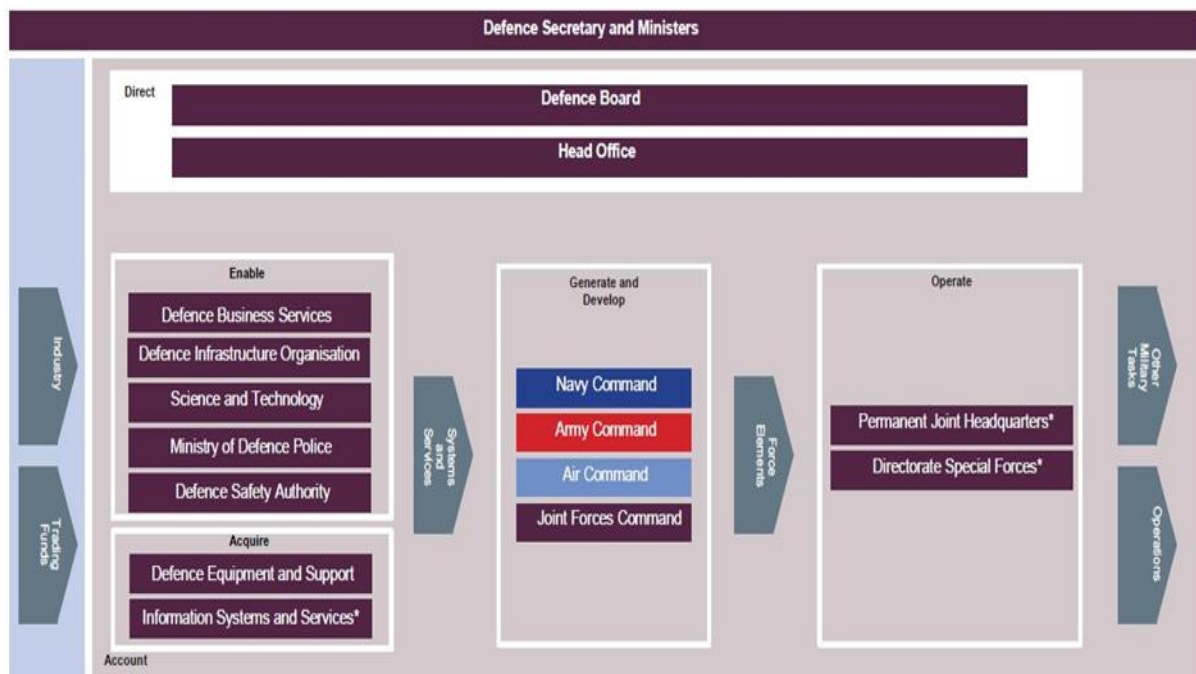
Figure 1.2 – Defence Operating Model (taken from How Defence Works)

Whilst MOD is not threatened by organisational survival, it is vitally important for the country that MOD takes timely action to exploit opportunities and to counter threats in order to sustain its performance, both in the here and now and for a range of potential futures. This challenge was underscored in a speech given by the Secretary of State for Defence in January 2015 when he stated

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[1] https://www.gov.uk/government/organisations/ministry-of-defence/about [Accessed: 07 Jan 2019]
[2] https://www.gov.uk/government/publications/how-defence-works-the-defence-operating-model [Accessed: 07 January 2019]

that *"MOD must not merely be match-fit, it must be permanently fit"*[3]. It is clearly a very significant challenge and one that, whilst most obviously evidenced in the operational domain, has implications for the whole organisation – from strategic planning at the highest levels of the department down to the everyday business–as–usual activities and from the Armed Forces deployed on the front-line back to enabling functions that provide equipment, infrastructure and business services.

In striving to maintain delivery under all circumstances, MOD is aspiring to operate as a High Reliability Organisation (HRO). These types of organisations sustain performance in complex operating environments through paying close attention to operating detail, refusing to simplify interpretations of weak signals, pushing for continuous improvement, underspecifying structures and maintaining sufficient organisational slack so as to respond promptly and effectively to unexpected events (when prevention fails). These characteristics have been collectively referred to as 'mindful organising' *(Weick, Sutcliffe, & Obstfeld, 1999)*.

MOD employs a number of processes to try to ensure mindful organising. These include processes that focus on the external operating environment such as strategic trends work conducted by the Defence Concepts and Doctrine Centre, adversary-focused intelligence estimates produced by Defence Intelligence and force development activities undertaken by the four Front Line Commands or FLCs (Army, Navy, Air and Joint Forces) that are guided by a set of scenarios produced by Head Office. These also include processes that focus on the internal operating environment such as Quarterly Performance and Risk Reporting, Audit and Assurance that are all undertaken by Head Office using information provided from across the organisation.

This research focuses on how mindful organising might be enhanced by conducting assessments of organisational health. This research was initiated in 2013 in response to a task from the MOD Director General for Head Office and Commissioning Services who had a specific focus on the ability to deliver infrastructure projects and services to support the operation of the department. Whilst others had a responsibility for setting the requirements for these projects and services, he had responsibility for ensuring that the right capabilities were provided in order to meet the requirements both now and in

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[3] https://www.gov.uk/government/speeches/reforming-defence-keeping-fighting-fit [Accessed: 07 Jan 2019]

the future. It was this split in responsibilities that led to the novel focus on health, as opposed to a traditional focus on performance.

1.3 Introducing the concept of organisational health

Organisational Health is an emerging area of interest in management science as evidenced by increased publication frequency. In the private sector, it is promoted as essential for sustainable performance and as a source of competitive advantage in a dynamic operating environment (Keller & Price, 2010). It also features in the international development sector where charities and others need to assess the health of unfamiliar organisations overseas prior to investment in order to maximise the likely return on that investment (Lusthaus, Adrien, Anderson, & Carden, 2002). Whilst there has been some application in the public sector – e.g. healthcare, education – this has been limited to date and appears to be an untapped area of potential.

Whilst organisational health is becoming increasingly prominent within management science and practice, there is no clear consensus on how it should be conceptualised. I propose here, drawing on the literature published over the last 70 years that will be expanded upon in Chapter 2, that a healthy organisation is one that is able to effectively balance the tension between performance in the here and now and the ability to adapt for the future. Figure 1.3 depicts my conceptualisation for how a 'healthy' system is able to achieve both high levels of performance in the here and now and high levels of adaptability to perform in the future, and how it contrasts against 'fragile' systems (which are optimised for high performance in the here and now but lack the ability to adapt for the future), 'latent' systems (which are able to adapt for performance in a range of futures, but not in the here and now) and 'broken' systems (which are configured neither for performance in the here and now nor for adaptation for the futur
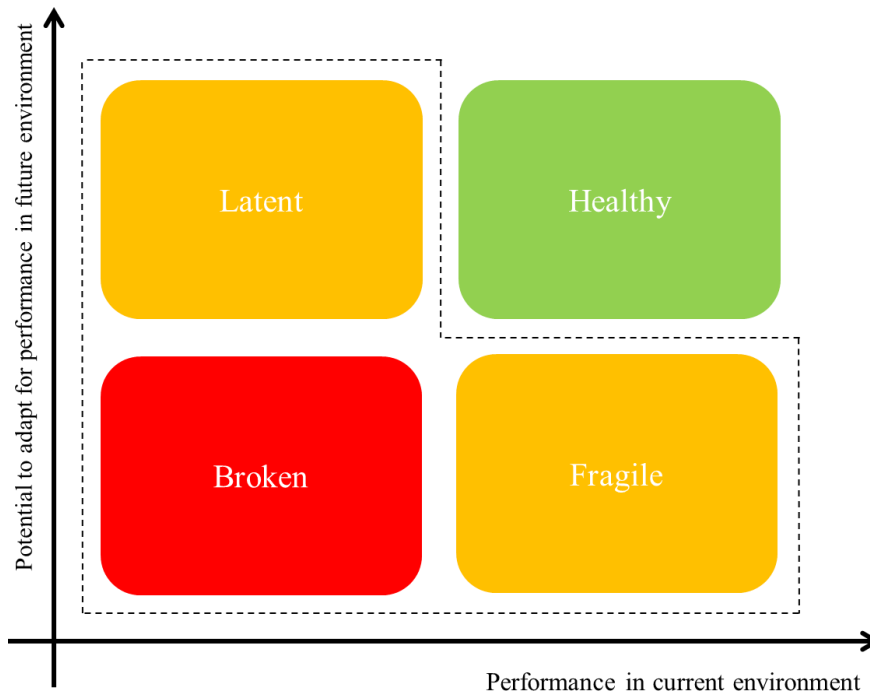
Figure 1.3 – Healthy systems balance performance and potential performance

By going beyond performance to assess health more broadly, I postulate that MOD – and other organisations – will be better positioned to take action in anticipation of issues that would otherwise hamper performance. It has been theorised that anticipatory control – distinct from reactive control – is realised through the maintenance of an internal model that processes contextual information to support decision making in the present based upon what might happen in the future (R. Rosen, 1985). There are clear examples of where this happens in the natural kingdom, from the way in which deciduous trees drop their leaves and sap in anticipation of the freezing temperatures in winter to the way in which birds migrate across continents in anticipation of better environmental conditions.

1.4 Defining the research challenge

My research challenge then is to investigate whether models of organisational health can help the MOD to take anticipatory action to ensure performance in the current and near future. In particular, I have focused my research on the ability of systems methodologies to develop models of organisational health. This is because the application of systems methodologies has a clear potential to positively impact the problematical situation, in terms of providing specific theories and models that aid the design of adaptable organisations (e.g. Viable System Model or VSM); providing techniques for seeing the

bigger picture when tackling complex issues and integrating multiple perspectives within this (e.g. Problem Structuring Methods or PSMs); and providing frameworks for critical reflection when setting boundaries, selecting specific methods and evaluating action for improvement (e.g. Systemic Intervention). The overarching research question therefore is posed as: *How can models of organisational health be developed through the application of systems methodologies to initiate and sustain anticipatory change?*

1.5 Describing my research methodology

I have addressed this research challenge through Action Research. This research methodology is recognised to be appropriate *"when the research question relates to describing an unfolding series of actions over time in a given group, community or organisation; understanding as a member of a group how and why their action can change or improve the working of some aspects of a system; and understanding the process of change or improvement in order to learn from it"* (Coughlan & Coghlan, 2002, p. 227), and it is this dual focus on improvement and learning that distinguishes Action Research from other research methodologies whose focus is either one or the other (Checkland & Holwell, 1998a). Action Research typically involves multiple, linked cycles of planning, taking and reflecting upon action in specific settings with meta-learning across these cycles aligned with the overarching research challenge. My research comprised three separate, but linked, cycles that each involved the development, application and reflection upon the use of innovative methods for assessing organisational health in four separate areas of MOD.

The first organisational health assessment method was developed and applied with respect to the Infrastructure System which was defined to be centred on the Defence Infrastructure Organisation (DIO) as the delivery agent, but that also included the elements of Head Office that provide governance for the operation of the DIO ('Governor' role) and the FLCs (and other elements of MOD) that provide infrastructure requirements for the DIO to deliver against ('Customer' role). This system is responsible for building, maintaining and servicing the infrastructure needed to enable MOD personnel – both military and civilian – to live, work, train and deploy in the UK and overseas. The results of the research in this area of concern were presented to the Director General for Head Office and Commissioning

Services who used them to set the agenda for a major change programme – the Defence Infrastructure System Programme. The results were also used (by others) to inform the development of a maturity assessment process that was established to track the impact of this change programme.

The second organisational health assessment method was developed and applied with respect to the larger and more complex Acquisition System which was defined to be centred on two key delivery agents: Defence Equipment and Support (DE&S) and Information Systems & Services (ISS) (see 'Acquire' in Figure 1.2). As per the Acquisition System Operating Model (ASOM) the system definition was scoped to also include Head Office in the Governor role and the FLCs in the Customer roles (as for the Infrastructure Delivery System). The results were used to inform the development of Acquisition Systems Health – a biannual monitoring of the ASOM that uses survey responses and self-reports and that has been repeatedly been used to brief to the Acquisition Architecture Board, chaired by the Permanent Under Secretary for MOD.

The third organisational health assessment method was developed in order to apply the organisational health concept at the department level. This research focused on identifying how health could be assessed at very large scale and how the results could be integrated with existing performance, risk, audit and assurance reporting in order to inform strategic decision-making by the Defence Board. The scale of this undertaking drove the development of a generic constitutive definition for organisational health that could be applied to any organisation. This generic framework was used to structure an assessment of the MOD's Permanent Joint Head Quarters (PJHQ) which was used to identify priority areas for intervention. The framework was then developed further to include a set of positive indicators whose presence or absence could be established using secondary data (both qualitative from surveys and quantitative from sources of management information). This method was applied within a subset of Head Office to establish technical feasibility and to better understand the associated costs before scaling up to the whole Defence Enterprise could be considered.

1.6   Previewing my contribution to knowledge

In addition to helping MOD to take action – by targeting interventions across its operating model as described above for Enable (Infrastructure, Acquisition), Operate (PJHQ) and Direct (Head Office)

– my research has yielded four significant academic contributions that each address knowledge gaps in the published literature. Each of these contributions to knowledge are described in turn below.

1. Establishing how organisational health should be conceptualised: Whilst organisational health is a growing area of interest of management science and practice, there is little in the way of consensus for how it should be conceptualised and defined. As described above and depicted in Figure 1.3, based on a comprehensive literature review I conceptualise a healthy organisation as one that is able achieve both high levels of performance in the here and now and high levels of adaptability to perform in the future. In subsequent research focused on assessing the health of the MOD as a whole, I extend this concept to establish a generic constitutive definition for organisational health to inform assessment at any scale.

2. Demonstrating how system methodologies can be used to assess organisational health: Whilst there have been a variety of approaches taken to assessing organisational health documented in the management science literature (and so there is much empirical data and evidence available), none of them leverage the concepts and theories associated with systems methodologies. My research demonstrates the benefits of using systems methodologies to assess organisational health, and identified a number of key methodological observations for practitioners based upon cross-sectional evaluation of my practice. My research makes clear contributions against three key challenges identified recently for PSM research and practice (Ackermann, Franco, Rouwette, & White, 2014) – developing effective support for multi-organisational collaborative working; developing effective procedures for mixing methods; and borrowing and developing theory to understand and inform problem structuring practice.

3. Investigating how organisational health assessments can initiate anticipatory action: The vast majority of literature designed to support change initiatives highlights the need to create a burning platform to motivate action. When assessing organisational health there is potential that only a smouldering platform will be created – for example where high levels of current performance mask the inability to sustain this over time. The use of models as boundary objects to stimulate debate amongst stakeholders and facilitate consensus on what action to take is at the heart of PSMs (Franco 2013). My research examines how lessons learnt with regard to taking action following reactive PSM use might

be applicable to initiating action in anticipation of issues that have yet to manifest themselves – or at least not fully manifest themselves – in ways that can be readily observed (e.g. performance metrics). My research therefore makes a contribution to the research challenge of identifying what structures and processes are necessary for anticipatory action (Poli, 2014).

4. Theorising how organisational health monitoring can sustain anticipatory behaviour: The term monitoring refers to the act of repeatedly assessing organisational health, if not continuously then at a frequency sufficient to provide timely information. My research leverages longitudinal evaluations from the Infrastructure and Acquisition implementations to theorise how organisational health monitoring can be used to sustain anticipatory behaviour. In particular it considers the implications of Actor Network Theory (Callon, 1986) for engaging and mobilising stakeholders (White, 2009). My research makes a clear contribution to the research challenge of understanding the impact of introducing information systems on an organisation's resilience (Annarelli & Nonino, 2015).

My research has also addressed a supplementary research question that arose along my Action Research journey. During the first Action Research cycle, I made the decision to adapt the VSM from its classic form in order to make it more accessible to stakeholders who had encountered difficulty with some of the language and visualisations. Whilst this adaptation was effective, it led me (and others) to question what was the irreducible minimum set of requirements for when using VSM to target systemic interventions. I therefore made a fifth significant academic contribution

5. Guiding what practitioners should be doing when using the Viable System Model: The VSM provides a powerful framework to aid the design and diagnosis of organisations to survive and thrive in complex operating environments. However, the cognitive accessibility of VSM as a modelling approach together with a confusing variety of associated methodologies – some copyrighted, some not – has limited its use. My research develops a set of constitutive rules (including an explicit epistemology) to guide the generation of knowledge via the application of the VSM in any form, and so encourage broader and/or more rigorous use of the VSM theory in real world settings. The epistemology is expressed as a performative model and my research has shown how this model can be

used as an aid to reflecting on practice, as an aid to designing VSM approaches and as aid to diagnosing the organisation in focus.

1.7   Outlining my thesis structure

My thesis is arranged in nine chapters. The contents of the following eight chapters are detailed below to provide a preview of what is to come.

Chapter 2 summarises the findings of my literature review that sets the academic context for this research. The chapter begins by introducing the concept of a High Reliability Organisation (Roberts, 1990a) and how 'mindful organising' (Weick & Sutcliffe, 2001) is key to their success in sustaining performance in a dynamic operating environment. It progresses to consider how anticipatory systems are able to position themselves for the future by taking action in the present using internal models (R. Rosen, 1985), before proposing that organisational health models might provide this affordance for MOD and other complex organisations. It then reviews how organisational health has been conceptualised in a range of fields and draws these ideas together into the new definition presented above. Lastly, it provides a brief overview of the three waves of systems methodology development – hard, soft and critical – before highlighting how each are relevant to assessing organisational health. The chapter closes by identifying three primary research questions set within the context of organisational change that together address the overarching research challenge.

Chapter 3 describes why Action Research was selected as the research methodology and how the research was conducted. Accordingly, the chapter begins by justifying my selection of Action Research as the most appropriate research methodology before proceeding to describe its key characteristics and how it is recognised as a rigorous methodology, including what makes for good Action Research. The chapter progresses to describe how I conducted my Action Research in three distinct but linked phases – each based upon Systemic Intervention (Midgley, 2000) and supported by increasingly sophisticated approaches to evaluation. The chapter closes by describing how each phase is leveraged to address the research questions and summarising the main points of the chapter.

Chapter 4 chronologically details the development and application of systems methodologies to assess the health of the Defence Infrastructure System (from July 2013 to August 2014) using the six step process model for Action Research proposed by Checkland and Holwell (1998a) to provide a structure. These steps comprise: (1) Entering the problem situation; (2) Establishing roles; (3) Declaring methodology and framework of ideas; (4) Taking part in the change process; (5) Exiting the problem situation; and (6) Reflecting on experience. It describes how Dstl was tasked to identify the strengths, weaknesses and opportunities associated with the introduction of a strategic business partner within the Defence Infrastructure Organisation (DIO) based on previous work and the way in which the Dstl team that I led worked with stakeholders to identify these. Specifically, it details how I combined the VSM with Hierarchical Process Modelling in a multi-methodology to generate a novel PSM, and how this method was used to assess the health of the Defence Infrastructure System that whilst centred on the DIO also included the FLCs and other parts of MOD (as customers) and Head Office (as governors). This chapter highlights how the results were used to structure a major change programme and how the health was to be monitored by the Defence Infrastructure Governance Authority going forward using a maturity model. The chapter closes by summarising the key methodological observations that are highlighted throughout the text.

Chapter 5 chronologically details the development and application of systems methodologies to assess the health of the Defence Acquisition System (from August 2014 to January 2015) using the same six step process model as a framework. It begins by outlining the pre-existing Acquisition System Operating Model (centred on DE&S and ISS delivery agents) and the task placed on Dstl to design how best to monitor the health of this system over time. Specifically it details how the VSM was applied to identify twenty key functions distributed across the system for assessment and how the proposal for how these should be assessed was developed. The chapter describes how the design was adapted for use by the Acquisition System Authority to inform their Acquisition System Health programme of work. The chapter again closes by summarising the key methodological observations.

Chapter 6 chronologically details the development and application of systems methodologies to assess the health of the MOD Enterprise as a whole (from February 2015 to October 2016) again using

the same six step process model as a framework. The chapter begins by describing how a new method was developed to assess the health at a very large scale, drawing upon a range of theories and existing approaches. It then details how it was applied – very differently – firstly to assess the health of MOD's Permanent Joint Head Quarters (using it as a basis for conducting interviews and communicating results) and secondly to assess the organisational health within a subset of MOD Head Office (using it to structure a hierarchical process model fed by pre-existing management information and data). As for Chapters 4 and 5, Chapter 6 closes by summarising the key methodological observations.

Chapter 7 considers how my Action Research, designed and conducted against the broad research challenge, can be used to answer three specific research questions: (1) How can systems methodologies be applied to assess organisational health? (2) How can organisational health assessments be used to initiate anticipatory action? and (3) How can organisational health monitoring be used to sustain anticipatory behaviour? This chapter also presents how additional research was conducted to address a supplementary research question that arose from the first cycle of Action Research: (4) What should a practitioner be doing when applying the Viable System Model?

Chapter 8 reflects upon my research findings. For each of my research questions the chapter presents a critique of my findings to reflect on the various strengths and limitations, highlights the methodological learning likely to be transferrable to other situations, and identifies the potential for further research to address particular challenges (including in relation to new academic literature).

Chapter 9 brings my thesis to a close by summarising the five major academic contributions from my research.

Chapter 2 – Setting the academic context for my research

2.1 Introduction

The aim of this chapter is to first ground my research in the background literature in four key areas — first with regard to High Reliability Organisations and Mindful Organising as key concepts for sustaining high levels of organisational performance (Section 2.2); second with regard to Anticipatory Systems as a theoretical lens through which to view the way in which such organisations take action in anticipation of full blown crises (Section 2.3); third with regard to the potential for the models of Organisational Health to enable anticipatory behaviour (Section 2.4); and fourth with regard to how Systems Methodologies can be used to build such models and ensure their exploitation in social processes of improvement (Section 2.5).

The aim of the chapter is also to establish a set of research questions to focus my inquiry against the overarching research challenge: *How can models of organisational health be developed through the application of systems methodologies to initiate and sustain anticipatory behaviour?* I establish three primary research questions in the context of change management literature that form the basis of my inquiry (Section 2.6). The first of these relates to how systems methodologies can be used to assess organisational health. The second and third of these relate to how the process and results of using these assessments to build organisational health models can be used to initiate change and how repeated assessments through monitoring can sustain change over time.

2.2 Reviewing how High Reliability Organisations sustain performance over time

In striving to maintain the delivery services at a high level of proficiency, no matter what the operating context, it can be said that MOD is aspiring to operate as a High Reliability Organisation (HRO) (Roberts, Bea, & Bartles, 2001; Roberts & Rousseau, 1989). The HRO concept originated in the late 1980s at the University of California at Berkeley through the detailed observation of the Federal Aviation Administration's operation of their Air Traffic Control System (La Porte & Consolini, 1998), the US Navy's operation of their nuclear-powered aircraft carriers (Roberts, 1990b; Rochlin, La Porte, & Roberts, 1998) and Pacific Gas and Electric Company's operation of their nuclear power plant at Diablo Canyon (Schulman, 1993). Each of these organisations was found to have maintained a

continuous high level of performance, whilst operating high risk technology in a context where political and social scrutiny and the consequences arising from errors severely limits the ability to learn through trial and error, through the application of a common set of approaches (Rijpma, 1997). These approaches involve dedication to comprehending the complexities of their operations and supporting technology (Rochlin et al., 1998); decentralisation of decision making (Weick, 1987); use of redundancy (La Porte & Consolini, 1991) and maintenance of 'conceptual slack' to ensure full consideration of the potential causes to explain observations and so avoid blindspots and hasty action (Schulman, 1993).

The HRO concept emerged as an optimistic counterpoint to the pessimism of the prevailing Normal Accident Theory (NAT). NAT was developed from a similarly detailed examination of the failure at the Three Mile Island nuclear facility (as opposed to the examination of success that drove the development of the HRO concept) and posits that failures in performance are inevitable or 'normal' in complex organisations because the intrinsic interactive complexity and tight coupling induce and propagate failure in ways that are unfathomable by managers in real time (Perrow, 1984). It follows from NAT that the only way to mitigate for such failures– and sustain high reliability – is to redesign the system to reduce the degrees of interactive complexity and tight coupling. The debate between NAT and HRO approaches to high reliability has been the subject of much discussion in the safety literature. HRO proponents point out that it is possible to manage for high reliability for systems that exhibit interactive complexity and tight coupling and that it is therefore possible to organise in such a way to overcome the odds. NAT proponents have countered that a HRO is at best temporary illusion and it is just a matter of time before failure occurs and that HRO practices can be counterproductive because they act to increase complexity. For example the introduction of redundancy into organisational processes can lead to a sense of complacency and diffusion of responsibility that negatively impacts reliability (Tamuz & Harrison, 2006)

This debate and other criticisms have caused the definition for HROs to evolve over time. Early definitions for HROs focused on whether or not the organisation depended on the interactively complex and tightly coupled operation of high risk technology together with statistics of failure rates and attempted to set thresholds (Hopkins, 2007) but these have since been supplanted by definitions that

focus on how HROs employ *"effective management of innately risky technologies through organisational control of both hazard and probability"* (Rochlin, 1993, p. 17). Early definitions also precluded learning by trial and error (Weick, 1987) but later thinking allowed for inevitability of these errors and the potential – albeit limited – for learning from them (La Porte & Consolini, 1991). There was also a realisation that 'ideal' HRO performance was in many ways unsustainable if not unachievable in the first place and that it was more helpful (and appropriate) to think of HROs as reliability seeking rather than reliability achieving entities (Sutcliffe, 2011).

Another development was the broadening of focus away from safe operation of high risk technology as the single organisational goal to also include the service outputs that such safe operation enables (Rochlin, 1993) (La Porte & Rochlin, 1994). Whilst traditional HROs are motivated by reliably maintaining outputs through the avoidance of catastrophic failures, a broader interpretation of the goal of such organisations puts at least as much emphasis on sustaining output as the sustaining safety of operation. Of course whilst safety and reliability are inextricably linked in the case studies that gave rise to the HRO concept, that is not true everywhere. It is easy to think of situations where unsafe operations give rise to reliable outputs (e.g. construction projects where the supply of labour is sufficient to replace individuals injured or killed through unsafe working practices) and conversely where safe operations yield unreliable outputs (e.g. rail services where service is interrupted to preserve stringent operating procedures).

The conceptualisation of reliability in an engineering sense (under a closed system paradigm) has a strong internal focus and centres on the repeatability of actions over time by investing in high quality components and maintaining stable activity patterns. However, reliability in an organisational sense (under an open system paradigm) is focused more on how the organisation is able to maintain performance in varying operating conditions. In this way the focus can be seen to shift from the simple characteristic properties of a system that relate to the repeatability of operations and failure rates of components to be a complex and emergent property that relates to continuity of output within a dynamic environment. Reliable organisations handle unforeseen situations in ways that forestall unintended consequences through the employment of dynamic activity patterns, supported by stable cognitive patterns (Weick et al., 1999). Efficient organisations – characterised by stable activity patterns and

dynamic cognitive patterns – experience fixation failures when they continue to do the same things in different circumstances (Starbuck, Greve, & Hedberg, 1978).

Weick and his co-workers from the University of Michigan coined the term 'collective mindfulness' and later 'mindful organising' to describe these stable activity patterns – *"Effective HROs organize socially around failure rather than success in ways that induce an ongoing state of mindfulness. Mindfulness in turn facilitates the discovery and correction of anomalies that could cumulate with other anomalies and grow into a catastrophe"* (Weick et al., 1999, p. 61). Further, these activity patterns were found to comprise five key processes: (1) Preoccupation with failure; (2) Reluctance to simplify interpretations; (3) Sensitivity to operations; (4) Commitment to resilience; and (5) Under-specification of structures – see Figure 2-1 (ibid). Each is discussed in turn in the below paragraphs.

PROCESSES

Preoccupation with Failure
Reluctance to Simplify Interpretations
Sensitivity to Operations
Commitment to Resilience
Underspecification of Structures

→ Mindfulness → Capability to Discover and Manage Unexpected Events → Reliability
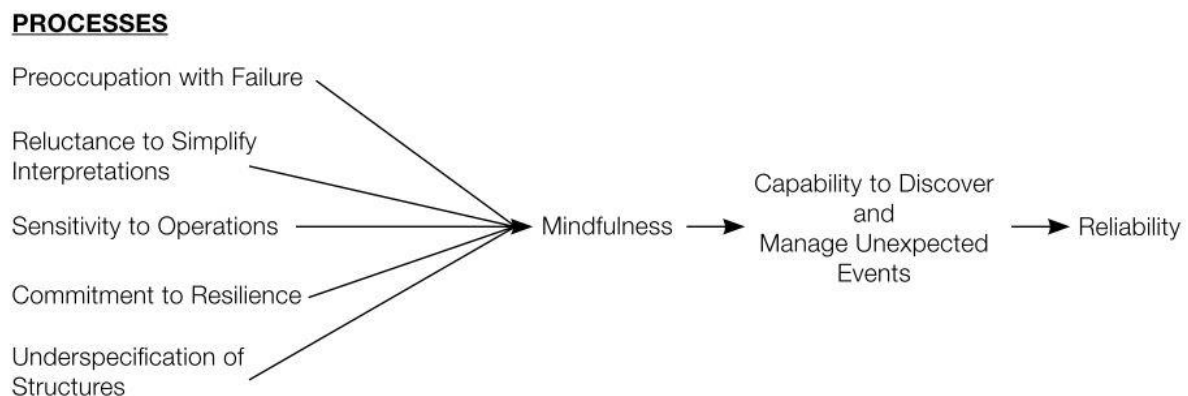
Figure 2.1 – A mindful infrastructure for high reliability taken from Weick et al. (1999)

The first process is 'pre-occupation with failure' which has been described as *"an ongoing caution that drives proactive and pre-emptive analysis of possible vulnerabilities and treats any failure or near-miss as an indicator of potentially larger problems"* (Sutcliffe, 2011, p. 139). HROs are driven by the failure yet to happen and do not become complacent based on past success (Boin & Schulman, 2008). HROs then place a premium on detecting and investigating weak signals until they are proved to be benign or confirmed to be indicators of issues requiring intervention (Hopkins, 2007). This leads to a climate of openness where all staff are encouraged to report concerns and managers are encouraged to make the most of anything that is reported (Rochlin, 1993). There have been high profiles cases for

non-HROs where concerns raised by technical experts were not listened to and this had led to failure – see for example the Space Shuttle Columbia disaster (Vaughan, 2006). HROs push for continuous improvement and fear that if there is no continuous improvement then what has been gained might quickly erode (Schulman, 2004).

The second process is 'reluctance to simplify interpretations' which involves actively seeking divergent viewpoints that question received wisdom, uncover blindspots and detect changes via a regime with sufficient 'conceptual slack' to accommodate multiple worldviews (Schulman, 1993). HROs place a premium on working with divergent perspectives as part of explicit 'sensemaking' processes (Weick, 1995) to understand what it is that they do not know and actively maintain sufficient 'organisational slack' necessary to make time for sensemaking activities (Lawson, 2001). HROs recognise that complex systems have more variety than a single person can comprehend and so deploy teams and networks of divergent individuals to match this variety (Perin, 1995; Weick, 1987) – typically staff are employed to collect and analyse relevant information.

The third process is 'sensitivity to operations' which involves creating and maintaining an integrating 'big picture' of the current situation in the moment through close attention to real time information. HROs are more tactical than strategic and operate in the here and now. This dimension is also referred to as 'having the bubble' (Roberts & Rousseau, 1989) which is a phrase used in the US Navy to refer to the ability of operators to *"construct and maintain a cognitive map that allows them to integrate … diverse inputs … into a single picture of the ship's overall situation and operational status"* (Rochlin, 1997, p. 109). It goes deeper than situational awareness to also include the determination of a coherent explanation and its monitoring (and revision) over time (Roth, 1997). In this way, HROs forestall catastrophic failures by making large numbers of ongoing small adjustments that prevent errors from accumulating (Wildavsky, 1991, p. 26).

The fourth process is 'commitment to resilience' which is distinct from the previous process in that it relates to the responses to issues as opposed to the prevention of issues. HROs expect that errors will occur and prepare to respond – the signature of HROs is not that they are error free but that errors do not disable them (Weick & Sutcliffe, 2001, p. 14) – in addition to taking steps to anticipate and forestall errors (first, second and third processes). HROs then develop response capabilities for error

containment and for error prevention (Weick et al., 1999, p. 47). In so doing, HROs are able to simultaneously both to believe and to doubt their past experience. This has been identified as being important for adaptive action (Ryle, 1976).

The fifth processes is 'under-specification of structures' which relates to the way in which decision making is shifted to experts when problems materialise, allow decision-making to migrate in tandem with problems (Weick et al., 1999, p. 49). HROs value contributions from technical experts not in management roles and flex their structures when needed by *"loosening hierarchy in favour of expertise"* (ibid, p.49). In contrast to hierarchical organisations where the structure remains constant whilst the activity of structuring is a variable, in HROs the structure is a variable whilst the activity of structuring is a constant (ibid).

It has been observed that the key challenge for mindful organising is *"sustaining the high level of discretionary effort and attentiveness that it demands"* (Levinthal & Rerup, 2006). Whilst the application of mindful organising principles has been argued to be relevant to organizations of all kinds (Vogus & Welbourne, 2003) it has been acknowledged that this is difficult in organisations where reliability is but one of many, often contradictory, goals that must be served (Wilson, 1989). Others have observed that *"HROs typically exist in closely regulated environments that force them to take reliability seriously but also shield them from the full exposure to the market and others forms of environmental competition"* (Boin & Schulman, 2008, p. 1053) and this brings into question the generalisability of the HRO concept.

There have however been several attempts to transfer at least some of the HRO principles to other contexts, most prominently in the healthcare sector (Lekka, 2011). In particular, it has been argued that HRO principles relating to redundancy, incident reporting and learning from accidents can be usefully transferred to healthcare. In support of this argument, a study found that the implementation of HRO processes in a paediatric intensive care unit resulted in reduced response times, increased quality of care and reduced mortality rates (Madsen, Desai, Roberts, & Wong, 2006). Another study established that the HRO-like principles of learning and trusting other roles, sharing responsibility, ensuring team awareness, and being adaptive were important to the success of trauma teams (Xiao & Moss, 2001). It should be noted however that the healthcare context is not so very far removed from the context which

gave rise to the HRO concept – severe consequences (if not catastrophic ones) associated with failure, close social and political scrutiny and very limited appetite to learn from errors. It has been suggested that the HRO cannot readily be transferred beyond non-profit organisations where there is less incentive to trade reliability for efficiency (Marais, Dulac, & Leveson, 2004; Tamuz & Harrison, 2006).

Another criticism that has hampered the broad implementation of the HRO concept is the lack of an underpinning theory to guide actions that will bring about the HRO processes. The vast majority of HRO research is descriptive and not evaluative. There is much published in terms of rich descriptions but little theorising with regard to cause and effect and so it is not clear how to realise HRO characteristics. There is some evidence from social science research that indicates teamwork (Baker, Day, & Salas, 2006); organising practices that emphasise respectful interaction and heedful interrelating (Sutcliffe, 2011); and emotional ambivalence and prosocial motivation that induce broad thinking and other-orientation (Vogus, Rothman, Sutcliffe, & Weick, 2014) are all necessary but likely insufficient.

It has been observed that organisational health monitoring has the potential to ensure *"a) proper function, b) quick response to internal or external loads (i.e. conditions that put stress in the organisation), and c) success in achieving the required performance levels"*(Xenidis & Theocharous, 2014). It is postulated here therefore that building and maintaining models of organisational health can increase the degree of mindfulness and so bring the associated benefits outlined above. At the minimum, it is postulated that organisational health models can help with strengthening preoccupation with failure by surfacing weak signals, avoiding simplified interpretations going beyond performance to look deeper and heightening the sensitivity to operations by providing insights on the cause of performance symptoms. Going further, it is postulated that organisational health models can also aid organisations to take action in anticipation of issues that have yet to (fully or partly) manifest themselves in operational performance terms. In the next section, I review the theory of anticipation as put forward by Robert Rosen who identified that the ability to maintain internal models lies at the heart of Anticipatory Systems.

2.3   Reviewing how anticipatory systems use models to take pre-emptive action

Robert Rosen (1934-98) was a theoretical biologist whose research was focused on how function rather than structure provides the basis for life – *"The physical structures of organisms play only a minor role … the only requirement … is to allow characteristic behaviours themselves to be manifested"* (R. Rosen, 2012, p. 3). He published some 250 papers and a dozen books over the course of his career – see (Mikulecky, 2001) for a helpful bibliography – largely going against the grain of the scientific establishment. Rosen theorised that complex systems – including but not limited to living systems – process contextual information via an internal model to anticipate the need for change and so effect an anticipatory mode of control (R. Rosen, 1985) and that this is the essence of life itself (R. Rosen, 1991) that differentiates living systems from machines. In his own words, an anticipatory system is *"a system containing a predictive model of itself and/or of its environment, which allows it to change state at an instant in accord with the model's predictions pertaining to a later instant"* (R. Rosen, 2012, p. 313)

Whilst the concept of anticipation was not new, Rosen's contribution was the systemic study of anticipation that led to the development of an underpinning theory than spans multiple domains including psychology, futures studies, artificial intelligence, engineering and semiotics (Poli, 2010b). This contribution was controversial at the time it was first published because it seemed to run contrary to the existing universal Newtonian or reactive paradigm that continues to dominate science and in particular to violate the principle of causality – a system can only react in the present to changes that have already occurred in the causal chain. However, the anticipatory paradigm is now seen as an extension to the reactive paradigm (as opposed to a competitor) in that a system can react in the present to changes that have occurred in the past, changes that are occurring in the present and changes that are anticipated to occur in the future.

As others have since noted *"the essential difference between reactive and anticipatory systems is that reactive control depends on the correction of an existing deviation, while anticipatory control depends on preventions of predicted deviation"* (Minch, 1986, p. 405). Reactive systems operate based on feedback, whereas Anticipatory systems operate based on feedforward. Feedback control is actuated by the discrepancy between a system's present state and the desired state. Feedforward control is

actuated by the discrepancy between anticipated future state (as determined by consideration of how current input relate to future outcomes) and the desired endstate. In this way, anticipatory systems can be seen to be goal seeking or teleological (Louie, 2010).

Anticipation is of course common in human decision making where courses of action in the present are typically evaluated using an assessment of what will result from each. Tools that support such anticipatory decision making include forecasting (where it is assumed that future is at least partly governed by the past) and scenario planning (where it is assumed that the future can be better confronted by considering multiple futures) (Poli, 2010a). However such behaviour is not limited to intelligent lifeforms, it is also common in biological systems at much lower levels of biological organisation too. One example is how deciduous trees drop their leaves, shut down photosynthesis and withdraw their sap into their roots in the autumn in advance of the freezing temperatures of winter (J. Rosen & Kineman, 2005). This adaptation to the onset of winter is cued by length of day (which is physiologically neutral) as a predictor of temperature (which is physiologically significant). Another example is how negatively phototropic organisms move away from the light (not in itself physiologically significant) as a predictor of better living conditions in terms of moisture and reduced levels of predation (which is again physiologically significant) (Louie, 2010).

In each of the natural system examples described above, predictive models – be they explicit (and so used consciously) or implicit (and so used sub-consciously) (Poli, 2010b) – are being used as a technology to support decision making in the present with regard to achieving outcomes in the future. It has been said that predictive models serve to *"pull the future into the present" (Louie, 2010, p. 20)* but that the predictive model in an anticipatory systems *"must not be equivocated to any kind of certainty (even probabilistically) about the future"* (Louie, 2010, p. 20). Note that prediction and anticipation are not interchangeable – predictions are expressions of probabilities and anticipation, whilst not unrelated to probabilities deal more with possibilities (see Nadin in the prolegomena to R. Rosen (2012)). Put another way, nothing is predictable unless it can be anticipated and not everything anticipatable is predictable.

The modelling relation between the system of interest (natural system) and the model thereof (formal system) lies at the heart of Rosen's theorising about anticipatory systems (see Figure 2.2 below

taken from R. Rosen (2012, p. 72)). Anticipatory systems seek to encode natural systems into formal ones via observation and measurement such that study of the formal system can yield insights that can be used to effect desired change in the natural system. If successful, the inferences or theorems elicited within the formal system become predictions about the natural system that are verified when appropriately decoded into the natural system. The formal system can then be said to be a model of the natural system. Rosen identifies three different types of prediction (R. Rosen, 2012, pp. 73-74). First there are predictions that are time-independent which typically address the identity of the natural system and so cannot change over time. Second, there are predictions that relate different system qualities at the same time which typically address how the natural system is linked together. Third, there are predictions that relate system qualities at different times which typically address how the natural system responds dynamically.
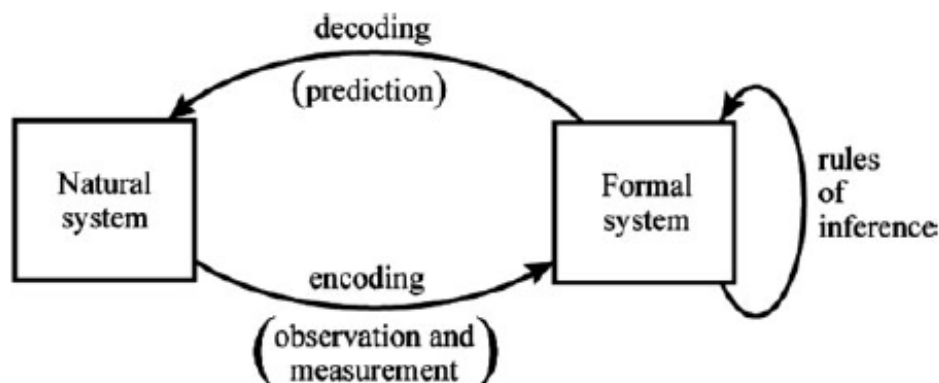
Figure 2.2 – Modelling relation for anticipatory systems taken from R. Rosen (2012, p. 72)

Rosen described how anticipatory behaviour will be generated in any system (S) that: (i) contains an internal predictive model of itself and/or its environment (M) and (ii) uses the predictions from this model to guide the actions of effectors (E) that act either on the system itself or on the environmental input to S. This description is shown diagrammatically below in Figure 2.3 (Louie, 2010). The use of these effectors depends on the predictions made by M with regard to S – where these predictions have S continuing in a desirable region then no action is taken, but where these predictions have S entering an undesirable region the effectors are programmed take action so as to preclude this. It is clear then that M has to run faster than real time if it is to influence S in anticipatory fashion.
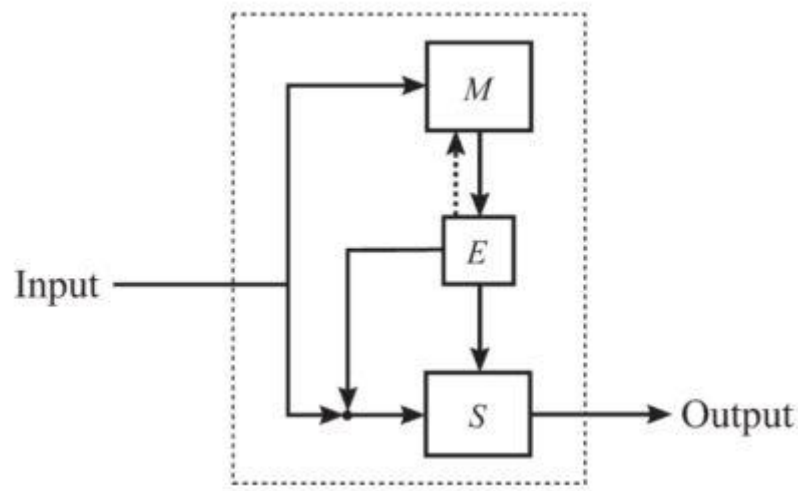
Figure 2.3 – Design for an anticipatory system as adapted from R. Rosen (2012, p. 13)

Rosen identifies six key considerations in the design of anticipatory systems: (1) Choice of Model M; (2) Selection of the Effector System E; (3) Design of Effector System E; (4) Programing of Effector System E; (5) Identification of Desirable and Undesirable regions; and (6) Updating the states of M (based on the effects activated – dotted arrow in Figure 2.3) (R. Rosen, 2012, pp. 13-14). But it is important to recognise that even with good design, anticipation can fail in its purpose. The causes of errors in anticipation have been categorised as being due to bad models (where the prediction does not match reality), bad effectors (where the means to take action do not achieve the action intended) and side effects (where unintended consequences result) (Louie, 2010). Whilst this last categorisation might have been better conceived as a subset of bad models (where in the effect of the effectors was not completely understood) or perhaps bad effectors (where the effectors themselves were not fully understood), either way these fallibilities can have serious consequences. These fallibilities are the are made more acute when changes in environment are unexpected – i.e. plants that are not yet ready for winter can be damaged or killed by an cold snap that occurs out of step with shortening daylight hours (J. Rosen & Kineman, 2005).

As introduced earlier, it is postulated here that the choice of model for sustaining high levels of organisational performance should be that of organisational health. In the next section I introduce the concept, discuss how others have conceptualised organisational health, develop my own

conceptualisation and review how others have developed a variety of approaches to organisational health assessment.

2.4 Developing the concept of organisational health

Organisational Health is a trending area of interest in management. A focused literature search in 2016 via the Web of Science searching for "Organi* Health" in the title returned 95 articles relevant to Organisational Health dating back to 1958, with 56 of these being published in the last 10 years (see Figure 2.4). The theories and other ideas put forward in these papers have been developed and tested in a wide variety of settings including healthcare (Khammarnia, Baghbanian, Mohammadi, Barati, & Safaris, 2013; Orvik & Axelsson, 2012), welfare services (Potter, Leake, Longworth-Reed, Altschul, & Rienks, 2016), local government (McHugh, 2001), service industry (Garda & Karacor, 2015), construction industry (Xenidis & Theocharous, 2014) and manufacturing industry (Shoaf, Genaidy, Karwowski, & Huang, 2004), but the vast majority of the publications have been based in the education setting. In fact the top three publications in terms of citation count (Bradshaw, Koth, Bevans, Ialongo, & Leaf, 2008; Hoy & Hannum, 1997; Hoy & Woolfolk, 1993) all come from this domain of study and make up one third of the total citations recorded.
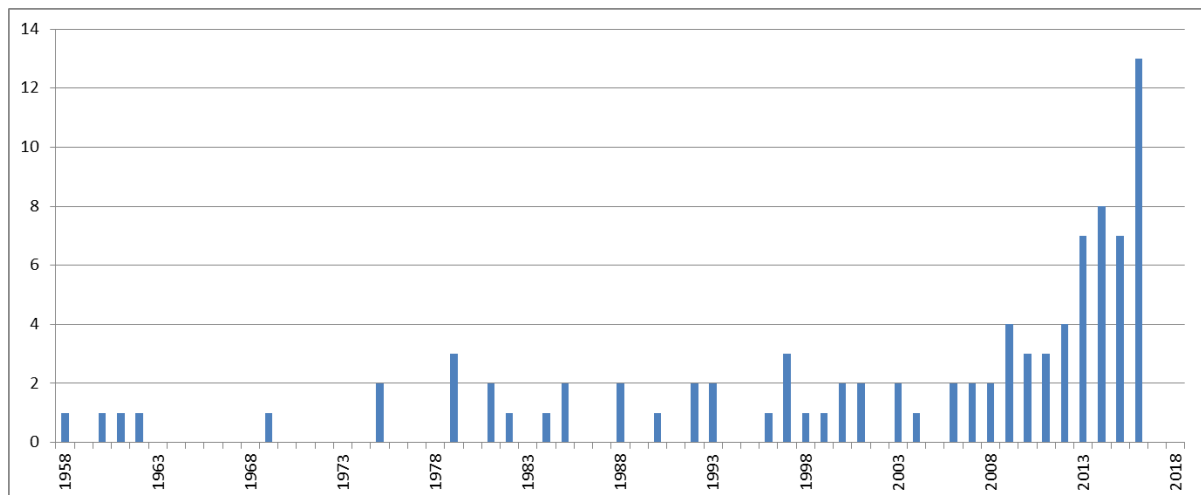
Figure 2.4 – Publication frequency with relevance to Organisational Health (1958 – 2016)

The first publication relating to organisational health (Argyris, 1958) highlighted the potential for false positives when assessing the health of organisations through the use of indexes such as absenteeism, staff turnover and grievance rates and argued that *"for a thorough diagnosis we must*

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therefore take a look inside" (p. 109) and highlighted that *"organizational health turns out to be a very complex idea"* (p. 115). The paper concludes that for long term success it is necessary for management and employees to go beyond operating on the quid pro quo basis of money, job security and benefits because such an operating basis will *"produce and reward apathy, indifference, alienation and non-involvement"* (p. 116) that will in turn cause management to suffer (because few employees will want to promote themselves into positions of responsibility), employees to suffer (because personal growth will be stifled) and the organisation itself will eventually suffer (because alienated, apathetic participants will tend to make it rigid, defensive and resistant to change).

The second publication relating to organisational health (Humber, 1960) identifies six major factors as affecting organisational health based both upon the symbiotic needs of individuals functioning in organisational structures and of organisations themselves, or as the author neatly puts this viewpoint – *"People need organisations, and organisations need people"* (p. 264). These major factors comprise: Clearly defined goals; Clarity of communication with regard to the goals to be achieved; Willingness of executive management to assume the prerogatives of management (and so vigorously pursue the goals); Leadership that is strong in character (so that it sets the right tone); Aligned interests between formal and informal groups within the organisation; and Capacity for anticipating future growth and working for its early realization. This key concept of symbiosis between employees and organisations was later restated as 'reciprocal maintenance' and explained to mean that "*neither partner seeks to take advantage of the other: the organizations are designed to enable the growth and development of their members or workers (in the broadest sense, including managers) and the individuals do their best to enhance the organization's long-term viability*" (Schuyler, 2004, p. 57).

The inter-relationship between individual well-being and the work environment has been a major area of research in the field of occupational stress that originated from these beginnings but, as has since been noted by one of the leading researchers in this area, organizational health encompasses *"more than the sum total of the states of health of its employees"* and that in this sense it has a Gestalt quality (Cox, 1988). This position was supported through the promotion of a heuristic model of organisational health originally put forward by (Hart & Cooper, 2001) and reproduced below in Figure 2.5. It depicts how employee well-being is influenced by both individual characteristics and organisational characteristics;

how all of these impact (and are themselves impacted by) organisational performance, and how health is impacted by external influences such as government, clients/customers, shareholders and communities. Linking employee wellbeing and organisational performance in this way recognises the practical reality that *"having happy and satisfied staff is of little value to an organisation unless staff are also performing efficiently and productively"* and likewise *"having an efficient and productive organisation is of little value if this is achieved at the expense of staff wellbeing"* (Cotton & Hart, 2003, p. 119).
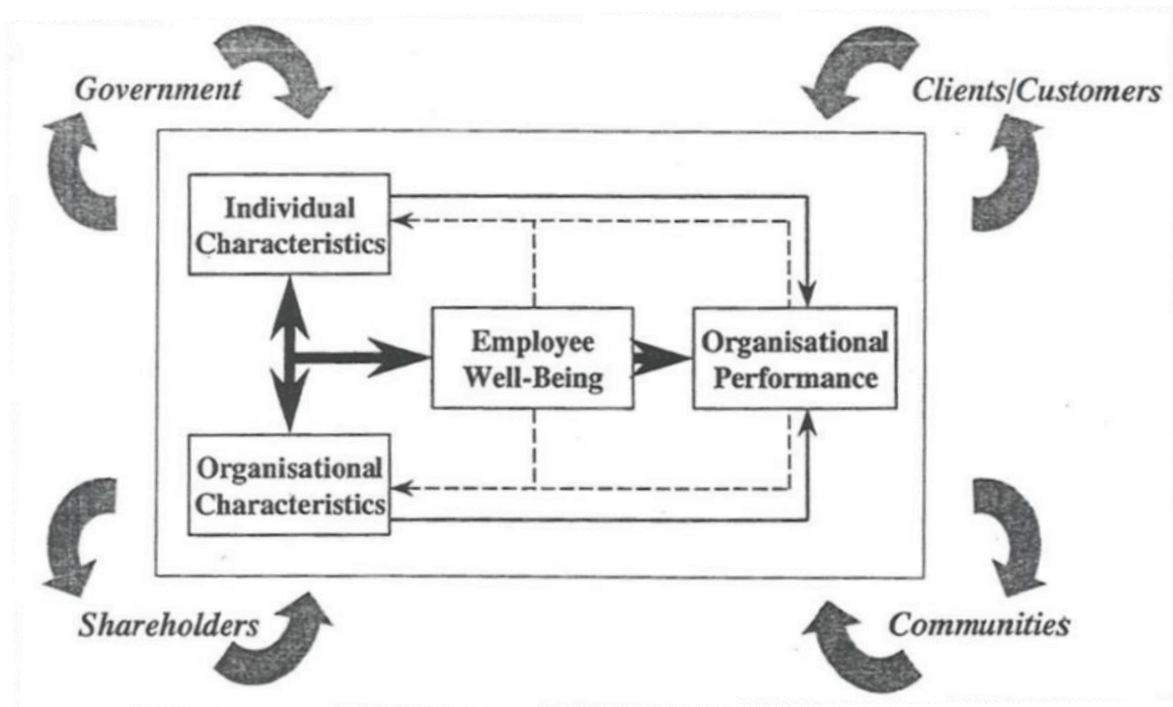
Figure 2.5 – A heuristic model of organisational health taken from Cotton and Hart (2003)

This model points towards the ability of an organization to effectively balance employee wellbeing and organisational performance as being central to the definition of organizational health. This is supported by other researchers who argue that *"organizational health is defined in terms of how an organization is able to deal with the tensions of diverse and competing values"* (Orvik & Axelsson, 2012, p. 1) that requires a hybrid form of management (Gillies & Greenwood, 1997) that simultaneously considers the needs of the organisation, the needs of the employees and the needs of customers.

This is supported by others who similarly view organizational health as the ability to balance worker well-being and effective business processes in order to ensure long-term profitability (Shoaf et al., 2004). These researchers seek to broaden the focus from the Individual to also include the Job, Process and Organization and so define four orientations of organisational health that must each be addressed in order to ensure both high levels of work performance and quality of work life (see Figure 2.6 below). The most obvious effect of this broadening is to open up the potential for interventions beyond individual coping strategies to also include job design, process design and ultimately organisational design, and so move organisational health into the mainstream of management science.
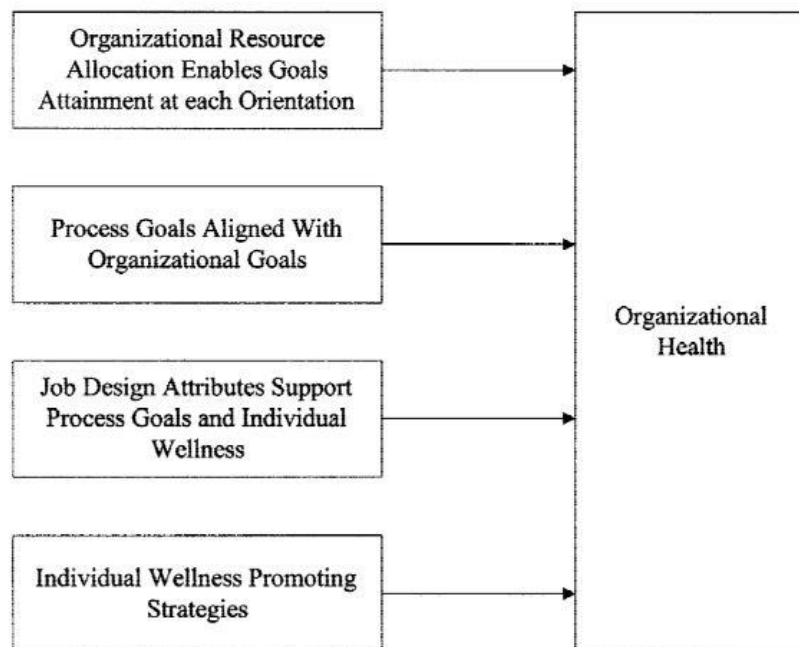
Figure 2.6 – Organizational health across four orientations taken from Shoaf et al. (2004)

Recent publications in the mainstream business management literature have sought to introduce organisational health as a complement to organisational performance in order to make for a more comprehensive evidence base upon which to guide intervention. For example, the Performance Driver Model (reproduced in Figure 2.9 far below) was proposed as a means for an organisation to undertake a 'healthcheck' and so *"more effectively address the causes rather than the effects, be in a position to prioritise actions where they can best leverage performance, take preventative actions ahead of major problems and use the information to inform stakeholders"* (Saunders & Barker, 2001) (p. 175). Separately, the Organizational Health Index (reproduced in Figure 2.10 far below) was developed based

upon empirical evidence gathered by McKinsey consultants to guide their clients with regard to *"investments in the organisation that need to be made today in order to survive and thrive tomorrow"* (Keller & Price, 2010) (p.5). It is interesting to note that, in a departure from the literature described above, the latter researchers conceptualise organisational health as being orthogonal to organisational performance – *"Performance is about delivering (financial) results in the here and now. Health is about the ability to do it year in, year out"* (Keller & Price, 2010) – but recognise that managing both holds the key to sustainable excellence as a healthy organisation.

Building on this (and all of the other literature introduce above) I present my conceptualisation for organisational health in Figure 2.7 below, for which organisational health is defined as the degree to which an organisation is 'Healthy' (an organisation that is both performing well in the here and now and that has the potential to adapt for performance in the future) and is neither 'Fragile' (an organisation that is optimised for performance in the here and now but either cannot adapt for sustained performance into the future or is vulnerable to change), nor 'Latent' (an organisation that has the potential to adapt for the future but that is struggling to perform in the here and now) nor 'Broken' (an organisation that is neither performing in the current environment nor able to adapt for the future). Note that in this conceptualisation it is not possible to be healthy without performing.
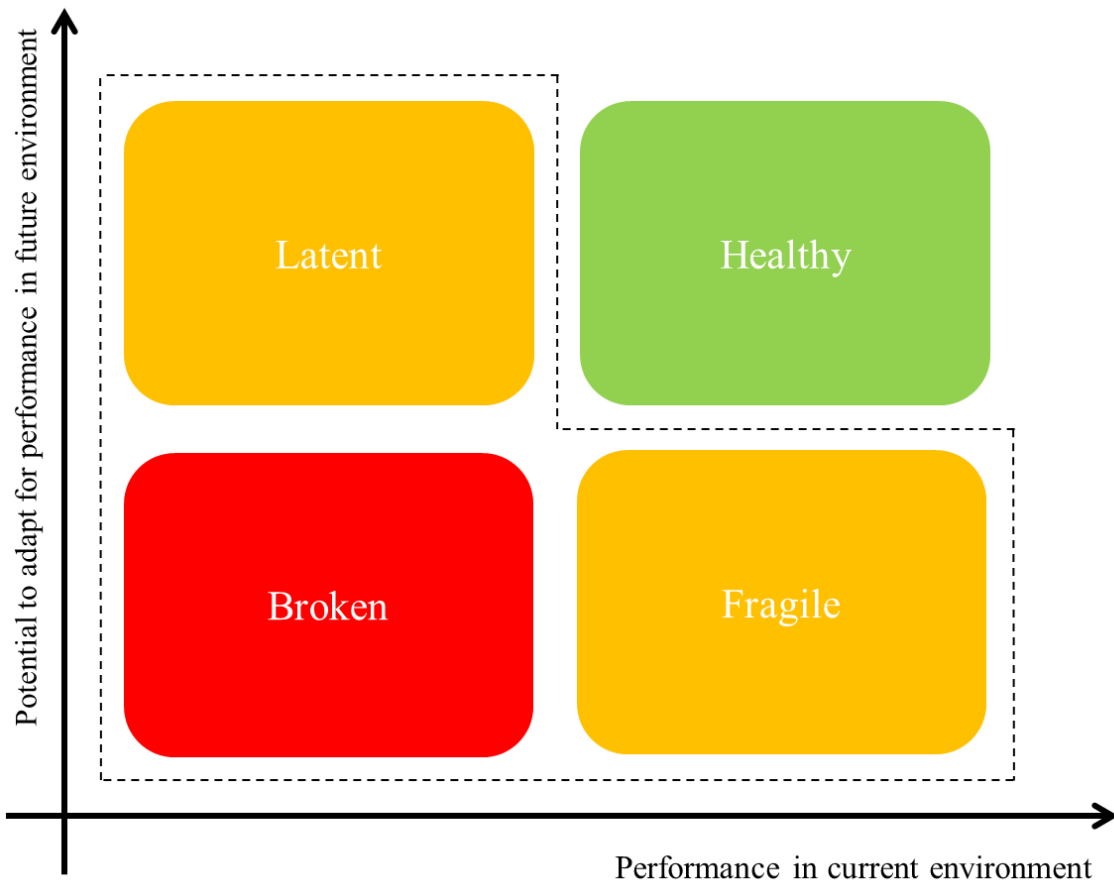
Figure 2.7 – My conceptualisation of a healthy organisation

The difficulty, as these other researchers have highlighted, is that the potential of an organisation to adapt for performance in future environments can only be measured *a priori* as opposed to performance in the current environment that is measured *a postiori*. (Xenidis & Theocharous, 2014). This difficulty is compounded by the fact that realised performance is directly observable at the surface of operations, whereas potential performance lies deeper within organisations and is only indirectly observable. Thus whilst it is straightforward to discriminate between high and low performing organisations using metrics linked to the organisations goals, it is not clear how to discriminate between 'Healthy' and 'Fragile' organisations (assessments based on performance only would yield a false positive that would lead to at best to an under-reaction or at worst no action at all) or how to discriminate between 'Latent' and 'Broken' (assessments based on performance only would yield a false negative that would lead to an overreaction that at best would be ineffective because it is targeted in the wrong area – i.e. inside not outside the organisation – or at worst would represent backward steps).

For these reasons, and because it turns out that the organisational factors that enable performance in the current environment and the potential performance in the future largely –- but not completely – overlap, researchers have focused on what it takes for an organisation to be healthy –i.e. to lie within the top right quadrant of Figure 2.4 and outside the dotted region (that comprises Fragile, Latent and Broken). There have been a number of efforts to identify the factors that bring about healthy organisations and how these can be incorporated within assessment schemes to measure organisational health. Whilst many are relevant only to specific organisational setting – e.g. for education see Lynden and Klingle (2000) and Miskel and Hoy (2001) and for child welfare see Potter et al. (2016) – three approaches to measuring organisational health that appear to be widely applicable are described below in the chronological order that they were developed.

The Organizational Assessment Framework developed by the International Development Research Centre recognises a good organisation to be one that *"balances effectiveness, efficiency and relevance while being financially viable"* (Lusthaus et al., 2002, p. 11) and posits that this is a function of its enabling Organizational Motivation, Organizational Capacity and Environment. Setting aside Environment (external to the organisation) leaves Organizational Capacity (defined as the ability of an organization to use its resources to perform) and Organizational Motivation (defined as the underlying personality of the organisation that drives it to perform) as the principle elements that drive a healthy organisation. Each of these elements is broken down into sub-elements that form the basis for assessment– see Figure 2.8. Whilst no specific methodology is recommended for implementing this framework (it is expected that this will be specific to the particular context), a strong preference is expressed for it to be used as an aid to self-assessment in support of learning as opposed to an aid for external evaluation in support of auditing.
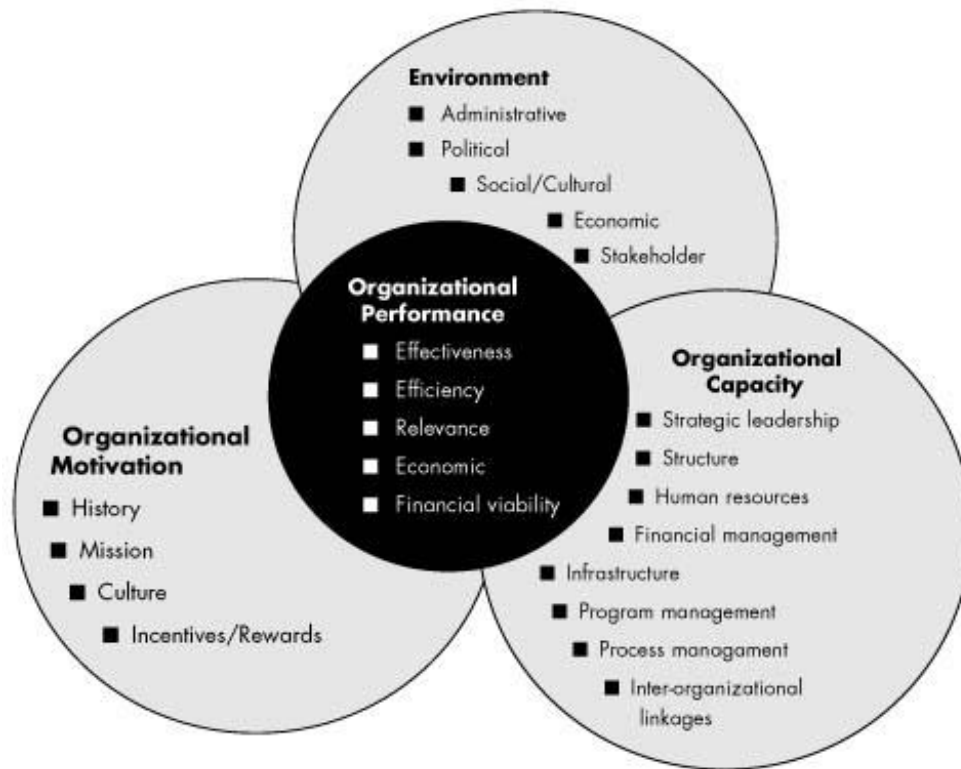
Figure 2.8 – Organizational Assessment Framework taken from Lusthaus et al. (2002)

The Performance Driver Model (Saunders & Barker, 2001) comprises four elements – Strategy, People, Enablers and Leadership, each of which is supported by a number of open questions designed to engender reflection – See Figure 2.9. It was conceived as a means to conduct regular *"structured and systematic analysis about the whole of an organisation and its interdependencies"* (*ibid*, p. 174) that would serve to avert organisational crises. These authors note that a vital part of applying the model, as for any model, is how well it engages the people within an organisation and that whilst supporting data can be gathered through surveys or through interviews, experience shows that gathering a wide cross section of employees together to challenge each other works best.
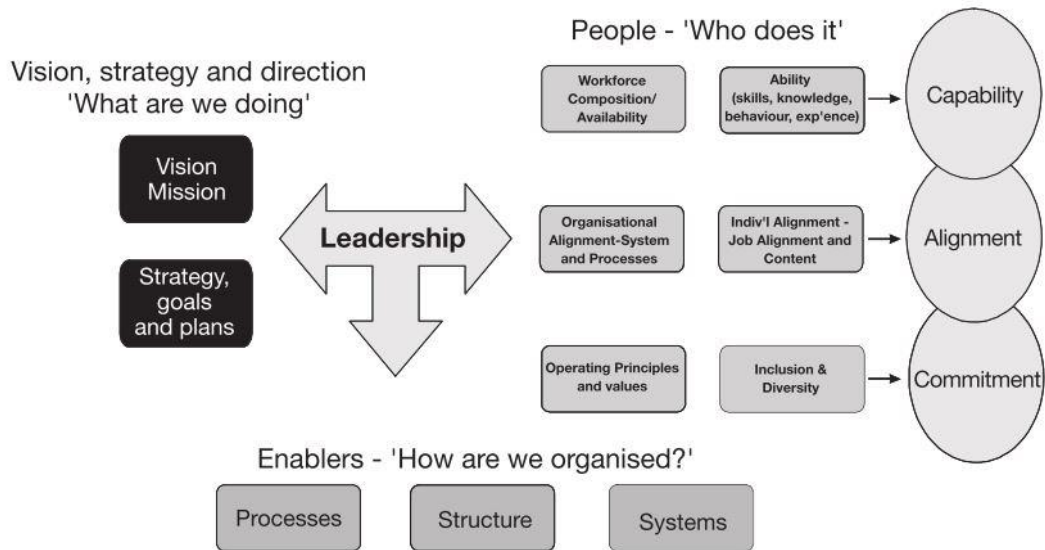
Figure 2.9 – Performance Driver Model taken from Saunders and Barker (2001)

McKinsey's Organisational Health Index (Keller & Price, 2010) comprises 3 key attributes of organizational health—internal alignment, quality of execution, and capacity for renewal—that link to 9 supporting elements (see Figure 2.10). In turn, these 9 elements are underpinned by 37 management practices that are observable and that have been shown to correlate with enduring performance. For example, one of the practices that underpins 'Direction' is 'Articulating a clear direction and strategy for winning, and translating it into specific goals and targets'. McKinsey's recommend that *"the best way for any organization to do a health check is to use the OHI with a large group of employees from all areas and levels, and then augment the findings with fact-based analyses to confirm that perceptions are rooted in reality"* (Keller & Price, 2011) with access to employees typically achieved via survey.
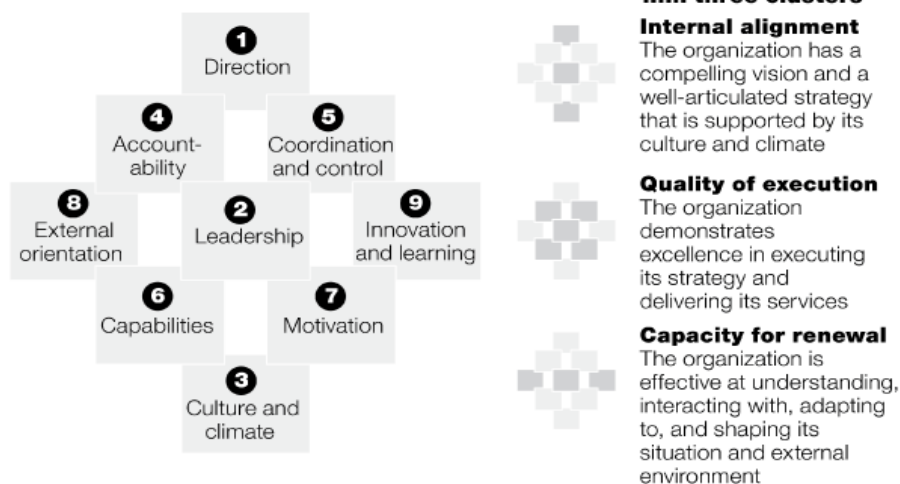
Figure 2.10 – Organisational Health Index taken from Keller and Price (2010)

Each of the three approaches described above were developed from empirical evidence generated through consulting practice. Whilst there is much alignment in thinking across these approaches (which gives some confidence), there is also variation (which suggests that there is more to be done). Further, whilst these approaches were developed using correlations – either formally based on mathematical analysis (as for the Organizational Health Index) or informally based on practitioner reflection (as for Organisational Assessment Framework and Performance Driver Model) – and that the factors highlighted each seem plausible, correlation does not suffice for causation. At best these approaches provide useful basis for stimulating helpful intra-organisational discussions but at worst they misdirect valuable organisation slack onto issues that are not the most important. In the next section I consider the contribution that system methodologies – extensively supported by theory – can make to the assessment of organisational health

2.5 Identifying the potential contribution from system methodologies

System methodologies are often categorised as either: hard, soft or critical and their respective development is often attributed to three separate waves of endeavour (Midgley, 2000, pp. 187-214) that span a number of disciplines. All three have relevance to the assessment of organisational health (as discussed below).

2.5.1 Hard Systems

The first wave of development brought hard system methodologies that are well suited to situations where the aim is to decide between alternative means to achieve a known end. The most prominent examples of hard methodologies are: Systems Dynamics (Forrester, 1961), Systems Engineering (A. Hall, 1962; Jenkins, 1969), Linear Programming (Dantzig, 1963), Systems Analysis (Quade & Boucher, 1968) and Viable System Modelling (Beer, 1979, 1981, 1985). These methodologies are well-suited to designing physical systems (e.g. linear programming for optimising supply chains) but can also be used to study natural systems (e.g. system dynamics for ecological balance) and to guide intervention in human activity systems (e.g. VSM for organisational re-alignment).

It is this latter application of the Viable System Model that is of most relevance to assessing organisational health – as has been recognised by other researchers (Hasani, Sheikhesmaeili, & Aeini, 2015). This is because it relates to the design and operations of organizations that persist over time through balancing performance in the here and now and adapting for the future. Stafford Beer developed the VSM (Beer, 1979, 1981, 1984) by applying cybernetic theory (regarding the flow and use of information for regulation and control) to the management of organisations. He established that the viability of an organisation to exist in its environment is dependent on the capacity of, and effective links between, five key system elements that Beer labelled S1-S5 and that have been referred to as – Policy (S5), Adaptation (S4), Control (S3 including Audit S3*), Coordination (S2) and Operations (S1) (Espinosa & Walker, 2017). These 'invariances' provide a functional framework for the design of a new system and/or the assessment of an existing system. It can be applied recursively to model organisational scale and complexity –see Figure 2.11.
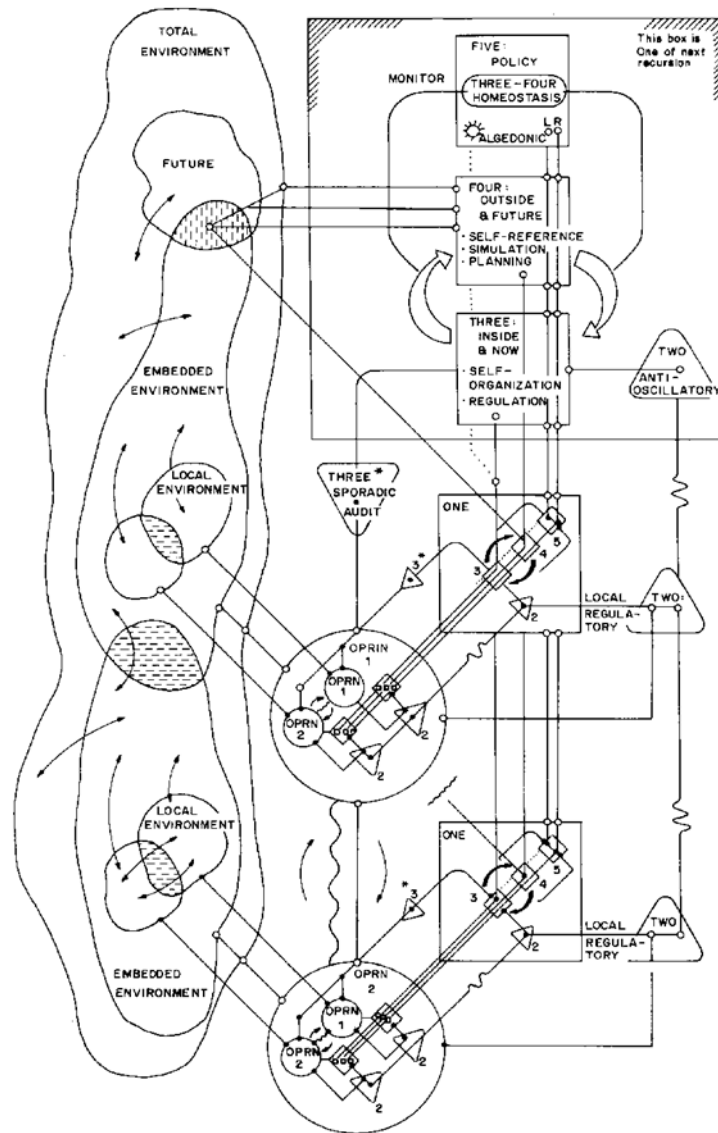
Figure 2.11 – The Viable System Model taken from (Beer, 1984)

The System 1 elements are where the value is generated for the organisation. They are viable systems in themselves, in that they have a certain autonomy to develop their tasks whilst responding to control from S3 (to act in accordance with organisational direction) and coordination from S2 (to ensure effective interaction with other parts of the organisation). Systems 2 to 5 are collectively referred to as the meta-systemic management and provide all the necessary mechanisms to assure system viability. In addition to control (S3) and coordination (S2) as explained above, these include: audit (S3*), adaptation (S4) and policy (S5). Audit (S3*) is where direct access to organisational data complement that which is self-reported by the S1 elements. Adaptation (S4) is where information from both inside (up from S3) and outside (from the environment) is processed and recommendations for change either

passed down to S3 for implementation (where the implications are for tactical change only) or passed up to S5 (where the implications are more strategic). Policy (S5) is where direction is set for the organisation as a whole based on the information passed up from S4 and the information passed down from the wider systems of which the system-in-focus is but one part.

The VSM has been found by others to be *"a model of the necessary and sufficient conditions for the viability of systems"* (Reynolds & Holwell, 2010, p. 19) that *"offers an insightful framework for thinking differently about organizations"* (Brocklesby & Cummings, 1996, p. 49). It is now a very well-established model that continues to be used to support the review of existing organisations and/or the design of new organisations in domains as diverse as disaster response (Preece, Shaw, & Hayashi, 2013), sustainable development (Espinosa & Walker, 2013), combatting transnational organised crime (Brocklesby, 2012), supply chains (Hildbrand & Bodhanya, 2014), local food networks (Tavella & Papadopoulos, 2015) and management of large multi-national corporations (Espinosa, Reficco, Martínez, & Guzmán, 2015).

Common system pathologies – that cause systems to fail – that are frequently highlighted by VSM analyses include: (1) the absence or weakness in key elements (most frequently S2 and/or S4); (2) the existence of superfluous elements that are at best irrelevant and at worst hamper efficient operation of the organisation and so threaten its viability; (3) the failure to recognise key elements as S1s and so not manage them appropriately to produce value; (4) the meta-systemic management prioritising their own continued existence over providing essential functions that enable the S1 elements to perform (and so ensure the continued existence of the whole); (5) the inability of S5 to represent the system to the wider system of which it is part; (6) the communication channels between elements and with the environment being insufficient to support effective communication (Jackson & Gregory, 2008).

However, the VSM has been critiqued for being inaccessible with highly technical visual representations and difficult language creating substantial cognitive barriers (Checkland, 1980; Jackson, 1988; Ulrich, 1981). VSM practitioners have often opted for adaptation – or at least alternative representation – of VSM concepts in order to apply the theory in real-life situations. The VSM has also been critiqued for restricting focus to how the necessary functions are carried out and underplaying

cultural, political and coercive aspects (Jackson & Gregory, 2008). This is most often associated with when the application of VSM is carried out in a functionalist sense under a hard systems paradigm (where a VSM practitioner brings specialist expertise to bear in comparing 'as is' or 'to be' organisational models against the VSM 'blueprint') – see for example Viable Systems Diagnosis (Flood & Jackson, 1991) and 'Systemic Management Control' (Schwaninger, 2006). However, the VSM can also be applied in an interpretivist sense under a soft systems paradigm (where a VSM practitioner facilitates dialogue between key stakeholders structured using the VSM) – see for example the Viplan method (Espejo & Reyes, 2011) and its use as a hermeneutical with a self-organising group who used VSM to self-diagnose their organisational (dis)function with support from expert researchers (Espinosa & Walker, 2013).

2.5.2 Soft Systems

The inability of hard system models to adequately address what have variously been referred to as messy, wicked, swampy problems – respectively (Ackoff, 1977; Rittel & Webber, 1973; Schön, 1987) – brought forth the second wave of system methodologies. In his critique of what he referred to as 'Machine Age' methodologies, Ackoff asserted that *"Messes require holistic treatment. They cannot be treated effectively by decomposing them analytically into separate problems to which optimal solutions are sought"* (Ackoff, 1979, p. 103) and that new methodologies instead should support planning and design in a process of continuous learning. The most prominent examples of this new type of 'soft' methodology that emerged in the 1970s and 1980s (in addition to Russ Ackoff's own Interactive Planning (Ackoff, 1974)) are Peter Checkland's Soft Systems Methodology (SSM) (Checkland, 1981), John Friend's Strategic Choice Approach (SCA) (Friend & Hickling, 1987) and Colin Eden's Strategic Options Development and Analysis (SODA) (Eden, Jones, & Sims, 1983). Each is described in turn below.

SSM was developed by Peter Checkland working in collaboration with various colleagues at Lancaster University (Checkland, 2010). It is *"an action orientated process of inquiry into problematic situations in which users learn their way from finding out about the situation to taking action to support it"* (Checkland & Poulter, 2010, p. 191) that is conducted in a number of stages. SSM begins with activities designed to understand the situation – as opposed to a specific problem – and typically

involves reflecting upon a 'rich picture' produced either by stakeholders themselves or by a facilitator working with the stakeholders. It then considers what is desired through the development of one or more root definitions that comprehensively describe a desired transformation using the CATWOE mnemonic – Customers, Actors, Transformation, Weltanschauung (or Worldview), Owners and Environment. These root definitions are then converted into activity models that describe the human activity system necessary for achieving the transformation, and actions are planned and committed to by comparing these models to real world situation. SSM has been used extensively but is probably best known for guiding the design of information systems (Checkland & Holwell, 1998b).

SCA was developed by John Friend working first with Neil Jessop (Friend & Jessop, 1977) and later Allen Hickling (Friend & Hickling, 1987) whilst working at the Tavistock Institute of Human Relations. It addresses the *"interconnectedness of decisions problems in an explicit yet selective way"* that *"helps people working together to make more confident progress towards decisions by focusing their attention on possible ways of managing uncertainty as to what they should do next"* (Friend, 2001, p. 115). As for SSM, SCA is conducted in a number of distinct stages. First, the shaping stage identifies which decision areas relating to the problem situation should be addresses. The options for managing in each of these areas are developed in the designing stage before they are packaged together and evaluated against a range of criteria in the comparing stage. The choosing stage is where stakeholders agree the immediate decisions to be taken and further investigations to be carried out. Whilst originally focused on supporting town and country planning, the SCA approach has become widely associated with making strategy in a wide range of sectors (Friend & Hickling, 2012).

SODA was developed by Colin Eden working in collaboration with various colleagues at Bath University (Eden, 1988). It uses cognitive mapping to *"construct a graphical representation of a problematic situation ... to help groups arrive at a negotiated agreement about how to act to resolve the situation"* (Ackermann & Eden, 2010 p. 135). Typically a facilitator works with stakeholder inputs using software that enables the map to be redrawn in step with the discussion and analysis to be run quickly. The cumulative effect is typically to transform a number of divergent viewpoints into a convergent representation of group consensus of what the problem is and what action should be taken.

Whilst originally focused on resolving messy situations, the SODA approach has become associated with making strategy more broadly (Eden & Ackermann, 1998).

These and other soft methodologies such as Drama Theory (Bennett, Bryant, & Howard, 2001), Robustness Analysis (Rosenhead, 1980), Strategic Assumption Surfacing and Testing (Mason & Mitroff, 1981) amongst others, have become collectively known as Problem Structuring Methods (PSMs) in the parallel field of Operational Research (OR). Note that SODA and in particular SCA tend to be more closely associated with OR than Systems. This recognises that the aim is to *"provide decision makers with systematic help in identifying an agreed framework for their problem"* (Rosenhead, 1996, p. 117) as opposed to solving them. The situations in which PSMs are deployed are typically characterised by the existence of multiple actors, multiple perspectives, incommensurable and/or conflicting interests, important intangibles and key uncertainties. In order to address these challenges PSMs must enable alternative perspectives, be cognitively accessible, operate iteratively (so that the problem representation adjusts to reflect the discussion) and permit improvements to be identified and committed to (Mingers & Rosenhead, 2004).

Ackoff concurs that managers must play an interactive role in order to build commitment to taking action (Ackoff, 1979). But manager interaction is also important as a source of data and information. Checkland in his seminal book Systems Thinking, Systems Practice (Checkland, 1981) identifies 4 types of system – the natural (e.g. weather), the designed physical (e.g. bridge), the designed abstract (e.g. library referencing) and the human activity system (e.g. education). He notes how the fourth type is fundamentally different to the first three in that they are *"manifest only as perceptions by human actors who are free to attribute meaning to what they perceive"* so that *"there will thus never be a single (testable) account of a human activity system, only a set of possible accounts all valid according to particular Weltanschauungen"* (Checkland, 1981, p. 14).

It is important to note that the role of modelling then is very different between hard systems and soft systems. For hard systems, models are representations of the real world that can be used to engineer solutions. For soft systems, models are learning devices that help stakeholders decide what action to take next. This epistemic shift marks the boundary between hard and soft systems methodologies and between positivist and phenomenologist perspectives (Checkland, 1985). There have been attempts to

span this boundary using multimethodology or mixed methodologies – typically sequentially with soft methodologies being used first to define the scope of the problem to be solved using hard methodologies. (The blending of hard and soft methodologies drawn from fundamentally different paradigms – often referred to as 'methodological pluralism' – is one aspect addressed by critical system methodologies.) But this is neither possible nor appropriate in many cases where the complexity is such that it cannot be tamed sufficiently for hard methodologies to be brought to bear.

More recent work has proposed a Generic Constitutive Definition (GCD) for PSMs to identify non-codified use, but also has benefit in identifying the essence that is common to all PSM use *(Yearworth & White, 2014)*. This definition – as reproduced in Figure 2.12 – highlights a number of aspects that make PSMs well-suited to assessing and then taking action for organisational health. First and foremost, the purpose of PSMs use is to guide improvement activity (#1) in a messy context (#6) in which stakeholders are intimately involved in – and not divorced from – the problem (#8). Second, the limitations (#9) brought about through application in real-world settings, where some or all of time, scope and expertise may be restricted, are seen as opportunities for methodological learning (#4) through reflection on the adaptation needed to ensure the methodology matches the setting (#3), as opposed to barriers that preclude involvement. Third, the way in which PSMs are applied can lead to anticipatory interventions because using a systemic approach (#2) that blend multiple worldviews (#5) in an interactive setting (#7) builds the necessary confidence and commitment for meaningful action to be taken.

i	P_i	Constitutive Definition	Cross-References
1	Improvement Activity	A structured way of approaching systemic intervention has been taken, which was *designed* to lead to improvements in a problematic real-world situation through a set of purposeful activities	#23, #35, 53, #126, **#161**, **#173**, #303
2	Systemic Approach	The problem structuring approach used systems ideas (including boundary, hierarchy, communication and control), which i) are appropriate to context, ii) theoretically adequate, and iii) supported by appropriate systems modelling	#52, #54, #56, #126, #160, **#203**, **#219**, #376
3	Adaptation/ Creativity	Conscious thought and creativity must have gone into how the problem structuring approach was adapted or elements combined for the particular problem situation	#41, #57, **#106**
4	Methodological Lessons	Use of the problem structuring approach yielded methodological lessons, extracted by conscious reflection	#20, #27, #41, **#255**, **#358**
5	Worldviews	The process of problematisation recognised that problems are construct of an individual's mind, they do not exist independently of human thought. These constructs are defined by an individual's "worldview", the problem structuring approach acknowledged these and worked with them	#29 , #119, #120, #128, #134, #154, #190, #224, #238, #365
6	Messiness	The problem context in which the problem structuring approach was used was recognised as *messy/wicked/swampy* following definitions such as contained in (Ackoff, 1979, 1981; Rittel & Webber, 1973; Rosenhead, 1992; Vennix, 1999)	#22, #24, #40, #239
7	Interactive/ Iterative/ Therapeutic	The intervention in the problem situation has come about through sharing of "*perceptions, persuasion and debate*" in a participative group setting using an interactive and iterative approach. The facilitator or owner of the problem structuring approach adopted a stance that was "*interactive/therapeutic, not expert*"	#16, #32, #37, #44, **#115**, **#161**
8	Subjectivity	In the approach taken it has been recognised that the stakeholders of the problem situation are not "*divorced from the problem*" and that they could not act as objective "*outsiders*" as in 'hard' Systems Engineering	#15, #381, #394
9	Limits	Approaches to problem structuring might unwittingly suffer from *inter alia* bounded rationality, inadequacy of organizational language to supply adequate conceptual terminology, application of non-appropriate methodology, "*spurious saliency*" etc. The approach used demonstrated that it dealt with such conceptual limitations including building expertise in the use of problem structuring	#10, #34, #42, #48, #49, #73, #65, #123, #325

Figure 2.12 – Generic Constitutive Definition for PSMs (Yearworth & White, 2014)

PSMs have been, and continue to be, a major area of both research and practice with prominent streams at major conferences. Useful summaries of these developments and reflections have been provided by Rosenhead (1996), Mingers and Rosenhead (2004), Eden and Ackermann (2006), White (2009), Mingers (2011) and Ackermann (2012). But their implementation and use has not been without controversy, especially outside the United Kingdom where they originated. Publication in the US in particular has been shown to be minimal with no PSM papers published in either Operations Research or Management Science (two of the most prominent journals for OR in the USA) (Mingers, 2011).

The primary criticism of soft methodologies is that they lack rigour and objectivity. Many researchers and practitioners view the subjectivity and lack of reproducibility of soft methodologies as unsatisfactory and it has been highlighted (Mingers, 2011) that some critics have gone as far as to challenge whether such methodologies should be associated with OR at all given that they are not based on mathematical models of the real world. But as has been pointed out (Ackermann, 2012; Mingers, 2011) hard methodologies cannot be brought to bear until a problem has been defined and the process of definition can never be truly objective. This is because it involves numerous judgements with regard to boundary of inquiry, objectives to be met, and types of solution to consider.

The subjective nature of soft methodologies gives rise to another challenge – the lack of empirical evidence of effectiveness (Ackermann, 2012). It is often very difficult (if not impossible) to assess the value provided by applying soft methodologies. Hard methodologies applied to well-defined problems provide quantitative results and so success can be readily communicated – e.g. % increase in efficiency, £M savings made in annual operating costs. Soft methodologies in contrast yield insights whose benefits whilst being more strategic also tend to be intangible and so defy measurement – e.g. deeper understanding, increased stakeholder consensus. Researchers are split on whether clear measures can be defined and experiments run in controlled conditions to demonstrate the value of soft methodologies (Finlay, 1998) or whether such evaluations can never hope to replicate the complex, messy conditions found in organisations and so will never be accepted as valid (Eden, 1995).

One the reasons given for the restricted use of soft methodologies is that they are difficult to teach (Ackermann, 2012). The development of facilitation skills in particular are not suited the classroom environment and this difficulty is compounded when many students have little real world experience to begin with (ibid, p. 656). It is also observed that some students struggle with the concept that there is no right or wrong answer and, more generally, how complex situations require holistic treatment that should be managed over time (Ackermann, 2011).

Another primary criticism of soft methodologies is that in some situations their use can reinforce relations of power (Healey, 1997; Jackson, 2000; Mingers, 1992; Willmott, 1989) and so rather than lead to improvement, can actually make the situation worse. This led researchers to call for new approaches to systems thinking for use in coercive environments (Jackson, 1982) that effectively challenge power relations (Mingers, 1992). This focus on emancipation and the ethics of intervention came to be one of the defining characteristics of the third wave of systems methodology development – critical systems methodologies.

2.5.3 Critical Systems

As Midgley (1996) notes there is no accepted definition of what critical systems thinking (and so methodologies) is and that it is instead best viewed as an evolving debate around three themes: *"Critical awareness—examining and reexamining taken-for-granted assumptions, along with the conditions that give rise to them; Emancipation—ensuring that research is focused on "improvement", defined*

temporarily and locally, taking issues of power (which may affect the definition) into account; and Methodological pluralism—using a variety of research methods in a theoretically coherent manner, becoming aware of their strengths and weaknesses, to address a corresponding variety of issues". Each of these themes is addressed in turn below.

Critical systems thinking and the methodologies associated with it were developed to enable analysis of (and intervention within) complex societal problem areas (Jackson, 2001). In order to set a firm foundation for analysis and subsequent intervention, it has been persuasively argued that it is important to develop a critical awareness of the aims (and the underlying values that give rise to them) of all stakeholders and to carefully consider how best to define the scope of the problem area – *"Systems thinking without critique is blind with respect to its underpinning boundary judgements and their normative implications"* (Ulrich, 2003, p. 327). The critical examination of boundary setting judgements, also referred to as boundary critique, is viewed as essential to mitigating against the risk that *"diagnoses of problem situations will be superficial and biased towards a narrow range of stakeholders"* (Midgley, 2002, p. 74). Whilst specific methodologies have been developed to support boundary critique processes – see for example Critical Systems Heuristics which involves the systematic consideration of 12 categories that together cover the perspective of the Client (sources of motivation), Decision Maker (sources of control), Planner (sources of knowledge) and Witness (sources of legitimation, those affected but not involved) (Ulrich, 1983) – it has been recognised that there are a myriad of possible ways of framing an intervention (Keys, 1997). This is an active area of research, and recent theorising based on empirical work proposes that practitioners (with/without their stakeholders) establish a firm basis for analysis by 'setting', 'following', 'enhancing', 'wandering outside', 'challenging' and 'probing' boundaries concerning both the problem context and the putative methodologies to be used (Velez-Castiblanco, Brocklesby, & Midgley, 2016).

The inability of soft system methodologies to effectively address power imbalances and so ensure that interventions result in improvements for all (and not just those with power) was a key driver in the development of critical system methodologies (Jackson, 1982). Critical System Heuristics can again help to address this aspect by stimulating a discourse between stakeholders and in particular between planners and witnesses. This is consistent with Midgley's assertion that method design can effectively

address the need to preserve the contributions of marginalised groups (Midgley, Munlo, & Brown, 1998). It should be noted that power relations relate both to exercise of influence via management hierarchies and via the retention of technical knowledge by experts.

The third and perhaps most prominent theme associated with the critical systems is that of methodological pluralism. The major contribution here was to move the debate on from the paradigm wars between the various proponents of hard and soft methodologies to instead promote the use of these complementary methodologies in combination. The key artefact in achieving this breakthrough was the System of System Methodologies (SOSM) developed by Mike Jackson and Paul Keys (Jackson & Keys, 1984) – see Figure 2.13, that plotted four sociological paradigms of Functionalist, Interpretivist, Radical Structuralist and Radical Humanist (Burrell & Morgan, 1979) using the axes of nature of the system (from simple to complex) and the relationship between participants (from unitary to pluralist to coercive). The SOSM matrix made clear that different methodologies were suited to different problem situations and that methodology selection should be based on a diagnosis of the problem situation (note that the larger Functionalist and Interpretivist boxes were later each divided in two for a six box model). For example – System Dynamics maps to the Simple Unitary box, Viable Systems Diagnosis maps to the Complex Unitary, and Soft Systems Methodology maps to the Complex Pluralist box. This is not without controversy however, as many have found this 'pigeon-holing' of methodologies against situational contexts to be overly constraining and/or not aligned with the original thoughts behind their development – see for example (Taket, 1992).

Increasing divergence of values interests

	Unitary	Pluralist	Coercive/Conflictual
Simple	Hard Systems Thinking	Soft Systems Approaches	Emancipatory Systems Thinking **Radical Structuralist**
Complex	**Functionalist**	**Interpretivist**	Postmodern Systems Thinking **Radical Humanist**

Increasing complexity (vertical axis label, downward)
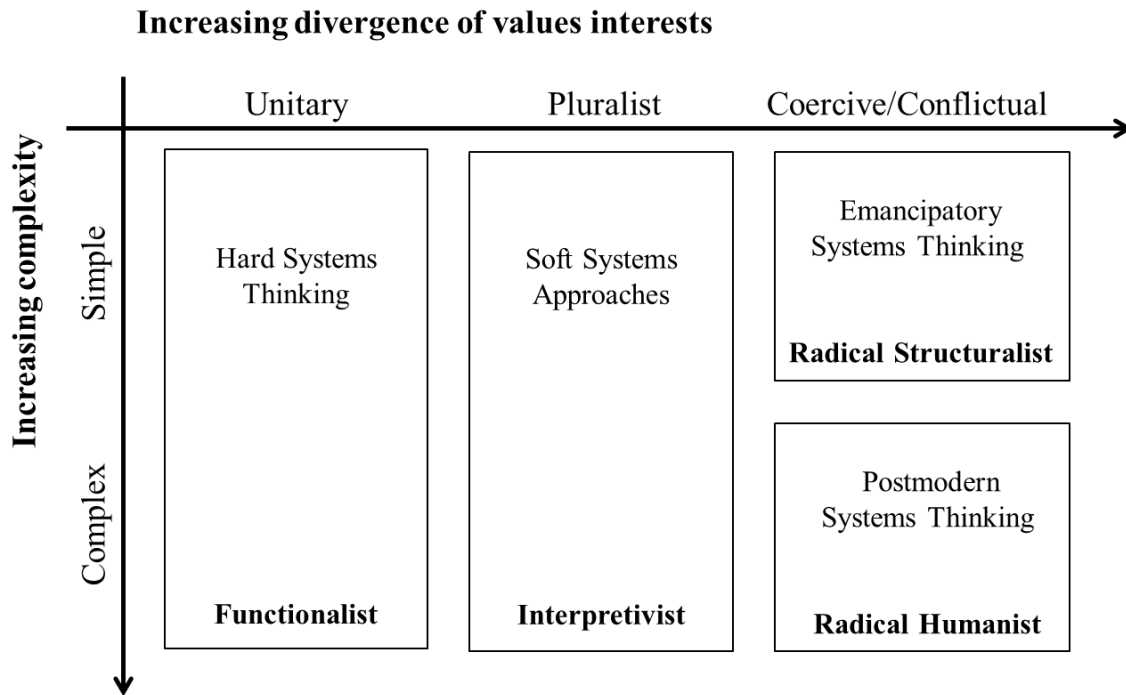
Figure 2.13 – System of System Methodologies redrawn from Jackson and Keys (1984)

Creative Holism (Jackson, 2003) expands upon Total Systems Intervention – as first described by Flood and Jackson (1991) and then updated by (Flood, 1995) – as the initial approach to implement the SOSM matrix and to promote pluralism by setting out a multi-paradigm, multi-methodology and multi-method approach to intervention in complex problem situations [Jackson, 1996]. It is comprised of four phases – creativity, choice, implementation and reflection (note that TSI was limited to the first three phases). In the creativity phase, the task is to better understand the problem situation from multiple perspectives using metaphors as helpful (e.g. machine, organic, neurocybernetic, cultural and political). Having identified the key issues, the task in the choice phase is to identify an appropriate methodology or set of methodologies to be used in the implementation phase based upon a critical awareness of respective strengths and weaknesses. The task in the reflection phase is to evaluate the implementation phase to yield substantive (about the problem situation) and methodological (about the methodology) insights.

It is interesting to note that whilst Jackson is supportive of innovation – *"System practitioners should be allowed the greatest freedom possible to tailor their use of tools to the complexities of the problem situation they are seeking to intervene in and the exigencies of that situation as it changes"*

Jackson (2001, p. 239), Creative Holism can be taken to be overly prescriptive with methodologies typically used in sequence in strict accordance with their theoretical and methodological underpinnings. Jackson (ibid, p. 229) is keen to guard against a slide into atheoretical pragmatism where the employment of tools is theoretically uncontrolled (as per mainstream management consulting). But it seems possible (to me at least) that more can be made of the middle ground between theoretical prescription and atheoretical pragmatism and I have identified that Systemic Intervention provides for this.

The Systemic Intervention philosophy, methodology and practice (Midgley, 2000) brings a critical focus on purposeful action for improvement by an agent through the use of (i) boundary critique to reflect upon and where necessary challenge judgements made about where to set the limits of inquiry (and the subsequent intervention), and (ii) theoretical and methodological pluralism to tailor the approach to the situation.

For (i), Midgley cites both Churchman (1970) and Ulrich (1983) as making important prior contributions to the advancement of boundary critique. Churchman recognised that any improvement is intimately linked to the boundaries set and that these boundaries are personal and/or social constructs (as opposed to real world physical) that can only be reflected upon rigorously via a dialectical process. Whilst Churchman focused on the role of the external practitioner in setting and reflecting on boundaries, Ulrich focused more broadly on the stakeholders as a group noting that any boundary judgements (as for subsequent interventions) should be acceptable to all involved. Ulrich also introduced that any improvement should be considered in light of universal moral issues although Midgley challenges this by observing that rarely is it possible for moral judgements to be applicable in all circumstances. Midgley himself developed a model of marginalisation processes that includes how marginalisation results when one or more individuals or groups draw boundaries differently and that the conflict is resolved via a social ritual where marginalised elements are either established to be 'sacred' (valued and so included) or 'profane' (devalued). He notes how such conflict is often very difficult to resolve in multi-agency settings with power relations being exerted on multiple fronts (Yolles, 2001). Midgley also notes how it can be necessary for the external practitioner to challenge an

apparent consensus boundary setting position amongst the stakeholders, for example using Ulrich's CSH, to at least make explicit what is being marginalised (if not to change the boundaries set).

For (ii), Midgley advocates for a process philosophy that allows for a plurality of theories, and associated methodologies, to be brought to bear on a particular problem (or problematic situation). This contrasts to what Midgley refers to as content philosophy where mono-theoretical knowledge generation systems are specified and followed. In this process philosophy subjects (the sentient beings making choices and conducting work) and objects (the focus of the work) are identified through a process of making boundary judgements. For subjects, this identification requires two boundary judgements – one for the sentient beings conducting the work and another for the knowledge generating systems that they choose to use. For Midgley theoretical pluralism brings forth a number of significant implications, with which I readily identify, including that theories are neither right nor wrong rather they are more or less useful; that there is always an agent making choices; and that the principles and standards underpinning these choices are derived locally and not universally.

Critical system methodologies then, and Systemic Intervention in particular, are well-suited to the specifics of making organisational health assessments via their emphasis on boundary setting (to appropriately scope the intervention), making improvements (to identify actions that satisfy each of the needs of the organisation, the needs of the employees and the needs of customers) and theoretical and methodological pluralism (to ensure that the methodology is tailored to the local specifics of the situation).

2.6 Setting out my research questions

This section sets out my three primary research questions that sit under my overarching research challenge: *How can models of organisational health be developed through the application of systems methodologies to initiate and sustain anticipatory behaviour?* These questions all relate to organisational change. In terms of the Inception – Growth – Maturity – Decline sigmoidal curve model for the organisational lifecycle (Handy, 1994), organisational change typically occurs at Point B when the organisation is in full decline (and when there is a clear and present danger to the organisation) – see Figure 2.14. This change can be seen to be 'reactionary'. According to Handy (1994), the key to

sustained success is to begin to explore change when the organisation is approaching maturity at Point A, whilst there are sufficient resources and time provided by the first trajectory to begin the second. This change can be seen to be 'anticipatory'. This is difficult of course because *"all the messages coming through to the individual or the institution are that everything is going fine"* (ibid, p. 51). My first research question therefore addresses how systems methodologies might be used to raise awareness of underlying health issues that necessitate anticipatory change (as per a mindful organising): *RQ1 – How can systems methodologies be applied to assess organisational health?*
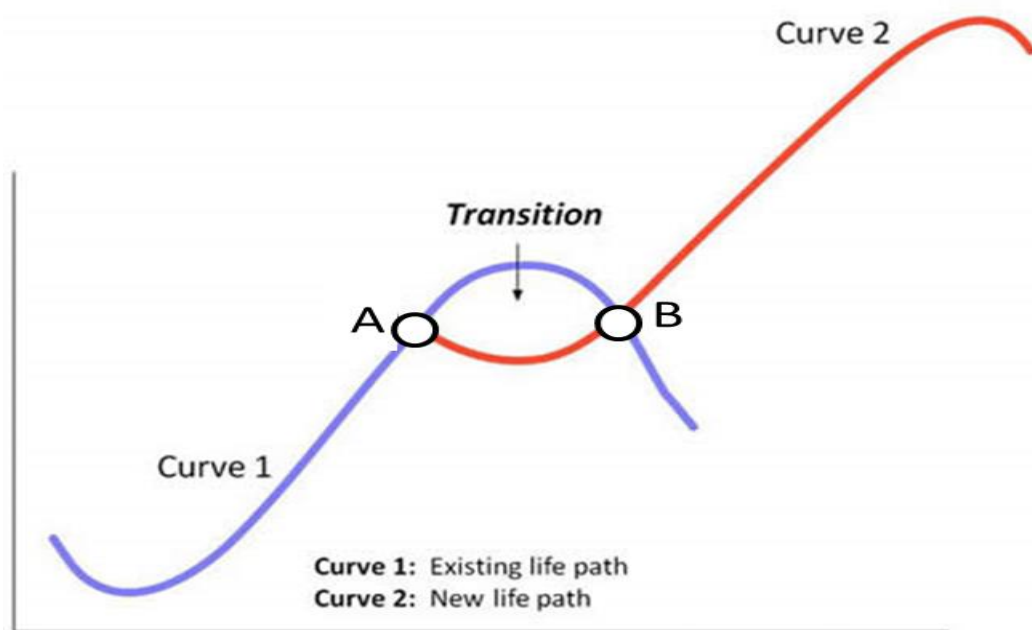
Figure 2.14 – Sigmoidal curve for organisational lifecycle (Handy, 1994)

When conceptualising change, much of the published theory boils down to – or at least can be linked back to – Kurt Lewin's Unfreeze – Change – Refreeze model (Lewin, 1952). Many change initiatives fall at the first of these hurdles due to the inability to establish a strong sense of urgency (Kotter, 1995). The key to clearing the unfreezing hurdle has been conceptualised as three basic processes (Schein, 1996): (1) Disconfirming the status quo (where key information leads to dissatisfaction in current conditions); (2) Inducing survival anxiety and/or guilt (where stakeholders respectively either fear organisational failure or fear not achieving organisational goals); and (3) Overcoming learning anxiety (where stakeholders build confidence that there is another viable way to succeed either by transferring a best practice model developed elsewhere or by scanning the

environment for new concepts that could apply to their context). My second research question therefore addresses how the processes and results of building organisational health models can support unfreezing (as per an anticipatory system): *RQ2 – How can organisational health assessments be used to initiate anticipatory action?*

In his highly cited examination of why change efforts fail, Kotter finds that after having established a sense of urgency, formed a powerful guiding coalition and created and communicated a vision (as part of Lewin's unfreeze), the next critical steps are to empower others to act on the vision, planning for and creating short-term wins and consolidating improvements and producing yet more change (as part of Lewin's change) (Kotter, 1995). The application of system methodologies, and in particular their ability to involve and broker collaboration amongst stakeholders, has been shown to help not only with implementing immediate change (Rouwette, Vennix, & Felling, 2009; Rouwette, Vennix, & Van Mullekom, 2002) but with sustaining momentum through learning (Monks, Robinson, & Kotiadis, 2014). My third research question therefore addresses how repeated assessments of organisational health in a process of monitoring can be used to overcome the barriers to delivering change and so sustain momentum to take the change necessary to maintain high levels of organisational performance (as per HRO): *RQ3 – How can organisational health monitoring be used to sustain anticipatory behaviour?*

2.7 Summary

In this chapter, I have reviewed how HROs are able to sustain high levels of organisational performance through 'mindful organising' and how this concept appears transferrable within the public sector (where continuous delivery of services is the driving goal). I then proposed how this concept could be applied to the MOD setting by using the process of assessing organisational health to strengthen preoccupation with failure, avoid simple interpretations and heighten sensitivity to operations. I then linked this to the way in which anticipatory systems take action based upon internal models to make change in advance of issues that threaten their existence.

I next reviewed how organisational health has been conceptualised previously in the academic literature and how it has and is being assessed in practice. From this review I developed the concept

for how a healthy organisation is one that can balance performance in the here and now with performance in the future. From my review of the development of systems methodologies over time, I then highlighted how aspects of hard, soft and critical systems methodologies can each make a contribution to building models of organisational health.

Lastly, I considered how models of organisational health can be exploited to trigger anticipatory change and to sustain the momentum necessary to deliver anticipatory change with reference to some of the academic literature on change (noting that this is a vast field). This led me to define my three primary research questions: (1) How can systems methodologies be applied to assess organisational health?; (2) How can organisational health assessments be used to initiate anticipatory action? and (3) How can organisational health monitoring be used to sustain anticipatory behaviour?

Chapter 3 – Declaring my research methodology

3.1 Introduction

The aim of this chapter is to describe my Action Research methodology (hereafter referred to as AR) in relation to my research challenge: *How can models of organisational health be developed through the application of systems methods to initiate and sustain anticipatory behaviour?* As per the definition provided by Midgley, this methodology goes beyond description of the *"set of techniques used in sequence/iteratively to achieve a given purpose"* (method) to also present *"a set of theoretical ideas that justifies the use of particular method(s)"* (methodology) (Midgley, 2000, p. 105).

3.2 Defining Action Research

It has been said that *"AR is an umbrella term for a shower of activities intended to foster change on the group, organizational and even societal levels"* (Dickens & Watkins, 1999, p. 127). These activities include (but are not limited to): Action Inquiry (Torbert, 1976), Action Learning (Revans, 1982), Action Science (Argyris, Putnam, & Smith, 1985), Appreciative Inquiry (Cooperrider & Srivastva, 1987), Clinical Inquiry Research (Schein, 1987), Participatory Action Research (Whyte, 1991), Cooperative Inquiry (Heron, 1996; Heron & Reason, 2006; Reason, 1988), Learning History (Kleiner & Roth, 1997) and Collaborative Management Research (Shani, Mohrman, Pasmore, Stymne, & Adler, 2007). In their Handbook of Action Research, Reason and Bradbury acknowledge the difficulty in using the term AR to cover a family of *"approaches and practices that are each grounded in different traditions, in different philosophical and psychological assumptions, pursuing different political commitments"* (Reason & Bradbury, 2001, p. xxiv). Like other families, whilst each member is related, some have more in common with each other than others and not everyone gets along all the time. A number of researchers have attempted to explain and so smooth this difficulty by differentiating between approaches informed by 'experimental social administration' and those informed by 'teacher researcher model' (A. Kelly, 1985) and by differentiating between 'action research' and 'research action' (Heller, 2004). Others have gone further in categorising 6 intervention strategies (Raelin, 1999), developing a typology covering 27 'flavours' of AR based upon dimensions of voice, practice and time (Chandler & Torbert, 2003) and by classifying 5 different approaches based on their underpinning philosophies (Cassell & Johnson, 2006).

Whilst the current state of AR then is recognised to be diverse, it is also acknowledged that AR has its origins in the work of Kurt Lewin (Adelman, 1993). Lewin was concerned with the limitations that he perceived of studying social problems in controlled laboratory environments (Lewin, 1946, 1947), and is popularly quoted as saying *"If you truly want to understand something, try to change it"*. Lewin conceived AR as a means for practitioners and researchers to collaborate in the simultaneous development of theory and in addressing practical problems (Cunningham, 1993). But as others have pointed out, Lewin *"never wrote a systemic statement of his views on action research"* (Argyris et al., 1985, p. 8) and in fact he only ever wrote 22 pages on the topic (Peters & Robinson, 1984). Argyris and co-workers summarised Lewin's concept of AR as involving: (1) Change experiments on real problems in societal systems; (2) Iterative cycles of identifying a problem, planning, acting and evaluating; (3) Re-education based upon the participation of clients in the diagnosis; (4) Challenging the status quo from the participant perspective; and (5) Simultaneous contribution to basic knowledge in social science and to social action in everyday life (Argyris et al., 1985).

More recently, and reflecting the development and diversification since Lewin's inception, Gummerson identifies 10 characteristics for AR (Gummesson, 2000, pp. 119-123). These are listed below together with my interpretation of the implications for what action researchers should do in their practice drawing upon the discussion offered by Coughlan and Coghlan (2002, pp. 224-226):

(1) Action Research is about taking action – Action researchers must go beyond observation to bring this action about.

(2) Action Research always involves two goals: solving a problem and contributing to science – Action researchers must actively engage in the problem situation to make change happen but they must also dis-engage at times to reflect on the change as it is happening in order to make a contribution to the body of knowledge (either with regard to the change activity or with regard to action research methodology).

(3) Action research is interactive – Action researchers must manage progress constantly, adjusting to new information and new events as they arise.

(4) Action Research aims at developing holistic understanding during a project and recognizing complexity – Action researchers must maintain a broad understanding of how the system works and be able to handle the associated complexity that arises over time.

(5) Action Research is fundamentally about change – Action researchers must possess knowledge and skill in the dynamics of organisational change.

(6) Action Research requires an understanding of the ethical framework, values and norms within which it is used in a particular context – Action researchers must take care to understand these and act in accordance with them at all times.

(7) Action Research can include all types of data gathering methods – Action researchers should critically reflect upon their data collection design to ensure it matches the specific context, including in coordination with stakeholders.

(8) Action research requires a breadth of preunderstanding – Action researchers should take steps to understand the organisation and use this to situate the research project.

(9) Action research should ideally be conducted in real time – Action researchers should make time for reflection and keep detailed notes as events unfold, so as to be able to write a detailed case study account during, or more typically after the event(s), as opposed to writing a retrospective case study based on recall.

(10) The action research paradigm requires its own quality criteria – Action researchers should resist their work being judged by the criteria associated with traditional, positivist science.

Picking up on the final point above, whilst Lewin advocated for the application of traditional scientific methods to generate knowledge deductively through the setting and testing of hypotheses (Clark, 1976), AR is now almost exclusively associated with inductive knowledge generation leading to emerging theory (Eisenhardt, 1989). In this way contemporary AR has much in common with grounded theory (Glaser & Strauss, 1967) and ethnography (Garfinkel, 1967) in that theory is developed from observation and not tested against it. To be clear: deductive knowledge generation involves testing

hypotheses through observation(s) to give rise to theoretical knowledge, whilst inductive knowledge generation involves the emergence of theoretical knowledge from observations without hypotheses guiding those observations.

This phenomenological form of AR *"derives theoretical insights from naturally occurring data rather than through interviews or questionnaires"* (Huxham, 2003). This necessitates that the action researcher must be intimately involved with the organisation undergoing intervention, working alongside (if not leading) organisational members on matters of genuine concern to them. Such access affords the collection of rich data about what people said and did when faced with the genuine need for action, that are timely because collection occurs at the point of happening and so avoids post–hoc recollection and rationalisations (Huxham, 2003). It has been noted that AR specifies neither the minimum nor the maximum amount of time necessary to generate *"legitimate research data"* and that action researchers must be *"continually alert"* as important data often come to the fore when least expected (Huxham, 2003). The means of collecting data can then be seen to involve choices. These choices have been described as relating to the degree to which the agenda is raised overtly with stakeholders involved, the visibility to the stakeholders of the research methods being used and the level of ambition (or risk) of the action intervention being accepted by stakeholders (Huxham & Vangen, 2003, p. 368). The key then for action researchers is to assess how much the research agenda can intrude on the intervention agenda (Huxham & Vangen, 2003, p. 398). Too much intrusion can lead to aggravated data that are not representative of reality and/or early termination when the alienation of stakeholders leads to access being revoked. Too little intrusion can lead to missed opportunities for data collection and verification where the interpretation of data can be checked with stakeholders and poor research outcomes, for example where opportunities for testing and developing theories are denied.

All inductive research from collected data has two basic steps: first is the search for a pattern in the data and the second is the 'creative leap' to generalise beyond the data. This search may or may not be informed by existing literature. Too much focus on existing literature (and the associated frameworks that this gives rise to) may result in the researcher not *"being open to what the site has to tell"* (Glaser & Strauss, 1967) and so deny the researcher a comprehensive understanding of what is unfolding around them. Too little focus may lead to confusion and an inability to make sense of the

situation and its dynamics. The key then for action researchers is to strike the right balance between using theory and suppressing it (Huxham, 2003) by undertaking sufficient pre-reading to identify what might be relevant without fixating on any one framework. As famously stated by Louis Pasteur in 1854 at the opening of the Faculte des Sciences in Lille: *"In the field of observation, chance favours only the prepared minds"*.

AR then can be seen to be a 'process' method as distinct from a 'variance' method (Poole, Van de Ven, Dooley, & Holmes, 2000). Process methods are concerned with inductively explaining how and why situations and events unfold and develop over time, whereas variance methods are concerned with making and testing predictions about what will occur. This distinction has methodological and ontological implications. Where process methods are typically inductive in nature and focused on processes (through the use of verbs such as 'organising'), variance methods are typically deductive in nature and focused on entities (through the use of nouns such as 'organisations'). Whilst some researchers view these approaches as complementary (Van de Ven & Poole, 2005) and others have argued for hybrid blending of the two so as to better address the challenges of Information Systems research (Ortiz de Guinea & Webster, 2017), these methods tend be viewed as very distinct with advocates from each camp criticising the other.

3.3   Justifying my choice of Action Research

I selected AR as the most appropriate research methodology because of how well it aligns with: (1) my research challenge and the research questions as developed in Chapter 2; (2) my practice situation; (3) my episodic research processes; and (4) my participative approach to practice and research. Each of these reasons is described below.

First and foremost AR aligns well with the research challenge to better understand how systems methods might be used in making organisational health assessments. AR is recognised to be appropriate *"when the research question relates to describing an unfolding series of actions over time in a given group, community or organisation; understanding as a member of a group how and why their action can change or improve the working of some aspects of a system; and understanding the process of change or improvement in order to learn from it"* (Coughlan & Coghlan, 2002, p. 227). My key

research outcomes include helping stakeholders to understand what decision support processes do (and do not) satisfy their needs and thereby adding to the knowledge base of praxis in Dstl and academia more widely. This understanding can only be attained through action. The AR methodology has been identified as affording the practitioner the ability to learn (Kolb, 1984) and reflect (Schön, 1983, 1987) in the course of their work duties and so make the most of these opportunities.

Second, and linked to the nature of my work duties, AR matches my practice setting where, in addition to satisfying my research objective, I am also seeking to support stakeholders drawn from across government in their targeting of interventions for improvement. AR has been described as a process in which *"a researcher enters a real world situation and aims both to improve it and to acquire knowledge"* (Checkland & Holwell, 1998a). My practice as a Dstl Technical Consultant affords me access to working on problems that really matter – both to the people involved in Defence and Security and to the country as a whole. In such settings the need to deliver results that enable stakeholders to make decisions that have real world impact precludes the selection of many other research approaches. For example it is impossible to run controlled experiments in parallel because the opportunity to learn can only be had once. More fundamentally, in such settings research cannot be the only outcome. This simultaneous dual focus on action and research is the main characteristic that distinguishes AR from other methodologies whose focus is either one or the other (Checkland & Holwell, 1998a).

Third, the cyclical nature of AR aligns with the episodic nature of my research. Action researchers agree that AR consists of multiple, linked cycles of planning, acting, and reflecting (Dickens & Watkins, 1999). Whilst the specifics of each intervention are unlikely to be transferrable from one situation to another, methodological insights regarding how the intervention was decided upon and enacted could be. It is this meta–learning across AR phases – in my case about how to design and implement organisational health assessments – that provides the link between distinct episodes of research. It is also this meta–learning, and the potential to generalise it outside MOD for applications with other organisations, that forms the basis of my academic contribution. AR projects can be viewed as multiple AR cycles acting in parallel (Zuber-Skerritt & Perry, 2002) – the *core* AR cycles that relate to interventions in specific situations overlaid with a *thesis* AR cycle that relates to critical reflection with regard to the research questions. This critical reflection has been usefully sub-categorised to

comprise separate foci on content, process and premise (Mezirow, 1991). These sub-categorisations manifest themselves in my thesis through reflecting on what happened (content) in call out boxes throughout Chapters 4, 5 and 6; through reflecting on why it happened (process) in the reflection sections in each of Chapters 4, 5 and 6; and through reflecting on what this means for underlying assumptions (premise) in Chapter 7.

Fourth, AR aligns with the participative nature of both my practice and my research. My practice as a technical consultant is participative by necessity. It relies upon stakeholders to afford access to the various organisations involved and to provide expert inputs on the associated issues. My research is also participatory, partly because stakeholders are key sources of evaluation data for methodological learning, but mainly because it is the budget holders within the stakeholder group who sponsor the work and so to a very large extent determine what my practice is. The flexibility to work with stakeholders to formulate specific research questions and to respond and adapt these in–flight therefore is critically important. Such fuzzy and dynamic situations are well–suited to AR, whereas traditional research methods which rely upon precise questions being set are very difficult to apply in such circumstances. AR is also a good match for the examination of complex issues insofar as it aligns with the *"probe-sense-respond"* prescription that is associated with the complex quadrant of the Cynefin framework (Kurtz & Snowden, 2003). AR also brings the potential to go beyond deductive testing of prior theory (as per the scientific method) and to also and/or instead inductively create theory.

3.4 Reviewing what makes for good Action Research

It is the inductive, process nature of AR that leads directly to the first of two prominent criticisms of it as a research methodology, namely that AR lacks the rigour of deductive, positivist scientific research (Coughlan & Coghlan, 2002, p. 237) with its strict internal and external control (Dickens & Watkins, 1999, p. 131). Whilst it has been established that it is inappropriate to apply the validity criteria of positivist science to AR (Susman & Evered, 1978) and that this should be resisted (Gummesson, 2000), action researchers have argued that there are standards of rigour that could be and should be applied to this interventionist form of research (Eden & Huxham, 2002). In their examination of the validity of AR, Checkland and Holwell (1998a) imagine AR lying part-way along a spectrum of

knowledge acquisition processes bookended by experimental natural science at one end based upon a repeatability criterion, and story-telling at the other based upon a plausibility criterion. Checkland and Holwell set upon 'recoverability' as a criterion for AR, highlighting that repeatability will never be achievable given that the associated social phenomena are not *"homogenous through time"* (Keynes, 1976). In their view, the truth claim from AR can never be as strong as that derived from scientific results because *"AR does not assume that social laws await discovery in the same way that physical laws can be regarded as regularities of the universe"* but that, done well, AR can *"yield defensible generalizations"* (Checkland & Holwell, 1998, p. 16). It is important therefore to make it clear to others: what was done, why it was done and how the conclusions were drawn (through providing comprehensive descriptions covering theory, practice and interpretation) so that others can determine whether this methodology has yielded valid knowledge.

The second major criticism of AR is that the principles of action and research are so different as to be mutually exclusive – either research with little action or action with little research (Dickens & Watkins, 1999, p. 131). Whilst many would hotly dispute that action and research are mutually exclusive, it is often the case that action and research are in tension because: *"From the action researcher's perspective, the challenge is to define and meet standards of appropriate rigour without sacrificing relevance"* (Argyris & Schön, 1989). Therefore it should be recognised that AR is rarely straightforward to conduct and that it is far from an easy methodological option to take. AR involves making research design choices throughout the research process (not just at the beginning), noting of course that these choices are not always free (Huxham & Vangen, 2003, p. 400) because AR is more about seizing opportunities to learn from practice than deliberately planning to conduct research.

I now examine the principles that management researchers have established should be followed when making these design choices in order to make for good AR. It should be noted that I am focusing my attention of the use of AR in organisational settings where the broad aim is to work with employees – from across the organisation – to identify how best to intervene in a problematical situation. As was highlighted above, there is a great deal of variation in how AR is defined elsewhere – for example, Reason and Bradbury (2001) define AR more narrowly as *"a participatory, democratic process*

concerned with developing practical knowing in the pursuit of worthwhile human purposes, grounded in a participatory worldview" and others narrower still *"an emergent inquiry process in which applied behavioural science knowledge is integrated with existing organizational knowledge and applied to solve real organizational problems"* (Shani & Pasmore, 2010[1985], p. 439). Whilst these views of AR, and the frequent extension that AR should facilitate emancipation (and not serve as an 'instrument' of management to achieve its objectives), are the prevailing beliefs of action researchers drawn from social science disciplines, this is not viewed here – or elsewhere – as a necessary criterion for AR in management research (Eden & Huxham, 2002).

Eden and Huxham identify 12 contentions focused on both the outcomes and processes of AR to *"suggest some of the standards to which action research might aspire"* (Eden & Huxham, 2002, p. 76). These authors note that these standards are hard to achieve and that success requires that a broad attention be paid to all issues by confident and experienced researchers with a deep understanding of methods for consultancy and intervention. The twelve contentions are detailed below in slightly adapted form to aid communication:

(i) <u>AR must have implications beyond those required for action or generating knowledge in the immediate domain of the project</u> – It is important that action researchers characterise and communicate their project-specific experience in such a way as to make it meaningful to others (and so enable wider application).

(ii) <u>AR delivers both research and action outcomes</u> – Action researchers work for outcomes that satisfy both knowledge and improvement aims and reject the rigour-relevance dichotomy that has been presented as a choice (Argyris & Schön, 1989).

(iii) <u>AR demands an explicit concern with theory</u> – Action researchers go further than suggesting how practice might be improved as a research outcome to also outline the theory that underpins such suggestions.

(iv) <u>AR generates emergent theory</u> – Action researchers work to inductively generate theory from data rather than deductively test theory using data (noting that this interpretation contrasts with Lewin's original conception of AR).

(v) AR builds theory incrementally – Action researchers develop and elaborate general theory from specific practice in small steps.

(vi) AR produces descriptive theory that is useful for practical applications – Action researchers clearly communicate what consumers should transfer from their descriptive findings to apply them in other contexts.

(vii) AR generates insights through reflection – Action researchers maintain a high degree of method and orderliness in reflecting upon, and holding on to, emerging research content over multiple episodes of engagement.

(viii) AR processes must be replicable or at least demonstrable to others – Action researchers support their findings by detailing their method of data exploration (not just collection).

(ix) AR can be considered to be internally valid if contentions (i) – (viii) are satisfied – Action researchers satisfy the above criteria necessary for internal validity (for their work to be regarded as research) but go further to also satisfy the below criteria necessary for external validity (for their findings to be regarded as representative of the situation in which they were generated and as having claims to generality).

(x) AR use should be justified by focusing on the aspects that other research strategies cannot address – Action researchers are able to generate unique insights by challenging the status quo (through enacting a change process) and link theory with practice to make for outputs that are relevant, readable and persuasive to both academic and practitioner audiences.

(xi) AR should make use of opportunities for triangulation – Action researchers exploit triangulation opportunities to create a dialectic for the development of theory.

(xii) AR findings should only be transferred to other settings after careful consideration of contextual factors – Action researchers regard the history and context of the specific intervention as critical factors in establishing how valid and how widely applicable the results may be.

These 12 contentions, and the later additions that expanded the set to 15 (Eden & Huxham, 1996), most notably adding that AR findings should be disseminated beyond those involved in the study, have been recognised as providing a rich account of AR by other eminent researchers (Checkland & Holwell, 1998a). However, Checkland and Holwell observe that the constitutive definition put forward by Eden

and Huxham whilst comprehensive and rich, has a key deficiency: namely the prior declaration of theory and methodological process. Checkland and Holwell argue that this aspect forms the basis for the 'recoverability' criterion upon which the validity of AR should be established and defended – see contention (viii). Checkland and Holwell (ibid, p. 13) highlight a general model for knowledge creation through research in any mode that comprises three main elements: "*particular linked ideas F are used in a methodology M to investigate some area of interest A*" (ibid, p. 13) (refining the proposal first put forward in (Checkland, 1985) – see Figure 3.1) and note that through deliberate reflection the alert researcher may learn things about all three elements. In the specific case of AR, Checkland and Holwell argue that F, M and A must be declared in advance and continuously reflected upon because, as one or more of these elements are likely to change during the research process, this will aid recoverability and enable the researcher and others to distinguish between researching and novel writing. This approach has been widely adopted and has provided the basis for the design and reporting of a number of recent AR studies (Espinosa et al., 2015; Espinosa & Walker, 2013; Franco & Lord, 2011; Tavella & Papadopoulos, 2015).
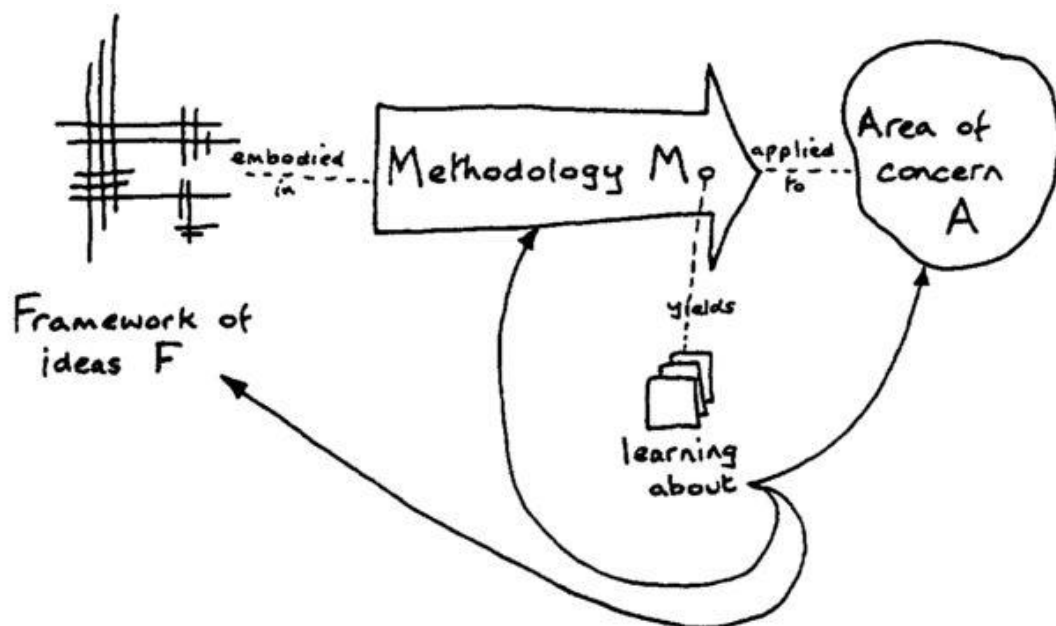
Figure 3.1 – Knowledge creation via research taken from Checkland and Holwell (1998a)

The generic model for AR since Lewin's inception is to plan, act, observe and reflect (or 'fact find' as Lewin had it – (Lewin, 1947)) and for this model to be applied iteratively in multiple loops of change and learning. Checkland and Holwell (1998a) propose a 6 step process model for AR (see Figure 3.2) that also includes negotiating entry and exit from the problematic situation, explicit setting and critical reflection upon the adequacy of M and F and recording of methodological and theoretical insights.
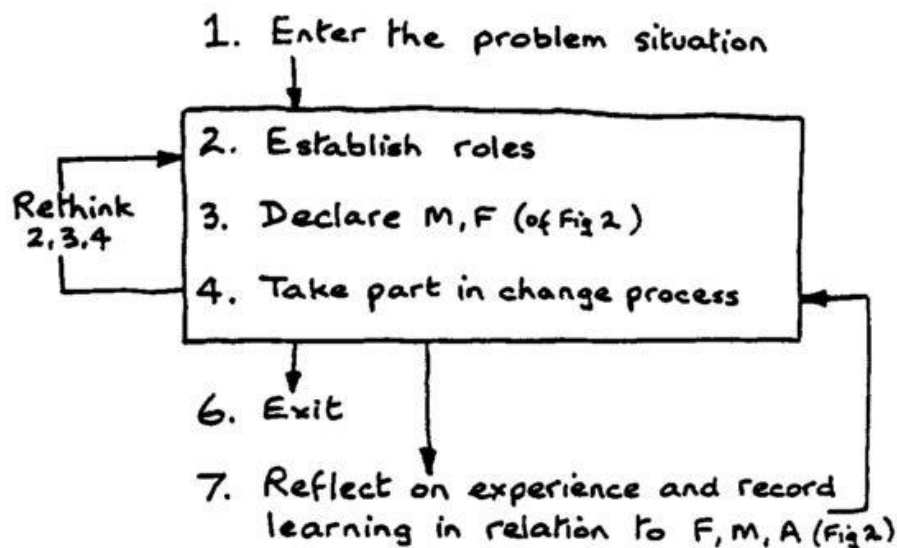
Figure 3.2 – The process of action research taken from Checkland and Holwell (1998a)

3.5   Previewing my Action Research

I conducted my AR in three distinct, but linked, phases with learning transferring between them. Figure 3.3 shows how three phases of core AR supported my thesis AR (Zuber-Skerritt & Perry, 2002) against three research questions.
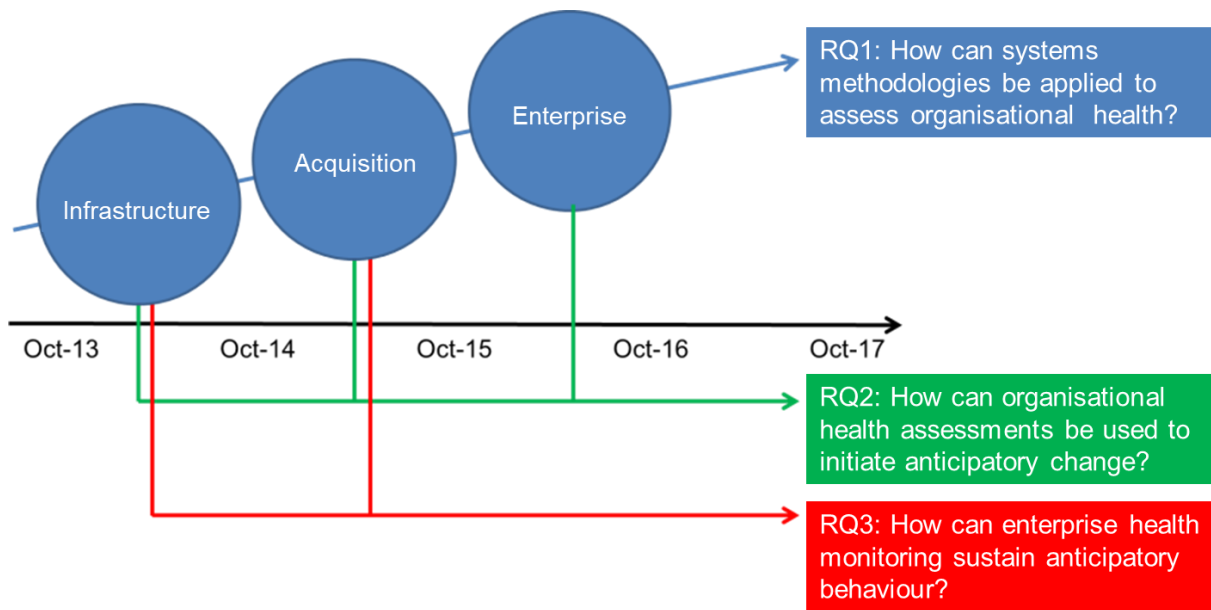
Figure 3.3 – Learning from three phases of Action Research to address three research questions

In the first sub-section below, I describe how in each phase of my core AR I combined a framework of ideas (F) via a Systemic Intervention methodology to develop a bespoke assessment method (M) to assess organisational health within a bounded area of concern (A). These areas of concern became broader as the work progressed, with attention focused first on the Infrastructure Delivery System (Phase 1); second on the Acquisition System (Phase 2); and third on the Defence Enterprise as a whole (Phase 3) – with two tests of this ambitious assessment method being carried out at a smaller scale with regard to the Permanent Joint Headquarters (Phase 3a) and Head Office (Phase 3b). These phases of core AR are mapped against the Defence Operating Model below in Figure 3.4 and described in the first sub-section below using the F, M, A nomenclature (see 3.5.1 – Core Action Research). Note that because the Systemic Intervention methodology is common to all phases, I limit the description of the Methodology (M) to the assessment method developed for each phase.
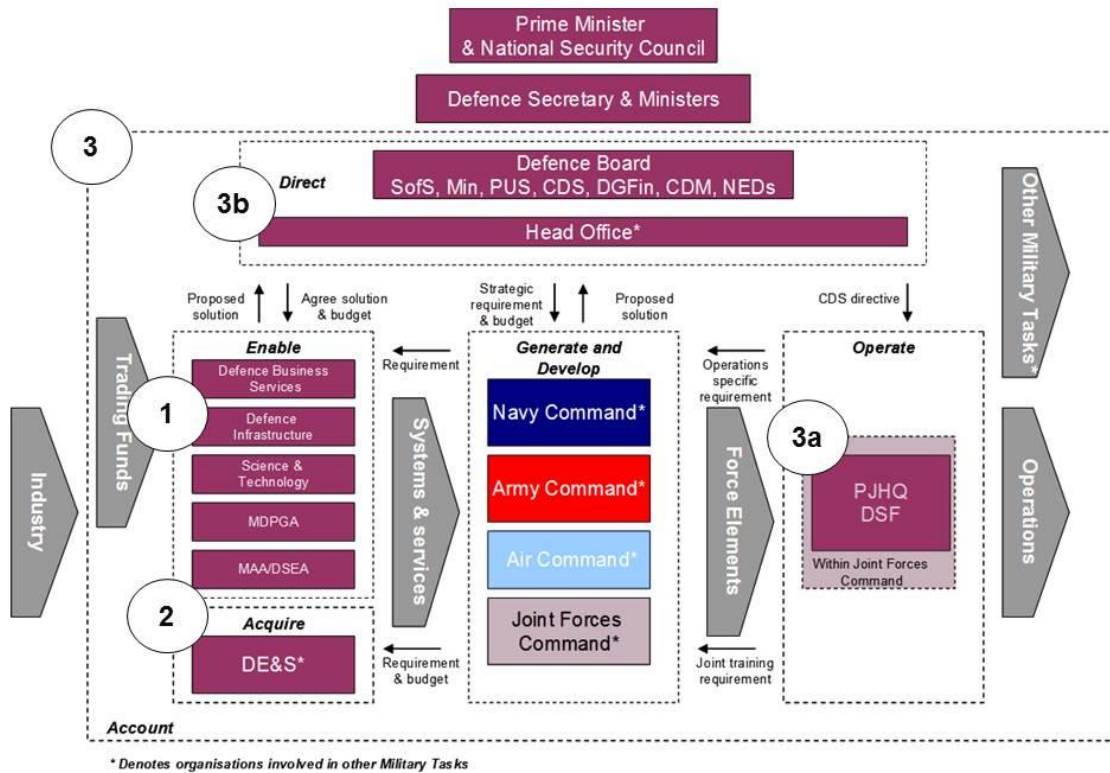
Figure 3.4 – Situating three phases of core action research within Defence Operating model

In the second sub-section below (see 3.5.2 Thesis Action Research), I describe how I involved stakeholders and fellow practitioners in evaluating my core AR to support my thesis AR, and how these evaluations contributed to a continuous process of 'meta-learning' that enabled me to address my three primary research questions: (1) How can systems methodologies be applied to assess organisational health? (2) How can organisational health assessments be used to initiate anticipatory action? and (3) How can organisational health monitoring be used to sustain anticipatory behaviour?

3.5.1 Core Action Research

Phase 1: Infrastructure Delivery System

Phase 1 focused on the health of the Infrastructure Delivery System as the area of concern (A) with the aim of guiding intervention for improvement via the Defence Infrastructure System Programme (DISP). As per the Systemic Intervention methodology, the area of concern was defined through boundary critique to be centred on the operation of the Defence Infrastructure Organisation but also to include the Front Line Commands and other elements of MOD that provide infrastructure requirements

for the DIO to deliver against ('Customer' role) together with the elements of MOD Head Office that provide governance for the operation of the DIO ('Governor' role). The DIO is the part of the MOD that is responsible for building, maintaining and servicing the infrastructure needed to support the UK's Armed Forces and MOD as a whole.

The framework of ideas (F) that the assessment method drew upon included the Viable System Model (VSM) (Beer, 1979, 1981, 1985), Hierarchical Process Modelling (HPM) (J. Hall, Blockley, & Davis, 1998), Problem Structuring Methods (PSMs) (Rosenhead & Mingers, 2001; Yearworth & White, 2014) and Multimethodology (Mingers & Gill, 1997). The VSM was used to identify a set of questions to assess the health of the Infrastructure Delivery System. HPM was used to conduct and visualise the assessments. The multi-methodology approach was used to fuse these ideas together to establish a novel PSM (Lowe, Martingale, & Yearworth, 2016) as per the methodological pluralism aspect of the Systemic Intervention methodology.

The assessment method (M) involved the development, population and visualisation of a new framework model by a small team of Dstl staff. The development occurred over an 11–month period from August 2013 to July 2014 and involved a number of iterations including in response to stakeholder feedback. The population was conducted by gathering key stakeholders together in two facilitated workshops to discuss the various dimensions of the assessment scheme and to record individual scores in an Italian Flag scheme using interval numbers (J. Hall et al., 1998). The visualisation drew upon HPM to present combined scores, again using Italian Flag scheme, alongside key sources of strength, weakness and uncertainty. The assessment method was then developed further by Defence Infrastructure Governance Authority (DIGA) supported by Deloitte to establish and maintain a maturity model to track the benefits being realised by the DISP.

Phase 2: Acquisition System

Phase 2 focused on the health of the Acquisition System as the area of concern (A) with the aim of guiding intervention for improvement via the Acquisition System Health (ASH) initiative. The Area of concern was pre-defined in the Acquisition System Operating Model (ASOM) to include two key delivery agents – Defence Equipment and Support (DE&S) and Information Systems and Services (ISS)

together with the Front Line Commands and other elements of MOD that provide requirements ('Customer' role) together with the elements of MOD Head Office that provide governance for the operation of DE&S and the elements of Joint Forces Command that provide governance for the operation of ISS ('Governor' role). DE&S is the part of the MOD that is responsible for acquisition of equipment, and related support, logistics and services. ISS is the part of the MOD that is responsible for satisfying corporate and operational requirements for Information and Communications Technology (ICT) capabilities and for making sure they are delivered on a day-to-day basis, together with setting strategy, policy and guidance for ICT and managing information across Defence.

The framework of ideas (F) that the assessment method drew upon was largely as for Phase 1, but additional work was conducted to extend the assessment structure to explicitly address the multiple organisations involved and their interaction as specified by the ASOM. The framework of ideas also included lessons learnt in Phase 1 and, in discussion with the MOD sponsor, included a focus on six dimensions for organisational health in order to aid diagnosis and to highlight cross–cutting issues. Again, as for Phase 1, these ideas were integrated together as per the methodological pluralism aspect of the Systemic Intervention methodology to develop a novel assessment method.

The assessment method (M) again involved the development, population and visualisation of a framework model. The development took place over 7 month period from August 2014 to February 2015 and involved applying the VSM to each element group of the ASOM to derive a set of functional requirements and interviewing key stakeholders across the ASOM to ensure that known strengths and weaknesses could be readily highlighted. This method was modified by the MOD customer to yield a simpler assessment scheme, and this has since been implemented by Acquisition Systems Authority supported by KPMG to establish and maintain a model of Acquisition Systems Health that is being used to guide interventions within the acquisition system. This simpler model has been populated via repeated surveys, self-assessments submitted by the constituent organisations and other pertinent information gathered via a combination of routine background reporting and targeted deep dives. The visualisation used the Italian Flag scheme to highlight the risk associated with key areas of uncertainty and weakness.

Phase 3: Defence Enterprise

Phase 3 involved the development and testing of an assessment method that could be scaled to address the Defence Enterprise as a whole over 18 months from March 2015 to July 2016. The testing took place in two sub-sets of the Defence Enterprise – the Permanent Joint Head Quarters (Phase 3a) and Head Office (Phase 3b).

Phase 3a: Permanent Joint Head Quarters

Phase 3a focused on the health of the Permanent Joint Head Quarters (PJHQ) as the area of concern (A) with the aim of identifying areas requiring intervention for sustainable performance. PJHQ is led by the Chief of Joint Operations (CJO) who is responsible for the command of forces deployed on operations overseas. Dstl was tasked by CJO to identify areas requiring intervention to enable sustained high performance of the HQ and I used this opportunity to pilot the new assessment methodology.

The framework of ideas (F) that the assessment method drew upon included a number of theories including VSM, Anticipatory Systems and the associated (Metabolism, Repair) model and Resilience Engineering in addition to a number of empirical models such as Organisational Capability Self-Assessment Tool (New Zealand Ministry of Social Development); Organizational Health Index (McKinsey); Health Check (Bond) and Organizational Assessment Framework (International Development Research Centre) (Lowe & Yearworth, 2016)

The assessment method (M) used a new framework for assessing enterprise health (developed by fusing the ideas detailed above) to structure a series of interviews that identified issues threatening the long-term performance of PJHQ. These issues were presented using a visualisation of the framework including dials and sliders. It is important to highlight that whilst I led the development of the framework, the stakeholder engagement, interviews, visualisation and presentation of results were all conducted by Dstl colleagues.

Phase 3b Head Office

Phase 3b focused on the elements of Head Office that report to the Director General Head Office and Commissioning Services (DG HO&CS) as the area of concern (A). These elements are responsible for the operation of Head Office and for providing governance of the Department's main arms-length bodies which include DE&S, DIO and Defence Business Services (which provides a number of corporate services for the Department). Dstl requested permission from DG HO&CS to pilot the broad assessment methodology in this area and, through negotiation, this focused on understanding whether existing management information and data could be used to populate a health assessment without the need for workshops or interviews.

The framework of ideas (F) that the assessment method drew upon was largely as for Phase 3a, but with the addition of ideas drawn from Group Support Systems, Group Decision Making and Negotiation and Hierarchical Process Modelling (Lowe, Porrett, & Yearworth, 2016). The inclusion of these additional elements was important because of the need to leverage existing data drawn from across MOD, the need to provide clear visualisations and the need to communicate insights to key decision makers who had not participated previously.

The assessment method (M) involved refining and extending the framework developed for Phase 3a to establish a set of positive indicators which could be readily judged to be present / absent / unknown using a mix of secondary data extracted from pre-existing sources of qualitative (survey) and quantitative (management information) data. These indicators were combined to produce Italian Flag assessments at each of the leaf nodes that were aggregated up the hierarchy using explicit assumptions regarding necessity, sufficiency and dependency (Marashi, 2006). Areas for improvement were highlighted either in terms of where performance could be improved (areas marked red) or where uncertainty could be reduced (areas marked white).

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3.5.2 Thesis Action Research

My thesis AR addresses three key research questions. I now describe how I have addressed each in turn below through processes of critical reflection and evaluation conducted with stakeholders and other project members with respect to my three phases of core AR.

RQ1: How can systems methodologies be applied to assess organisational health?

This research question was answered through continuous personal critical reflection throughout, and formal cross-sectional evaluation approach at the end of, each of the three phases of core AR. The formal evaluation approach was designed to provide a consistent basis for methodological learning within and across phases based upon four key design principles: (1) The evaluation should be easy for stakeholders and research team members to understand; (2) The evaluation should be quick for stakeholders and research team members to contribute to; (3) The evaluation should capture all the information necessary to enable insightful analysis; (4) The evaluation should be based upon established best practice. The first two design principles serve to maximise participation by lowering barriers to access (ensuring ease of use) and lowering barriers to engagement (ensuring speed of use). The remaining two design principles serve to maximise the value of the evaluation by focusing attention in the right areas (ensuring comprehensive coverage) and leveraging best practice (learning from others' experience).

The approach that was implemented comprised a set of twenty reflective questions (see Figure 3.5) based upon the framework put forward by Midgley et al. (2013) to evaluate the use of systemic problem structuring methods in workshop settings. This framework covers Purpose, Context, Methods and Outcomes to provide a comprehensive basis for ensuring that evaluations can be compared across situations (in addition to being useful locally). The 'open' questions that I have arrayed under these headings are a subset of those proposed by Midgley et al. in their questionnaire (to make it quick to use), with some being reworded (to make it easy to access). These reflective questions were used to guide discussions in uni–lateral interviews and multilateral workshops with both study stakeholders and research team members.

Purpose

1. What was the expressed purpose of the research (e.g. set by the sponsor)?
2. What other purposes (if any) did the researchers' have?
3. What other purposes (if any) did participants have?
4. Was there any conflict between the participants' purposes?
5. Was there any conflict between the expressed purpose and those held by participants and researchers?

Context

6. What key perspectives, values and issues did participants bring in and what impact (if any) did these have?
7. Did people feel enabled or constrained by wider issues, and what impact (if any) did this have?
8. Were there significant processes of marginalization or exclusion of people and/or issues?
9. How were the researchers seen by themselves and others, and why?

Methods

10. What was the primary method used?
11. What other methods were used?
12. How skilled were the researchers in the method(s) used?
13. Did the method facilitate effective participation?
14. Did the method help participants to think differently?
15. What were the key methodological learning points?

Outcomes

16. How satisfactory were the outcomes?
17. How do the outcomes relate to original purposes?
18. What immediate plans, actions or changes were achieved?
19. What longer-term outcomes been achieved, and can these be linked back to the use of the method?
20. What outcomes (positive and negative) were unanticipated?

Figure 3.5 – Reflective questions used in formal evaluation

RQ2: How can organisational health assessments be used to initiate anticipatory action?

This research question was answered through meta-learning across the three phases of core AR supported by Qualitative Comparative Analysis (QCA) (Ragin, 1987). QCA provides a means to analyse the contribution of different 'causal conditions' (e.g. specific aspects of a situation – either internal or external to the intervention) to a given 'outcome'[4]. QCA spans the gap between detailed qualitative analysis at the case study level and sweeping quantitative analysis across large numbers of cases (e.g. conventional statistical methods), but there is no lower or upper limit of cases that can be considered. QCA uses set theoretical methods to understand causal complexity based upon either crisp

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[4] https://www.betterevaluation.org/en/evaluation-options/qualitative_comparative_analysis [Accessed: 21-Apr-2019]

set (conditions are scored as either 0 for absent or 1 for present) or fuzzy set (condition scores vary continuously between 0 and 1) formulations[5].

QCA is a theory-driven approach in that it tests the contributions of pre-specified causal conditions to achieving an outcome of interest with regard to a number of cases. I identified 13 method factors and 4 context factors that were potentially causal conditions for achieving the outcome of initiating anticipatory action through a combination of literature review, my personal continuous critical reflection and the cross-sectional evaluation described above. The method factors comprise: M1. Apply appropriate methods; M2. Facilitate participation; M3. Structure multiple perspectives; M4. Enable systemic thinking; M5. Enhance mutual understanding; M6. Manage process (and content); M7. Ensure procedural justice; M8. Create boundary object; M9. Support thinking differently; M10. Strengthen inter-relationships; M11. Agree the issue(s); M12. Achieve accommodations; and M13. Identify actions. The context factors comprise: C1. Agreed purpose; C2. Agreed participants; C3 Lack of politics & power issues; and C4 Commitment to work together.

RQ3: How can organisational health monitoring be used to sustain anticipatory behaviour?

This research question was answered by leveraging longitudinal monitoring of the first two phases of AR – 1. Infrastructure and 2. Acquisition – to conduct Realistic Evaluation (Pawson & Tilley, 1997) via interviews with key stakeholders. I selected Realistic Evaluation because of how, unlike experimental evaluation methods, it can be applied in real-world settings to afford insight into not only what outcomes are produced from interventions but also *"how they are produced, and what is significant about the varying conditions in which the interventions take place"* (Tilley, 2000). Realistic Evaluation is a theory based approach that was developed to effectively identify why interventions work differently across different contexts. The aim is to understand how a given Outcome (O) was caused through the application of a given Mechanism (M) in a given Context (C). In particular Pawson and Tilley[6] argue that the aim of Realistic Evaluation should be to produce 'middle range theories' that are specific enough to test and general enough to apply across different situations. Middle range theory

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[5] https://eprints.ncrm.ac.uk/250/1/What_is_QCA.pdf [Accessed: 21-Apr-2019]

[6] https://www.betterevaluation.org/en/approach/realist_evaluation [Accessed: 19-Apr-2019]

"lies between the minor but necessary working hypotheses … and the all-inclusive systematic efforts to develop a unified theory that will explain all the observed uniformities of social behavior, social organization and social change" (Merton, 1968).

The process of Realistic Evaluation begins and ends with theory – see Figure 3.6 – in that the purpose is as much to test and refine the proposed theory and models of intervention (i.e. what mechanisms work in what contexts to achieve what outcomes) as it is to determine whether a specific programme worked in a specific setting. My proposed theory and models of intervention are developed with reference to Actor Network Theory that has been used to identify four pre-conditions necessary for successful (reactionary) interventions (White, 2009) following earlier work (Callon, 1986). These comprise: (1) Problematisation: What is the problem that needs to be solved?; (2) Interessement: Are the actors interested and negotiating the terms of their involvement?; (3) Enrolment: Do the actors accept the roles that have been defined?; and (4) Mobilisation of allies: Do the actors have the support of wider actors? My proposed theory is that organisational health monitoring can bring about these pre-conditions as necessary steps to sustaining anticipatory behaviour. Accordingly, I developed three starting hypotheses with key stakeholders draw from the Infrastructure context: (a) Organisational health monitoring can identify risks that need to be addressed (problematisation); (b) Organisational health monitoring can convince immediate stakeholders that they have roles to play in addressing risks (interessment, enrolment) and (c) Organisational health monitoring can convince wider stakeholders that resolving risks should have their support (mobilisation of allies). I then used these hypotheses to structure interviews with key Acquisition stakeholders to elicit their observations and test these hypotheses.
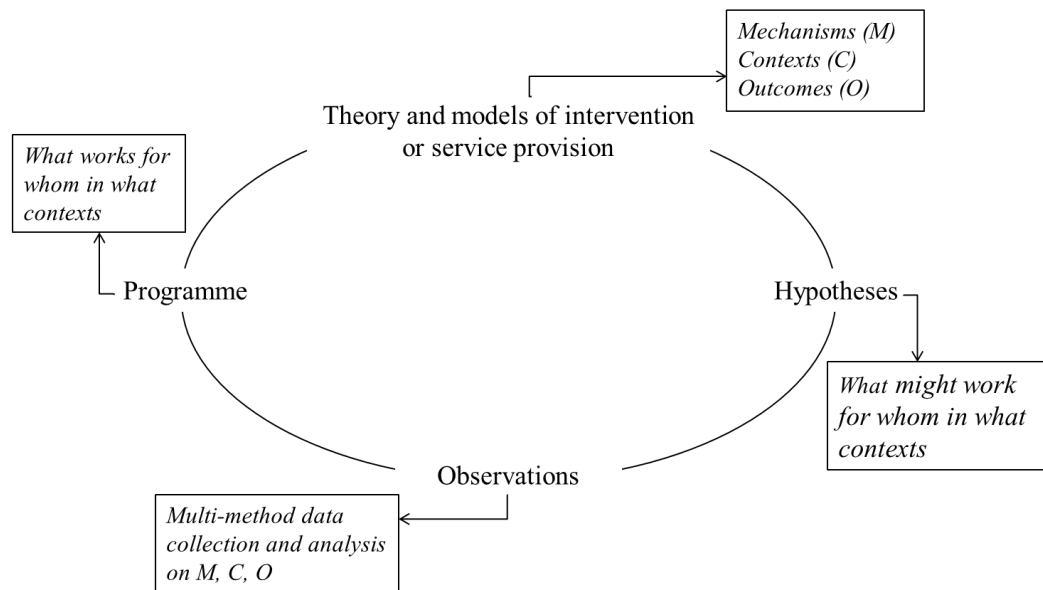
Figure 3.6 – The realist evaluation cycle redrawn from Pawson and Tilley (1997, p. 85)

3.6   Summary

In this chapter I introduced and described the key characteristics of AR and evidenced how it is widely recognised as a rigorous 'process' methodology. In particular I described how AR is an umbrella term for a shower of activities that have diversified from common origins but that are united by the unique aspect that is the dual focus on taking action (to bring about improvement in the specific situation) and conducting research (to contribute to the body of knowledge). I also described 10 key characteristics for AR (Gummesson, 2000) and highlighted how AR is almost exclusively associated with inductive knowledge generation leading to emerging theory.

I then justified AR as the most appropriate methodology to use both for the specifics of my research challenge and for the specifics of my practice, before discussing what makes for good AR. I highlighted that good AR should be 'recoverable' (as opposed to the 'repeatable' associated with positivist science) and the implications that this has for reporting AR in terms of making clear what was done, why it was done and how the conclusions were drawn. I also highlighted the AR process model developed by Checkland and Holwell (1998a) that will provide the structure for my reporting of core AR in Chapters 4, 5 and 6.

Finally, I explained how I conducted three phases of core AR with an increasingly wide focus of inquiry from Infrastructure to Acquisition and finally the Defence Enterprise (with pilots conducted for

Permanent Joint Head Quarters and Head Office) using the Framework of ideas – Methodology – Area of application (FMA) model for knowledge creation also developed by Checkland and Holwell (1998a). I then explained how I made use of both cross-sectional and longitudinal evaluations to address my three primary research questions using (respectively): an adaptation of the framework for systemic evaluation proposed by Midgley and co-workers (Midgley et al., 2013); Qualitative Comparative Analysis (Ragin, 1987) and Realistic Evaluation (Pawson & Tilley, 1997).

Chapter 4 – Assessing the health of the Defence Infrastructure System

4.1   Introduction

This chapter describes the Systemic Intervention (Midgley, 2000) conducted with regard to the Defence Infrastructure System that forms the first of three phases of my core AR. The description is structured using the six step model for AR proposed by Checkland and Holwell (1998a) to ensure that this account is both comprehensive and aligned with AR quality criteria[7]. This main period of activity was from January 2013 through August 2014 with pre-work conducted immediately prior to this period and subsequent monitoring being conducted up to and including July 2018 (see Figure 4.1). The description provided in this chapter is based upon project documentation that was produced in the course of the work, research notes that were made contemporaneously as the work progressed, discussions held with the project team (as part of project closure) and interviews conducted with key stakeholders.
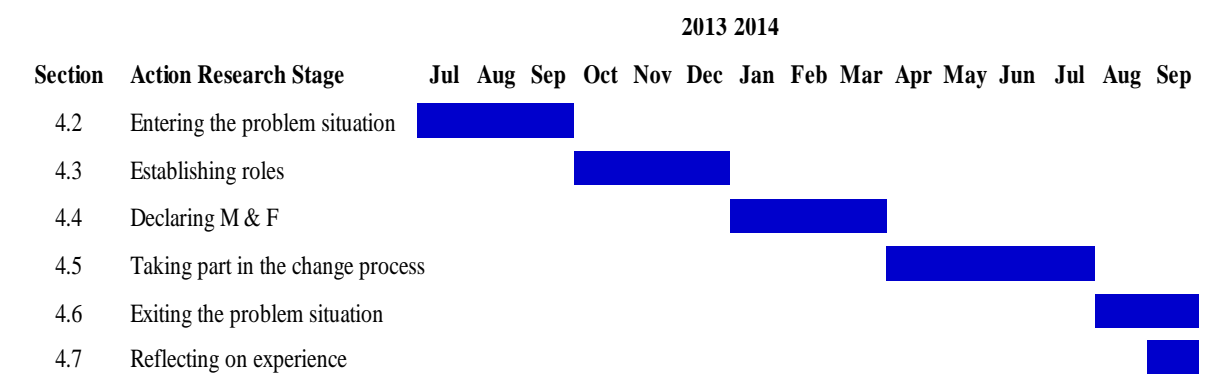
Figure 4.1 – Timeline for Defence Infrastructure System Core Action Research Cycle

In the course of the work, the boundary for the Defence Infrastructure System – proposed and accepted as an appropriate focus for this inquiry – was defined through Boundary Critique (Midgley et al., 1998) to encompass the Defence Infrastructure Organisation (DIO) together with the elements of MOD Head Office that provide governance for the operation of the DIO ('Governor' role) and the Armed Forces and other elements of MOD that provide infrastructure requirements for the DIO to deliver against ('Customer' role). The DIO was created in April 2011 to *"coherently manage delivery against MOD's infrastructure requirements"* from a number of organisations distributed across

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[7] Note that a less detailed account was published in 2016 in the Journal of Operational Research Society – see Lowe, Martingale, et al. (2016) as per the References section – for which I was the main author.

Defence as part of the Levene Review on Defence Reform[8]. It has an annual budget of more than £3B that is spent building, maintaining and servicing the infrastructure necessary to enable MOD personnel – both military and civilian – to live, work, train and deploy both in the UK and overseas. The DIO manages more than £20B of assets spread over 4,000 sites in the UK and around the world, including but not limited to: Cyprus, Gibraltar and the Falkland Islands.

The DIO is the largest property manager in the UK. In March 2014, the MOD was reported[9] to own 228,000 hectares of land and foreshore and to hold rights over a further 205,000 hectares which amounts to 1.8% of the UK land mass. Approximately one third of the owned estate is classed as 'built' and includes airfields, naval bases, living accommodation, storage and distribution centres, communications facilities and office buildings. The remaining two thirds comprises mainly training areas and ranges on undeveloped rural land. When this research commenced in 2013, one of the key activities for the DIO was to reduce these holdings in alignment with reductions in the size of the Armed Forces. In addition to reducing running costs, sales of surplus holdings provided for significant financial gains that could be reinvested and contributed to wider government initiatives to provide additional land for housing.

4.2   Entering the problem situation (Jul 13 – Sep 13)

In 2013 MOD was considering major changes to its infrastructure system centred on the Defence Infrastructure Organisation (DIO), and to its acquisition system centred on Defence Equipment and Support (DE&S). Various options were under consideration for the structure and operation of these bodies that included the outsourcing of certain functions external to the core MOD organisation. For DIO, the aim of introducing a Strategic Business Partner[10,11] was to drive further efficiency and effectiveness within the DIO by acting as the senior management team and injecting knowledge and expertise developed in the private sector. For DE&S, the aims of transitioning to an enhanced DE&S

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[8] https://www.gov.uk/government/publications/defence-reform-an-independent-report-into-the-structure-and-management-of-the-ministry-of-defence--2 [Accessed: 07 January 2019]

[9] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/304504/DIO_EIR_30March2014.pdf [Accessed 07 March 2019]

[10] https://www.gov.uk/government/news/dio-awards-contract-for-strategic-business-partner [Accessed: 07 March 2019]

[11] https://www.gov.uk/government/news/dio-welcomes-new-strategic-business-partner [Accessed: 07 March 2019]

operating model (DE&S+) or a Government Owned Contractor Operated (GOCO) model as part of the 'Material Strategy'[12] were similar – to *"operate differently to become more effective and more efficient"*, but also sought to establish a *"DE&S with engaged and motivated staff and the behaviours, accountabilities, skills and processes required to do the job"*.

In July 2013, the Defence Transformation Unit (DTU) tasked Dstl to highlight the opportunities and threats to the newly established Defence Operating Model presented by making further changes within DIO and DE&S. The DTU were primarily concerned with the impacts associated with outsourcing delivery within these key enablers and approached Dstl based on the reputation built through previous work in this area that was delivered in October 2012[13]. This previous work comprised a literature review and analysis of nine case studies relating to the outsourcing of major services and capabilities for MOD, National Health Service, Department for Transport, UK Border Agency and US Department of Defense, that were assessed as relevant to Defence Transformation. These case studies were selected to span the spectrum of success, from those with very positive outcomes to those which ended disastrously, and the spectrum of complexity from small scale tightly bounded projects to large scale enterprise–wide projects. Analysis of and across these case studies identified eight themes for effective outsourcing that should be considered by project teams developing and delivering outsourcing models as an integral part of the design, management and review of these projects: (1) Understanding and managing the system as a whole; (2) Setting and managing requirements; (3) Governing (inc. via portfolio/programme management); (4) Building relationships between 'customers' and 'suppliers'; (5) Managing contracts; (6) Establishing appropriate incentivisation; (7) Sustaining knowledge/capability; and (8) Avoiding monopolies.

I was appointed to lead the Dstl response to the DTU task upon returning to Dstl from an exchange with the United States Department of Defense (DoD) in August. Whilst I had no prior experience of supporting organisational change, I was familiar with the key tenets of Defence Reform and had met some of the senior MOD staff involved whilst in my exchange post where I had brokered

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[12] https://www.gov.uk/government/news/new-defence-materiel-strategy-announced [Accessed: 07 March 2019]
[13] Predicting the Risks and Opportunities of Outsourcing Associated with Defence Transformation – Literature Review and Analysis, DSTL/CR66906, 30 October 2012. [Not publically available]

their interactions with senior DoD staff. I was also familiar with the basic principles of systems engineering and systems thinking from Dstl roles previous to my exchange and had contemporaneously resolved to develop my competence in this area by enrolling on the Systems Engineering EngD programme at the University of Bristol. Lastly, and perhaps most importantly, I had developed knowledge, skills and experience in communicating with and delivering analysis to senior leaders from previous roles – both in the UK for MOD and Other Government Departments and in the United States.

In response to the tasking from DTU, I worked with a variety of Dstl colleagues – including those who had supported and/or were still supporting Defence Reform – to propose a work plan for Defence Enterprise Analysis (DEA) in three phases – see Figure 4.2. I presented this plan to the customer and gained their agreement that the proposal would satisfy their requirements. I also gained the agreement of the Dstl programme manager that the proposal aligned with their research mandate (and so could be funded from the central MOD research budget without the need for the DTU to provide funding). Lastly I gained agreement from Dstl management as to how the approach should be resourced – with limited time available and a large number of stakeholders to engage and manage, I requested and was allocated three senior colleagues to join me in forming the core study team, in addition to a number of more junior colleagues to support our activities (and to develop their capabilities).

Work Plan

<u>Phase 1 (August 2013 – December 2013)</u> – *Analyze the interactions between DIO and the remainder of the Defence Enterprise and identify key risks associated with the operating models under consideration*

A systems visualization will be constructed to capture the 'as is' key interfaces between DIO and the wider Defence Enterprise as described in the New Defence Operating Model as of April 2014. It is assumed that this visualization will be built using existing documentation and information provided by DIO, and validated through engagement with key stakeholders.

Additional visualizations will then be constructed to capture multiple potential "to be" interfaces associated with the introduction of a Strategic Business Partner - including "unincorporated", "incorporated" and potentially additional operating models. It is assumed that these visualizations will be built using existing documentation and information provided by DIO, and discussed with key stakeholders.

Analysis will then compare "as is" against (multiple) "to be" models. It is anticipated that Phase 1 will culminate with a Stakeholder workshop to discuss and validate the study outputs.

Deliverable: Presentation and summary report (December 2013)

<u>Phase 2 (September 2013 – March 2014)</u> – *Analyze the interactions between DE&S and the remainder of the Defence Enterprise and identify key risks associated with the operating models under consideration*

This work will employ a similar approach as for Phase 1, although the system in this case is larger and more complex. Two models will be examined in the context of the New Defence Operating Model: an enhanced in-house model where DE&S remains within MoD (DE&S+), and a 'Government Owned, Contractor Operated' (GOGO) model.

Deliverable: Presentation and summary report (March 2014)

<u>Phase 3 (January 2014 – July 2014)</u> – *Identify transition issues associated with the introduction of new DIO and DE&S operating models*

Assuming that one or both decisions results in the introduction of new operating models, this study will then examine the transition plans in order to identify potential issues and risks. This work will build on the studies conducted in Phase 1 & 2, but will focus on the transition process rather than the appropriateness of the selected model.

Figure 4.2 – Defence Enterprise Analysis Work Plan (dated 13th September 2013)

The next section describes the work that was delivered in Phase 1 to support the scrutiny of a formal business case to introduce a Strategic Business Partner (SBP) within the DIO (in January 2014). The subsequent sections then describe the further work that lasted until August 2014 to design a major change programme to make the most of this significant investment. The work planned for Phase 2 and Phase 3 never occurred as events changed the course of the study. The work that was conducted in support of the Defence Acquisition System (centred on DE&S) is described in Chapter 5.

4.3   Establishing roles (Oct 13 – Dec 13)

Through the process of proposing, negotiating and agreeing the work plan, the study team established their dual roles with the DTU as both consultants working for them (delivering the results necessary to support the scrutiny of the SBP business case) and as researchers working to the MOD research programme (delivering insights for the wider benefit of MOD). This duality required careful management at times to ensure appropriate balance, but also served to help broker relationships with wider stakeholders that were critical to the success of the work.

As part of the proposing, negotiating and agreeing of the work plan it was highlighted that the quality, depth and timeliness of the analyses was in part dependent on the quality, depth and timeliness of the information available and that there was a risk that failing to engage with key stakeholders (most importantly including DIO, but also the Front Line Commands) would impact one or more of project quality, cost and duration. Given that the task could not be extended because of the investment approval timelines and that the work needed to be of sufficient quality to influence senior leaders in their decision making, an early task therefore was to identify and engage these stakeholders in order to secure their support for the duration of the work. The identification was carried out in conjunction with the DTU customer and included key posts in the DIO together with the key post in each of the Front Line Commands – Army, Royal Air Force, Royal Navy and Joint Forces Command. The engagement was done in pairs by members of the study team during October and November on visits to various locations across the UK.

In each engagement, the study team members, working from core scripts, took the opportunity firstly to introduce themselves and our tasking, secondly to understand their perspectives on the current state of affairs and lastly gain access to key documentation or further contacts that we should engage with. In introducing our tasking we made clear that, whilst we were supporting the DG (and so acting on his authority), we were also working for everyone in the situation. It is important to recognise that infrastructure is rarely a priority for Front Line Commands whose capability management activities are usually dominated first by procuring new equipment and second by recruiting, training and retaining personnel. The study therefore presented a rare opportunity for infrastructure leads to raise issues and have them addressed. In the process of understanding the various perspectives, the study team members

were able both to build rapport with key stakeholders by showing an interest and empathy with their situations and to demonstrate the potential for our technical skills to add value within the problematical situation by using diagramming and other systems concepts to check on what was being communicated. In gaining access to key documentation we were able to check what was being said against official records and also to build our knowledge of key terms in order to better speak the language of the problematical situation.

Throughout October and November I chaired synchronisation meetings where the team members came together to discuss their progress in arranging visits and the key insights arising from these and where I was able to share the latest insights from my engagements with both the DTU customer and Dstl programme managers relating to our delivery approach and timescales. Towards the end of November we came together as a team to share and then cluster all key themes emerging from the interviews to form an initial assessment of the problematical situation. This produced 22 clusters that, whilst not generated using the eight themes identified from previous work, mapped neatly against them. Arranging these clusters under the eight themes to form a hierarchical assessment framework – see far below in Figure 4.3 – had two key benefits. First and foremost it made for clear communication and structured thinking because arranging the 24 assessments under 8 headings, made for at most 6 clusters to be discussed at any one time. Second, it established a link with previous work which was both familiar to the customer and highly regarded by them.

In December the study team called and ran a workshop with all key stakeholders attending with the aim to: (i) validate our initial assessment of the 'as is' management arrangements for the DIO (based upon the newly established DIO Enhanced Operating Model or 'EOM'); (ii) explore how these assessments might project into the future by three years or 'EOM+3' without any further intervention; and (iii) identify the areas in which the introduction of a SBP could help. The assessments for (i) and (ii) used a simple Red – Amber – Green scale to respectively highlight the weaknesses, mixed performances and strengths. The potential impacts identified for (iii) were coded High, Medium or Low. The team stepped through the framework briefing these assessments and the supporting rationale for them derived through interviews before facilitating a discussion to consensus on what the assessments should be. The team then invited the DIO representatives to brief on the latest plans for

introducing a SBP which had hitherto not been made clear to the Front Line Command customers. The team then invited all stakeholders – DIO and Front Line Commands – to assess whether the introduction of a SBP as described would make an impact and why. Figure 4.3 displays these results. The workshop was well received by the stakeholders who valued the opportunity to learn about how the SBP was to be introduced and the opportunity to contribute to the assessment of both the current arrangements and how a SBP would likely impact these.

These assessments, along with specific recommendations for action, were presented to the DG who found them to be *"very clear"* and the effort to be *"a very good piece of work"* – see Figure 4.4 for the summary slide from this presentation. In particular it was recommended that MOD Head Office scrutinise the Main Gate Business Case (MGBC) – submitted in January 2014 to seek MOD final approval to release the funds necessary for an SBP investment – with regard to the ability to address the key shortfalls identified for the current management arrangements and the ability to realise benefits in specific areas (both as per the results displayed in Figure 4.3). However, given that many of the shortfalls identified in *Understanding and Managing the Whole System* risk area persist even with the introduction of a SBP, it was also recommended that MOD Head Office consider the need for additional intervention. Specifically it was recommended that MOD Head Office *"initiate separate work to address the following shortfalls that impact the delivery of infrastructure sites and services, but that fall outside the MGBC approval envelope: (a) Establish a framework to manage the interdependencies in order to synchronise investment decisions across Defence; (b) Develop a method to understand risks and benefits to the Defence Enterprise associated with these investment decisions in order to develop coherent policy and to balance resources".* The next section describes how the study team proceeded to address part (b).

#	Key Risk Area / Underlying Issue	EOM 2013	EOM 2016	SBP 2016
1. Understanding and Managing the Whole System				
	Understanding Risks and Benefits to the Defence Enterprise			
	Synchronising Investment Decisions across Defence			
	Policy for Infrastructure			
2. Requirement Management				
	Defining Requirements			
	Prioritising Requirements			
3. Effective Governance and Portfolio/Programme				
	Top level Governance			
	Mid level Governance			
	Strategy Formulation			
	Programme Formulation			
	Project Design and Approvals			
	Project Delivery			
	Holding to Account			
4. Knowledge/Capability Sustainment				
	Management Information			
	DIO Suitably Qualified and Experienced Personnel			
	TLB Suitably Qualified and Experienced Personnel			
5. Effective Relationships				
	Strategic Relationships			
	Operational Relationships			
	Tactical Relationships			
6. Effective Incentivisation				
	User Incentivisation			
	DIO and TLB Incentivisation			
	Supplier Incentivisation			
7. Coherent Contract Services				
	Coherent contracting of services			
	Standardisation of service delivery			
8. Need for Effective Competition				
	Competition between service delivery suppliers			

Figure 4.3 – Areas of concerns and potential for SBP to positively impact - REDACTED
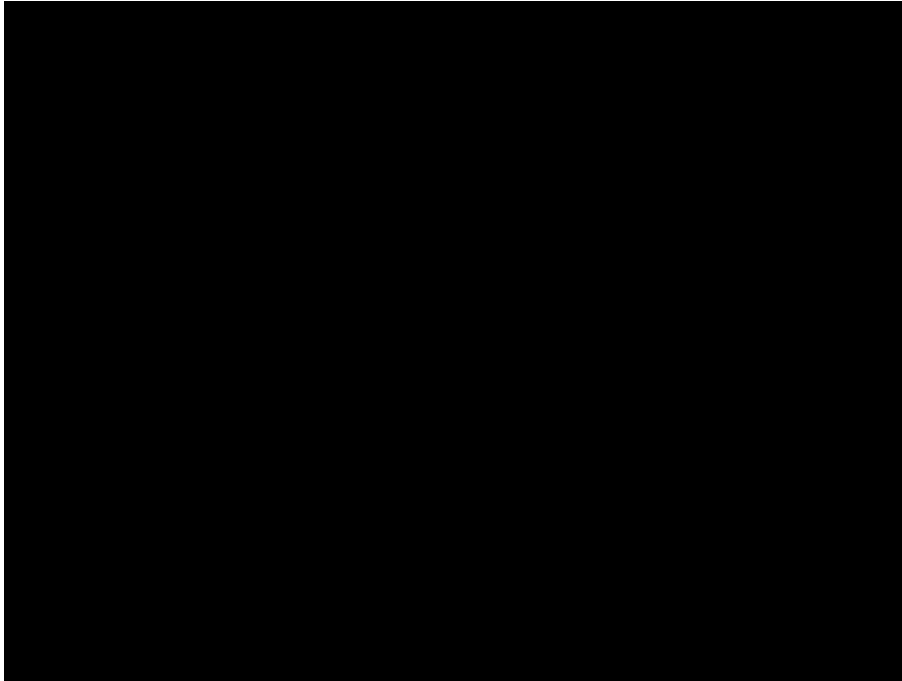
Figure 4.4 – Summary slide from presentation delivered to DG Transformation - REDACTED

Key Observation # 1 – Collaborative working is vital to beginning transformational change

The process of bringing key stakeholders together to formulate a collaborative assessment of the problematical situation proved to be transformative not only in building shared awareness of the situation, improving working relationships and agreeing priorities for action but also in establishing the study team's credibility as impartial brokers with valuable knowledge, skill and experience who can help bring about improvements.

4.4 Declaring M and F (Jan 14 – Mar 14)

Whilst I and the study team were pleased that we had delivered well in the time available before the MGBC submission, we were aware that we had only reported the issues that were highlighted to us by the expert stakeholders and it was possible that we had not considered everything necessary to make the intervention a success. We were also aware that we had only accessed an expert but nonetheless very small sample of the people involved in delivering the Defence Infrastructure System. This led us to question what risks we had missed because we did not ask the right questions or because stakeholders did not bring them forward.

In response I set out to design a Problem Structuring Method to support a more rigorous assessment that would address these concerns in close partnership with a colleague and at greater distance with my supervisor (Lowe, Martingale, et al., 2016) as we returned to work after the Christmas break in January. As described in Chapter 2, Problem Structuring Methods (PSMs) *"provide decision makers with systematic help in identifying an agreed framework for their problem"* (Rosenhead, 1996, p. 117) in situations that are typically characterised by the existence of multiple actors, multiple perspectives, incommensurable and/or conflicting interests, important intangibles and key uncertainties (Mingers & Rosenhead, 2004). In this endeavour I was acting firmly in researcher mode (as opposed to consultant mode) because whilst the SBP MGBC was being considered there was very little draw upon Dstl to deliver further work to our customer. My approach was to draw upon broad framework of ideas – as per the methodological pluralism aspects of Systemic Intervention (Midgley, 2000) – in order to develop a comprehensive framework that would first enable us to solicit stakeholder views (potentially at very large scale via survey) and then to integrate these inputs from across the Defence Infrastructure System, to achieve the aim of identifying areas of strength, areas of weakness and areas of uncertainty therein. The wider aim was to apply this framework in other areas of Defence or even more broadly still.

In order to ensure comprehensive coverage in our framework design, we drew heavily upon the Viable System Model. This course of action was informed by familiarisation activities that both I and my colleague had engaged in with expert practitioners (Fractal Consulting) as part of a wider Dstl capability development effort, and by my colleague's subsequent experience of applying VSM to our own organisation to inform transformation activities within Dstl. As described in Chapter 2, Stafford Beer developed the VSM (Beer, 1979, 1981, 1984, 1985) by applying cybernetic theory to the management of organisations and established that the viability of an organisation to exist in its environment is dependent on the capacity of, and effective links between, five key system elements. We used these 'invariances', and the interactions necessary between them, to provide a comprehensive top-level framework for assessment – see Figure 4.5. Note that that we named Beer's invariances as: Strategic Leadership (S5), Strategy Formulation (S4), Operational Management (S3), Coherence and Assurance (S2) and Project Delivery (S1) and that we applied VSM recursively to set the operation of

the infrastructure system within the wider context of the Defence Operating Model (for which we excluded consideration of Beer's S5 and S4 owing to their distance from the operation of the infrastructure system).
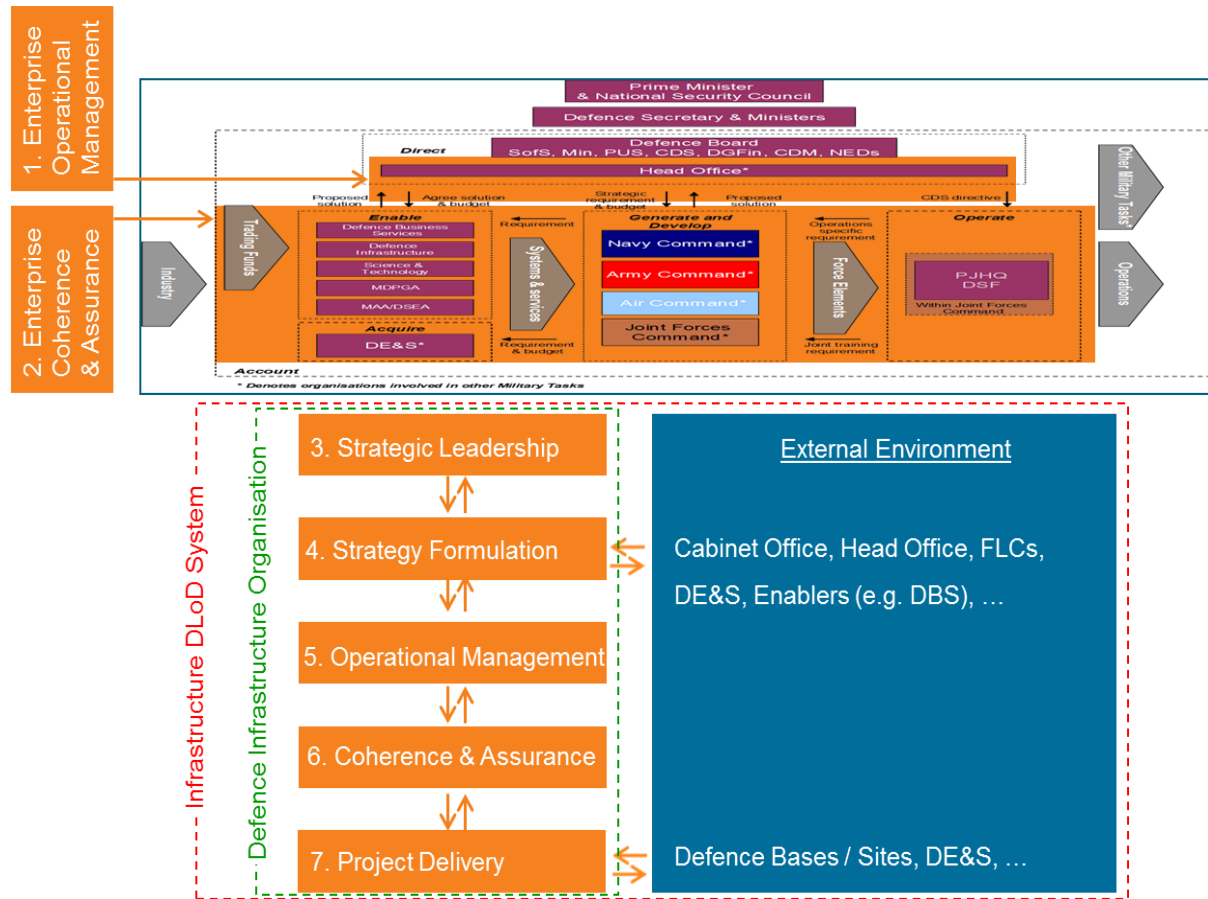
Figure 4.5 – Putative top-level structure for assessing the Defence Infrastructure System

The top-level framework was developed in a series of internal workshops throughout January and February to provide further detail such that it could be operationalised for use in assessment. This included adding sub-headings and posing closed questions to which the answers would be yes / no / do not know. This morphology is illustrated in Figure 4.6 and the detailed framework is attached in Appendix 4–1 (p. 227). Note that this framework is functional in nature in that it guides assessment of whether key functions can be performed independent of which part (or more likely parts) of the organisation are involved. In logically expanding the framework in a hierarchical way, in seeking to array positive evidence, negative evidence and uncertainty against it, and in focusing on function (and

not form) I recognised how this approach aligned with Hierarchical Process Modelling (HPM) that I had been introduced to during the taught course elements of my EngD programme.

Organisational Element/Interface	Question	Yes	Don't Know	No
1.Defence Enterprise				
1.1 Defence Enterprise Operational Management				
1.1.1	Does robust process exist to translate 'Defence Strategy' into 'TLB Delivery Direction' (e.g. programming to deliver against customer and internal change requirements)?			
1.1.2	Is 'TLB Delivery Direction' to DIO coherent with external strategic requirements? What mechanisms are in place to ensure coherence?			
1.1.3	Is 'TLB Delivery Direction' to DIO coherent with internal strategic requirements? What mechanisms are in place to ensure coherence?			
1.1.4	Is 'TLB Delivery Direction' coherent pan-TLB? What mechanisms are in place to ensure coherence?			
1.1.5	Do clear and measureable pan-TLB/DLOD success factors exist that are clearly linked to 'Defence Strategy' success factors?			
1.1.6	Are clear standards and controls set for all relevant facets of the 'Defence Enterprise's' (pan-TLB) business (e.g. operational delivery, SHEF, quality, commercial practice, financial pract...			
1.1.7	Are appropriate decision making mechanisms in place for all relevant facets of 'Defence Enterprise Operational Management'?			
1.1.8	Is effective pan-TLB/pan-DLOD risk management practice in place, informed by appropriate MI from the TLBs?			
1.1.9	Does the 'Defence Enterprise Operational Management' body posess the people, skills, information, process, ways of working, infrastructure to operate effectively?			
1.1.10	Are clear and consistent limits of autonomy set for each 'TLB' unit of the 'Defence Enterprise'? Is autonomy optimised?			
1.1.11	Are limits of autonomy set to ensure each 'TLB' delivery unit of the 'Defence Enterprise' (TLBs) is able to function as a part of the integrated 'Defence Enterprise'?			
1.1.12	Are limits of autonomy set to ensure that a single 'TLB' delivery unit of the 'Defence Enterprise' cannot threaten the survival of the 'Organisation' as a whole?			
1.2 Linking Defence Enterprise Operational Management to TLB Delivery Units				
1.2.1	Does the 'Defence Enterprise Operational Management' body communicate 'TLB Delivery Direction', success factors, delivery requirements, standards and controls effectively to each...			
1.2.2	Are clear resource allocation mechanisms in place, to provide each 'TLB' delivery element of the 'Defence Enterprise' with appropriate funding, human capital, infrastructure and facili...			
1.2.3	Does the 'Defence Enterprise Operational Management' body communicate reporting requirements for all relevant facets of the 'Defence Enterprise's' business to all TLBs?			
1.2.4	Are all limits of of autonomy communicated clearly to 'TLB' delivery units?			
1.2.5	Are there mechanisms in place to allow 'TLB' delivery units to feedback to the 'Defence Enterprise Organisational Management' body?			
1.2.6	Is the 'Defence Enterprise Operational Management' body provided with appropriate inputs (MI etc) to support the formulation of effective 'Defence Enterprise Delivery Direction'?			
1.2.7	Is the 'Defence Enterprise Operational Management' body provided with appropriate inputs (MI etc) to allow tracking and management of 'TLB' delivery, including against 'Defence Str...			
2. Defence Enterprise Coherence and Assurance				
2.1 Defence Enterprise Delivery Coherence				
2.1.1	Is there clarity over the purpose of each TLB?			
2.1.2	Are interfaces between each TLB clearly articulated and understood?			
2.1.3	Are clear common processes and practices in place for all relevant facets of 'TLB' business (e.g. operational delivery, quality, commercial practice, financial practice, HR practice,...			
2.1.4	Does the 'Delivery Coherence' body posess the people, skills, information, process, ways of working, infrastructure to operate effectively?			
2.1.5	Are all common processes and practices communicated clearly to all TLBs?			
2.1.6	Are there clear, well understood and accessible routes for TLBs to feedback on the appropriateness of commmon processes and practices?			
2.2 Defence Enterprise Audit and Assurance				
2.2.1	Are mechanisms in place to ensure the compliance of the 'TLBs' with process, practice, standards, controls and delegated authorities?			
2.2.2	Are the mechanisms to ensure the compliance of all TLBs with process, practice, standards, controls and delegated authorities effectively communicated to TLBs?			
2.2.3	Are assurance and audit activities prioritised against their contribution to strategic benefits, 'Defence Strategy' and 'Defence Delivery' success factors, and against 'Defence Enterprise'...			
2.2.4	Are other healthchecks in place to assess e.g. employee engagement, safety culture, quality culture across 'TLBs'?			
2.2.5	Does the 'Audit and Assurance' body posess the people, skills, information, process, ways of working, infrastructure to operate effectively?			
2.2.6	Are there clear, well understood and accessible routes for TLBs to feedback on issues relating to the implementation of commmon processes and practices?			
3. Strategic Leadership				
3.1 The Board				
3.1.1	Does the 'Board' set a clear scope, vision, purpose for the 'Organisation' and clearly articulated 'Strategic Benefits'?			
3.1.2	Is 'Board' decision making focussed on achieving strategic benefit?			
3.1.3	Does the 'Board' posess the people, skills, information, ways of working, infrastructure to operate effectively?			
3.1.4	Does the 'Board' employ effective 'Strategic' risk management practice, informed by appropriate MI from the DIO?			
3.1.5	Does the 'Board' communicate scope, vision, purpose and strategic benefits effectively?			
3.1.6	Is the 'Board' provided with appropriate support (MI etc) to support effective decision making?			
3.1.7	Is the 'Board' provided with appropriate support (MI etc) to allow tracking of the achievement of 'Strategic Benefits'?			
3.1.8	Are there mechanisms in place to allow the Infra DLoD community (DIO, Customers, Users) to feedback to the Board on its direction?			
4. Strategy Development				
4.1 Customer Relationships				
4.1.1	Is there a clear pan-DIO understanding of the external environment at a strategic level, including identification of key strategic stakeholders?			
4.1.2	Does the DIO have clear and stable mechanisms in place to interface with and influence key strategic stakeholders?			
4.1.3	Are 'Customers' able to effectively articulate and prioritise those strategic requirements against which they wish the DIO to deliver?			
4.1.4	Is there a clear mechanism for provision of strategic 'Customer' requirements into the DIO?			
4.1.5	Is there a clear mechanism for the DIO/SBP to respond to strategic customer requirements?			
4.1.6	Do the 'Customers' posess the people, skills, information, ways of working, infrastructure to effectively articulate and prioritiseDefence Infra requirements?			
4.2 Strategy Development				
4.2.1	Is strategy formulation comprehensive (addressing delivery, people, capability, enablers?)			
4.2.2	Is strategy coherent with itself (longterm vs short term, delivery vs resource, national vs regional etc)? What mechanisms are in place to ensure coherence?			
4.2.3	Does the 'Strategy' body posess the people, skills, information, ways of working, infrastructure to operate effectively?			
4.2.4	Is strategy coherent with 'Board'-set strategic benefits? What mechanisms are in place to ensure coherence?			
4.2.5	Is strategy coherent with strategic Customer/User requirements? What mechanisms are in place to ensure coherence?			
4.2.6	Are clear and measureable success factors identified that link to 'Strategic Benefits' identified by the 'Board'?			
4.2 Linking Strategy to Operational Management				
4.2.1	Does the 'Strategy' body communicate strategy and associated success factors effectively to the DIO 'Operational Management'?			
4.2.2	Are there mechanisms in place to allow the DIO 'Operational Management' to feedback to the 'Strategy' body?			
4.2.3	Is the 'Strategy' body provided with appropriate support (MI etc) to support effective strategy formulation?			
4.2.4	Is 'Strategy' body provided with appropriate support (MI etc) to allow tracking of the implementation of strategy, including against Strategy success factors?			
5. Operational Management				
5.1 Operational Management				
5.1.1	Does robust process exist to translate strategy into programme plans (e.g. programming to deliver against customer and internal requirements)?			
5.1.2	Are 'Programme' plans coherent with strategic 'Customer' requirements? What mechanisms are in place to ensure coherence?			
5.1.3	Are programme plans coherent with internal strategy requirements? What mechanisms are in place to ensure coherence?			
5.1.4	Are programme plans coherent with themselves (e.g. customer delivery programmes vs internal change programmes)? What mechanisms are in place to ensure coherence?			
5.1.5	Are clear and measureable 'Programme' success factors identified, clearly linked to 'Strategy' success factors?			
5.1.6	Are clear standards and controls set for all relevant facets of DIO's business (e.g. operational delivery, SHEF, quality, commercial practice, financial practice, HR practice)?			
5.1.7	Are transparent decision making mechanisms in place for all relevant 'Operational Management' facets of DIO's business?			
5.1.8	Is effective 'Programme'-level risk management practice in place, informed by appropriate MI from the 'Project Delivery' body?			
5.1.9	Does the 'Operational Management' body possess the people, skills, information, process, ways of working, infrastructure to operate effectively?			
5.1.10	Are clear and consistent limits of autonomy set for each element of the 'Project Delivery' body? Is autonomy optimised?			
5.1.11	Are limits of autonomy set to ensure each element of the 'Project Delivery' body is able to function as a part of the integrated 'Organisation'?			
5.1.12	Are limits of autonomy set to ensure that single elements of the 'Project Delivery' body cannot threaten the survival of the 'Organisation' as a whole?			
5.2 Linking Operational Management to Project Delivery				
5.2.1	Does the 'Operational Management' body communicate 'Programme' plans, success factors, delivery requirements, standards and controls effectively to the 'Project Delivery' body?			
5.2.2	Are clear resource allocation mechanisms in place, to provide the 'Project Delivery' body with appropriate funding, human capital, infrastructure and facilities?			
5.2.3	Does the 'Operational Management' body communicate reporting requirements for all relevant facets of DIO's business to the 'Project Delivery' body?			
5.2.4	Are all limits of of autonomy communicated clearly to the 'Project Delivery' organisation?			
5.2.5	Are there mechanisms in place to allow the 'Project Delivery' body to feedback to the 'DIO Organisational Management' body?			
5.2.6	Is the 'Operational Management' body provided with appropriate inputs (MI etc) to support effective 'Programme' formulation (delivery/internal change)?			
5.2.7	Is the 'Operational Management' body provided with appropriate inputs (MI etc) to allow tracking and management of 'Programme' delivery, including against 'Programme' success fac...			
6. Delivery Coherence and Assurance				
6.1 Delivery Coherence				
6.1.1	Is there clarity over the purpose of each element of the 'Project Delivery' body?			
6.1.2	Are interfaces between each element of the 'Project Delivery' body clearly articulated and understood?			
6.1.3	Are clear common processes and practices in place for all relevant facets of the 'Project de;livery' (e.g. operational delivery, SHEF, quality, commercial practice, financial practice, HR p...			
6.1.4	Does the 'Delivery Coherence' body posess the people, skills, information, process, ways of working, infrastructure to operate effectively?			
6.1.5	Are all common processes and practices communicated clearly to the 'Project Delivery' organisation?			
6.1.6	Are there clear, well understood and accessible routes for the 'Project Delivery' body to feedback on the appropriateness of commmon processes and practices?			
6.2 Delivery Audit and Assurance				
6.2.1	Are mechanisms in place to ensure the compliance of the 'Project Delivery' body with process, practice, standards, controls and delegated authorities?			
6.2.5	Are mechanisms to ensure the compliance of the 'Project Delivery' body with process, practice, standards, controls and delegated authorities effectively communicated to the 'Project...			
6.2.2	Are assurance and audit activities prioritised against their contribution to strategic benefits, 'Strategy' and 'Programme' success factors?			
6.2.3	Are other healthchecks in place to assess e.g. employee engagement, safety culture, quality culture across the 'Project Delivery' body?			
6.2.4	Does the 'Audit and Assurance' body posess the people, skills, information, process, ways of working, infrastructure to operate effectively?			
6.2.6	Are there clear, well understood and accessible routes for the 'Project Delivery' body to feedback on issues relating to the implementation of commmon processes and practices?			
7. Project Delivery				
7.1 Project Delivery				
7.1.1	Is each element of the 'Project Delivery' body able to capture the MI neccessary for effective local and 'Operational Management' decision making, and to demonstrate compliance wit...			
7.1.2	Does every element of the 'Project Delivery' body posess the people, skills, information, process, ways of working, infrastructure to operate effectively?			
7.2 Linking Project Delivery with Users and Suppliers				
7.2.1	Do all elements of the 'Project Delivery' body understand the external environment at a 'Project Delivery' level, including understanding of all primary users and suppliers?			
7.2.2	Are there clear mechanisms in place to build, interface and engage with all primary users and suppliers?			
7.2.3	Does each element of the 'Project Delivery' body have clear and stable relationships in place to manage all primary user and supplier relationships?			
7.2.4	Is there a clear mechanism for each element of the 'Project Delivery' body to deliver against User requirements?			
7.2.5	Is there a clear mechanism for Users to provide feedback against 'Project Project Delivery'?			

Figure 4.6 – Putative detailed assessment framework for Defence Infrastructure System

HPM was developed at the University of Bristol based on the idea of combining a strong process-based view of system description (J. Hall et al., 1998) with uncertain inference using Interval Probability Theory (IPT). HPM has been used in the Civil Engineering domain to support a process known as Evidential Discourse for Engineering (Marashi & Davis, 2006, 2007; Marashi, Davis, & Hall, 2008) and more recently as an epistemic device to decide how to intervene in a messy problematical situation (Davis, MacDonald, & White, 2010). In a full HPM implementation, hierarchical system structure is built down from a single top-level transformational process (the purpose of a system) through repeated questioning of how? until there is no longer a process answer to these how? questions. Each of these processes is described in a gerund form. The use of gerund forms without subject and without specification of the agent (performer) stimulates creativity in modelling where even physical entities can be considered as processes. For example, a bridge becomes "crossing a river" in gerund form and addressing how this process is to be achieved opens up other options for achieving success, other than just a bridge, e.g. ferry, tunnel. Performance measures are assigned at the lowest level – or leaf nodes – of the hierarchical structure through the use of interval numbers (J. Hall et al., 1998) which can be represented by the use of the 'Italian Flag' notation. Leaf processes can be scored using an Italian Flag scale that details what is known to be good about this process (green), what is known to be bad about this process (red) and what is uncertain or unknown (white). These scores are then typically aggregated up the hierarchy using sufficiency, necessity and dependency conditions drawing upon a variation of the IPT described by (Marashi et al., 2008) called the Juniper algorithm (Marashi, 2006).

The combination of VSM and HPM for use as a PSM was found to be novel, with no previous reference made to it found in the literature. In fact, of the mixed method papers reported by Munro and Mingers (2002) only 12 (or 8%) featured VSM – paired either with Soft Systems Methodology or Influence Diagrams. Furthermore, VSM does not appear in the more recent review of 30 mixed methods by Howick and Ackermann (2011) and HPM appears in neither review. When combining methods within a multi-methodology (Mingers, 2001; Mingers & Brocklesby, 1997; Mingers & Gill, 1997) it is important to consider the possibility of paradigm incommensurability (Schultz & Hatch, 1996). However, whilst the ontological, epistemological and axiological assumptions (Mingers, 2003) that underpin VSM and HPM methods are indeed different, because it was proposed that they be used

simultaneously in a parallel multi-methodology under an interpretive paradigm (Pollack, 2009), we found no need for recourse to mitigating strategies as reported by others (Kotiadis & Mingers, 2006).

In late February, following the MOD Main Gate decision to enter the preferred bidder stage of negotiations for the award of the SBP contract to a consortium led by Capita[14], and prior to the decision to award the contract[15], DG (Transformation and Corporate Strategy) requested that we review how MOD was positioned to minimise the threats and maximise the opportunities of this investment. Therefore, reverting to 'Consultant' mode, we focused our efforts on pulling the framework of ideas (F) together into an explicit methodology (M) for use as a means to assess – and then monitor over time by repeating the assessment – the health of the infrastructure systems set within the wider context of the Defence Enterprise. Our concept was to distribute the detailed assessment framework (see Figure 4.6) to a large number of key DIO staff and stakeholders as a questionnaire (so expanding the reach of previous work), and to analyse the returns before convening a workshop with a small group to verify our results. This methodology relied upon three main factors – clear communication to and support from the stakeholders for the methodology; senior direction to and support from the stakeholders to actively participate in the methodology; and a mature and shared understanding of future operating model. Consequently, on the 21st March, less than a month later, we convened a meeting with key stakeholders to gain endorsement for our putative methodology. It did not go very well.

The meeting began with an introduction from our MOD Head Office customer describing our tasking and how it was a key part of the activity to maximise the return on SBP investment that seemed to land well with stakeholders. In particular, our customer highlighted that we were to review progress post Main Gate investment decision in order to identify how/whether implementation was mitigating risks and realising opportunities (or otherwise). Senior DIO staff then provided an update on emerging plans for SBP implementation as part of the future operating model that was also welcomed by stakeholders (who had little previous sight of these plans). We then briefed our putative methodology – comprising both a new framework and a plan for assessment against this framework. We explained

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[14] https://www.gov.uk/government/news/mod-announces-preferred-private-sector-bidder-to-join-dio [Accessed: 21 March 2019]

[15] https://www.gov.uk/government/news/dio-awards-contract-for-strategic-business-partner [Accessed: 21 March 2019]

a new framework was necessary because whilst the previous work used a high-level framework (8 factors) to highlight key strengths and weaknesses of multiple operating models, the new task required a more detailed framework to make a comprehensive assessment of a single operating model. We invited critical review of our framework in terms of whether it was found to be: (a) *Effective* in capturing both assessment and supporting rationale; (b) *Comprehensive* in addressing all relevant aspects; and (c) *Useable* in being intuitive, easy to use and not too long, using handouts of Figure 4.4 to stimulate discussion. Whilst the stakeholders found the framework to be effective and comprehensive, they expressed some confusion as to whether it was usable – highlighting that some aspects of the framework appeared duplicative and in particular challenged why <5. Operational Management> was separated from <6. Operational Coherence & Assurance>. The stakeholders also highlighted that <3. Strategic Leadership> of the infrastructure system is shared across Defence (not just delivered by DIO 'Board') and recommended that more should be done (through the framework) to map organisational form to organisational function before meaningful assessments could be made. Lastly, the stakeholders found our proposed questionnaire-based approach to assessment to be inappropriate and expressed very strong preferences that the assessments should be conducted collaboratively in workshop settings to ensure consistent interpretation of the framework and accurate understanding of the future operating model.

Key Observation # 2 – Assessment frameworks must be comprehensive and accessible

Whilst VSM brought credibility to the assessment framework, and ensured a comprehensive scope of inquiry, some of the associated language proved difficult to understand and so presented a barrier to use. Adapting the VSM, including through the use of language that resonated with stakeholders, proved critical to making progress in this real world setting.

4.5 Taking part in the change process (Apr 14 – Jul 14)

Given the pressing timescales for completion, and seizing the opportunity to respond to stakeholder feedback and so strengthen the participative nature of the work, we elected not to attempt to challenge these stakeholder views. Instead we acted upon the feedback – finalising, populating and visualising a simpler structured approach to assessment.

4.5.1 Finalising an assessment structure

During April and early May, the Dstl team held a number of internal workshops to simplify the assessment structure and invited independent review from Professor Mike Yearworth from the University of Bristol. This was achieved principally by adapting the classic five layer VSM into a four layer model by combining Beer's S3 (control), S3* (audit) and S2 (coordination) into a single Operational Management layer and using plainer English to describe the functional processes in gerund form that sit within each layer as follows:

1. <u>Strategic Leadership (Beer's S5):</u> Setting strategic direction; Setting strategic incentives; and Managing strategic performance and risk.

2. <u>Strategy Formulation (Beer's S4):</u> Capturing inputs and constraints; Setting strategy; and Monitoring strategy implementation.

3. <u>Operational Management (Beer's S3, S3* and S2):</u> Setting management direction; Managing performance and risk; Assuring delivery coherence; and Assuring and auditing performance.

4. <u>Operational Delivery (Beer's S1):</u> Understanding user requirements; Understanding supplier capabilities; Delivering projects and services; and Managing delivery performance and risk.

We applied this adapted VSM at two different levels to situate the examination of the Infrastructure Delivery System (S) in the wider context of the Defence Enterprise (E) – see Figure 4.7. Note that the Infrastructure Delivery System is an element of the function E4 but, to be viable, needs itself to address all four elements of the model (represented as functions S1 –S4), as well as link effectively both with the external environment and with the remainder of the Defence Enterprise Operational Delivery. Note also that the framework includes both these key functions (blocks) and their key vertical and horizontal interfaces (arrows).
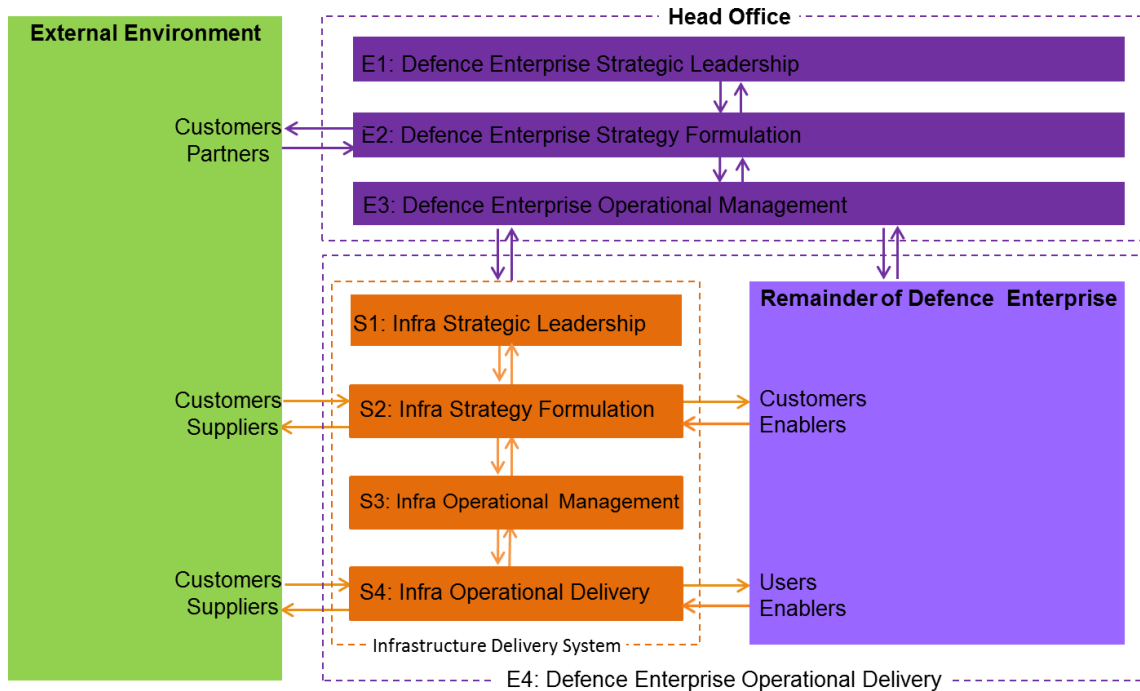
Figure 4.7 – Assessing the Infrastructure Delivery System in the context of the Defence Enterprise

Throughout May, in advance of workshops scheduled for June, we arranged individual meetings with key stakeholders to explain this refined framework and ensure that they understood and endorsed its use in the assessment to come. In acknowledging and responding to the stakeholders' needs, it is clear that we embraced adaptation/creativity aspect of the PSM Generic Constitutive Definition (Yearworth & White, 2014). However, this came at the cost of weakening the method's theoretical grounding in the VSM and so potentially damaging the credibility of the overall approach as a PSM (Ackermann et al., 2014). Given the need for modelling support at a conceptual level as per the soft systems paradigm identified in Table 3.1 of Checkland and Holwell (2004) to support stakeholders in their assessments and the fact that no aspect of the VSM was discarded (although it is acknowledged that there is a risk that the interplay between Beer's S2, S3 and S3* may have been considered less explicitly than in a traditional VSM approach), we found this to be an acceptable trade-off. However, this raises an interesting question of how far it is possible to adapt VSM before the links with underpinning cybernetic theory are broken such that the results are no longer valid. I will address this supplementary research question in Chapter 7.

4.5.2 Populating the assessment model

Acting again on stakeholder feedback, the assessments were undertaken via two workshops, one focussing on *'Defence Enterprise Operational Management'* (function E3) held on 12th June in MOD Main Building and the other focussing on *'Infrastructure Delivery System'* (functions S1-S4) held one week later on 19th June in DIO Andover. The aim of the workshops was to identify strengths, weaknesses and uncertainties associated with each element of the framework under consideration and accordingly the workshop participants were those stakeholders identified as having responsibility for and/or experience of key elements within functions E3 and S1-S4, as well as those representing the Infrastructure customer base (principally the Armed Services). We engaged in advance to ensure that all sides (i.e. DIO, Governors and Customers) were appropriately represented by expert participants with direct and relevant knowledge. Our role as consultants was then to act as facilitators to ensure that a balanced assessment was arrived at and that it was supported by objective evidence wherever possible. The open questions that were used to guide the facilitation of these workshops are detailed in Appendix 4–2 (p. 233).

Each workshop was structured using the relevant parts of the framework which we progressed through using three steps for each framework element. In the first step, we conducted a simple **RACI** exercise where participants proposed, debated and reached consensus on who was **R**esponsible, **A**ccountable, **C**onsulted and **I**nformed[16]. This enabled the group to map organisational form (as per the real world) to organisational function (as per the framework) and so respond to another aspect of the stakeholder feedback provided in March. In the second step, the workshop participants collectively identified the strengths, unknowns or weaknesses associated with each organisational function from their personal perspectives. As consultants, we captured and displayed these contributions around the room before facilitating a group discussion to build shared understanding if not necessarily consensus. In the third step, the participants used a simple template to independently score the relative weight of the strengths (green), unknowns (white) and weaknesses (red) on a 10 point scale and to provide explanatory comments on individual assessment sheets. Note that this scoring was not based simply on

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[16] See for example: projectsmart.co.uk/how-to-do-raci-charting-and-analysis.php [Accessed: 15-Sep-2019]

the number of strengths, weaknesses or unknowns, but rather on the participants' judgement of their cumulative impact on functional performance. As consultants, we collected these individual scores and supporting rationale at the end of the workshop.

4.5.3 Visualising results

The scores and comments for each function and sub-function were processed after the workshops to construct an 'Italian Flag' using median values calculated from individual scores and normalised to fit on a scale of uniform length (nominally subdivided into ten sub-sections). It was interesting to note that for all the debate there was only minor variation about these median values. Figure 4.8 shows how the scores for the 'Infrastructure Delivery System' (S1-S4) were visualised as a HPM[17].

Figure 4.8 – Hierarchical Process Model for Infrastructure Delivery System (illustrative only)

It should also be noted that this is not how HPMs are traditionally constructed. Firstly, the aggregation between sub-function and function level was not carried out mathematically through the use of necessity, sufficiency and dependency conditions (J. Hall et al., 1998), rather the aggregation

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[17] Note that this HPM is not representative of the actual results owing to their sensitivity, it is only for illustration.

was carried out by the workshop participants themselves. Secondly, the model was structured through the use of the adapted VSM prior to population. Traditionally, a HPM is derived through group model building (Vennix, 1996) where the model is simultaneously constructed and populated during the workshop. The adaptation was however influenced by the stakeholders as described above – both from the March meeting and from the one-to-one interviews held in advance of the workshops. These interviews proved critical in providing an opportunity both to introduce the model structure and to make minor adjustments at the process level (e.g. to clarify our meanings) and so minimise the risk of rejection during the workshops. Whilst this pre-structuring might be unusual, it was welcomed by workshop participants who were able to spend more time on model population and discussion and less on model building.

The Italian Flag visualisation played a key role in how we presented results for 'Head Office Management and Governance of the Defence Enterprise' (covering E3) and 'Infrastructure Delivery System' (covering S1-4) to our senior stakeholder – DG Transformation – on 14th July. The briefing, began with a reminder of the task and an overview of the methodology that highlighted the VSM as the key underpinning theory. It also described the scope that had been agreed with stakeholders, the participative nature of the workshops (including who attended), before progressing to cover summary assessments and recommended actions. For each of E3 and S1-4 we presented our results using a consistent template as shown in Figure 4.9 (which relates to E3 only) and used this as a basis for briefing the key points to the DG with whom we had not had direct contact since December 2014. Whilst there were some questions over the organisational form that supported the organisational function as per prior stakeholder feedback in March, the presentation progressed very smoothly. In particular, the DG was able to quickly take on board the main points with regard to what was working well (green ticks), what was not working well (red crosses) and where there was uncertainty (bulleted questions).

Key Observation # 3 – Italian Flag scheme is helpful in communicating known and unknown

The Italian Flag scheme proved popular with participants and the senior decisionmaker alike. It enabled the balanced presentation of key strengths (green), weaknesses (red) and uncertainties (white) and the clear signposting of areas for action – either to address key performance issues (red) or to address key uncertainties (white.)

Figure 4.9 – Summary assessment for E3 'Defence Enterprise Operational Management'- REDACTED

We also briefed eight recommended actions to either improve performance and so address red assessments, or to reduce uncertainty and so address white assessments. These actions were based on additional inputs from workshop participants who were asked to collectively identify their top priorities for action at the end of each workshop. As per the summary assessments, these eight recommended actions were readily accepted by the DG and Figure 4.10 shows how we linked these priority action areas to the eight risk factors identified in the previous case study review described in Section 4.3. This mapping highlights 'Understanding and managing the whole system', 'Effective governance and portfolio, programme and project management', 'Effective relationships' and 'Requirements management' as highly repeated areas of concern and these are emphasised in bold font. Further, it suggests that addressing 'Develop Intelligent Customer status (Head Office & FLCs)', 'Accelerate roll-out of management information systems', 'Link Infrastructure delivery to Defence objectives', and 'Test, formalise and communicate internal interfaces' would impact the greatest number of risk factors identified through case study results (also emphasised in bold font).

Case Study Findings (Sep-12)	Weaknesses & Unknowns (Jun-14)
Understanding & managing the whole system	W1: Manage Infrastructure Delivery System as a whole
Effective governance & Portfolio Programme and Project Mgmt	W2: Establish incentives for 'Defence first' behaviours
Effective relationships	**W3: Develop Intelligent Customer status (Head Office & FLCs)**
Robust contract management	**W4: Accelerate roll-out of management information systems**
Effective incentivisation	**W5: Link Infrastructure delivery to Defence objectives**
Requirement management	U1: Define scope of Infrastructure Delivery System
Knowledge/capability sustainment	**U2: Test, formalise and communicate internal interfaces**
Effective competition	U3: Test, formalise and communicate external interfaces

Figure 4.10 – Mapping recommended actions against previous case study results.

4.6 Exiting the problem situation (Aug 14 - Sep 14)

The final report that was delivered in August brought our direct support to our MOD customer and stakeholders to a close. It described the approach followed, detailed the attendees and results from both workshops, presented summary results and made clear eight recommendations:

1. Manage Infrastructure Delivery System as a whole to enable an integrated approach to infrastructure delivery across the various delivery agents (W1);

2. Establish incentives for 'Defence First' behaviours to deliver an affordable estate that supports priority Defence objectives (W2).

3. Develop Head Office and FLCs as Intelligent Customers to enable strategy formulation, requirement setting and holding to account (W3);

4. Link Infrastructure delivery to Defence objectives to establish 'golden threads' that enable prioritisation of Infrastructure activity to realise strategic benefits (W4);

5. Accelerate Management Information System roll-out to provide evidence for risk and performance management at all levels (W5).

6. Define scope of Infrastructure Delivery System (to include delivery mechanisms outwith the DIO) to enable the management of the systems as a coherent whole (U1);

7. Test, formalise and communicate the purpose, relationships and interfaces between key players, key artefacts and key decision-making bodies within MOD to ensure that these integrate effectively and efficiently (U2); and

8. Test, formalise and communicate the purpose, relationships and interfaces with organisations external to MOD to ensure that appropriate links are established and sustained (U3).

The results, and specifically the eight actions, were used to define the forward work plan for the Defence Infrastructure System Programme (DISP)– a major change programme to be delivered by the Defence Infrastructure Governance Authority (DIGA) established to govern the operation of DIO. The feedback received from DIGA was very complimentary:

"The Dstl work made a real difference in the success of the Defence Infrastructure System Programme definition stage. In particular it enabled us to arrive at an agreed maturity model much more quickly than would otherwise have been the case as many of the key stakeholders had already been through the thought process that led them to understand the functions within the system. In addition, your work with them around the Italian Flag assessment resulted in a common understanding of system weaknesses. This enabled us to reach a rapid and robust consensus as to the current state of the Infrastructure System and priorities for corrective action"

Whilst it is evident from this feedback that the assessment method developed was successful, a formal evaluation approach was implemented to provide a firm foundation for methodological learning – a key aspect identified for PSM practice (Yearworth & White, 2014). This formal evaluation approach – as described in Chapter 3 (Section 3.5) – was based upon the framework put forward by (Midgley et al., 2013) and covered Purpose, Context, Methods and Outcomes. The methodological observations from this evaluation are presented and discussed below in Section 4.7. It should be noted that not all questions were used with all those interviewed – for example *'15. What were the key methodological learning points?'* was used only in discussion with research team members.

The DIGA commissioned Deloitte to assess the current state of the Defence Infrastructure System as a baselining activity for the DISP. Whilst the Dstl team provided continuity from the work described

above, we did not provide any support as the work was most appropriately delivered by industry. The Deloitte consultants applied a maturity model comprising five main components, comprising *Strategy Development; Planning & Prioritisation; Governance, Accountability & Assurance; Information; and Capacity, Proficiency & Incentives*, supported by a total of 48 sub-components – see Appendix 4–3 (p. 237). For each component and subcomponent a healthy state against which progress from the current state was to be tracked over time on a five point scale that ran from 'fragmented' to 'optimised' – see also Appendix 4–3 (p. 237). I will make further reference to this work in Chapter 7 when I use it as a longitudinal evaluation to support my discussion of how organisational health monitoring can help to sustain organisational change over time.

4.7   Reflecting on experience

This section discusses four key methodological learning observations that emerged from my cross-sectional evaluation activity in terms of Purpose, Context, Method and Outcomes and that appear readily transferrable to other areas. Areas for further research are also highlighted.

<u>Effective stakeholder engagement was critical to meeting the Purpose:</u>

Our ability to satisfy the Purpose hinged on facilitating two workshops where we needed to *"deploy both facilitation and modelling skills"* (Franco & Montibeller, 2010) to surface, discuss and balance multiple worldviews. Given the pressing timescales and earlier setback with stakeholders in this situation, we decided to also deploy our skills in advance of the workshops firstly acting in an *"expert"* mode to develop the assessment structure and then acting in *"facilitator"* (ibid) mode to refine the structure in conversation with individual stakeholders .

These preparatory one-on-one interviews brought two main benefits. Firstly, they enabled us to introduce the aims and to preview the approach intended for the workshop. This not only saved time on the day, it ensured that the participants came prepared with relevant background material as necessary. Secondly, it provided an opportunity to identify risks and adjust the workshop plan accordingly, which reduced the potential that stakeholders would reject the workshop approach.

Whilst there is precedent for pre-structuring activity in advance of workshops – the use of preliminary models, supported by conducting interviews and/or reviewing documentation, is recognised as a key phase in the Group Model Building method (Andersen & Richardson, 1997; Andersen, Vennix, Richardson, & Rouwette, 2007) – there is a concern that such pre-work could constrain and/or bias the problem structuring activity itself. Future research could investigate the extent to which this prior engagement activity affects the achievement of Purpose and/or delivery of Outcomes.

> Key Observation # 4 – Preparation and facilitation are important to making good assessments
>
> *Stakeholder engagement prior to group workshops provides a means to clarify objectives, scope and approach and so de-risk the event itself. During the event effective facilitation skills are essential to managing the stakeholders and eliciting the expert judgement that only they can provide in a structured and balanced manner.*

The VSM provided an excellent basis for structuring the Method:

My first key consideration in the design of the Method was the need to comprehensively cover the functionality of a healthy system– i.e. one that can sustain performance and remain viable for the long term. The VSM not only provided this comprehensiveness but it also readily brought credibility with stakeholders given its widespread use to good effect as detailed in the management science literature and sound theoretical basing in cybernetics.

My second key consideration was the need for the model to engender constructive debate between stakeholders by acting as a boundary object (Franco, 2013). The VSM's focus on organisational function over organisational form was found to be critical for this in that the debate focused more on the 'what' and less on the 'who'. This has some resonance with the ideas elsewhere in management science including those of (Rummler & Brache, 1990, pp. 8-9) that involve taking a horizontal view of an organisation to focus on how the organisation works together across the organisation chart to deliver value, as opposed to a vertical view that focuses on the individual management responsibilities. As Beer himself observed: *"models of management are useful for little more than apportioning blame"* (Beer, 1984).

My third key consideration was the need to examine the infrastructure system in the context of the Defence enterprise and so ensure consideration of all the key issues addressing the infrastructure system – both inside and outside its boundary. The recursive nature of VSM that affords the examination of the system-in-focus (level 1) in the context of both the level below (level 2) and the level above (level 0) was therefore very helpful in providing an integrated understanding of the situation (Yolles, 1999).

Key Observation # 5 – VSM provides a sound basis for assessing organisational health

Use of the VSM affords a comprehensive coverage of essential function necessary for the organisation to sustain performance over time, a constructive focus on function not form that is very helpful in multi-stakeholder situations and an ability to set the scope of inquiry in wider context through recursive application of the model.

The HPM representation brought useful structure and rich visualisations:

The hierarchical nature of the HPM, pre-structured using the VSM, proved to be very useful in both providing specific focuses for discussion (i.e. at the leaf nodes) and in providing a logic for aggregating these discussions and detailed assessments into summary assessments (i.e. the tree structure). The HPM method affords the potential to mathematically aggregate leaf node scores up the tree structure (J. Hall et al., 1998; Marashi et al., 2008). However, whilst automatic aggregation could be viewed as providing assistance to stakeholders, it was assessed to be incommensurate with the participative nature of the methodology and therefore not used. Specifically, I was concerned that it could distance the participants from 'their' results and that this would lead to reduced ownership, and ultimately put implementation at risk. Future research could follow up to investigate whether this unused affordance would add or detract from the process of organisational health assessment.

Key Observation # 6 – HPM provides helpful structures for assessing organisational health

Use of the HPM provides a useful means to consider both the detail and how it contributes to the overall picture, and offers the potential to assist stakeholders in aggregating their detailed assessments using necessity, sufficiency and dependency assumptions.

Further, the Italian Flag scheme, whilst new to every stakeholder, was quickly picked up and proved to be both effective and popular as a means to summarise stakeholder assessments. In particular the stakeholders liked how the 'rich' visualisations enabled them to convey both what was good (green) and what was bad (red) and to simultaneously convey this performance balance alongside the degree of uncertainty present (white). The most commonly used alternative in the MOD is Red-Amber-Green traffic light assessments (that represents the net balance of performance) and that is sometimes accompanied by a code to indicate the quality of the assessment (e.g. A for objective evidence supplied through to D for subjective judgement only). The Italian Flag scheme, as already highlighted, was found by stakeholders to be superior.

Key Observation # 7 – The Italian Flag scheme affords rich analysis and communication

Use of the Italian Flag scoring scheme provides a useful means to simultaneously present – and so consider – the strength, weaknesses and uncertainties around a specific aspect of organisational health. It also ensures that actions are taken both to address shortfalls in performance (red) and shortfalls is knowledge (white) where these are deemed important.

Creative adaptation and mixing of methods proved critical to the successful Outcome:

Creative adaptation is recognised to be a key aspect of problem structuring (Yearworth & White, 2014) and the method detailed here is clearly an example of such. First, the VSM has been significantly adapted by collapsing it into four layers and by simplifying the language used to describe these layers, their functions and their interfaces. Second, this adapted VSM was used to structure an HPM in a unique multi-methodology (Lowe, Martingale, et al., 2016). Third, this structure was populated by subject matter experts in facilitated workshops without recourse to the supporting mathematical algorithms based on necessity, sufficiency and dependency assumptions. This adaptation and mixing of methods in an interpretivist paradigm – far from functionalist roots of each method – proved critical to the successful outcome. In particular, the decision to respond to stakeholder feedback rather than to reject it was assessed to have built a strong sense of stakeholder ownership and momentum that carried the team through two highly effective workshops into ready exploitation by setting the direction for a major change programme. However, as highlighted earlier, this adaptation and mixing of the VSM and

HPM is potentially troubling from the perspective of negating – or at least reducing – their respective value as well-established systems models. I consider what represents the irreducible minimum for VSM use as a PSM in Chapter 6. Future research could examine how far it might be possible to go in adapting other methods before they are devalued beyond repair and/or how far it might be possible to go in mixing methods before the cumulative value of the whole is less than the sum of its parts.

Key Observation # 8 – Creative adaptation can ensure that method(s) match the situation

Stakeholder views, values and beliefs should not be overlooked when designing organisational health methods to match specific situations because their participation is critical to the success – both by providing their expert judgements and by taking action on the results. Methods should be adapted to fit the situation (not the other way around).

4.8 Summary

This chapter has detailed my Systemic Intervention with regard to assessing the health of Defence Infrastructure System in the wider context of the Defence Enterprise. Specific to Systemic Intervention methodology, this chapter has detailed how I focused the intervention through Boundary Critique and how I developed a novel PSM through methodological pluralism.

This chapter has yielded a number of key observations for the assessment of organisational health, both as a result of continuous personal critical reflection (see observations 1 – 3) and as a result of cross-sectional evaluation conducted with stakeholders and research team members (see observations 4 – 7). These comprise:

- Key Observation # 1 – Collaborative working is vital to beginning transformational change
- Key Observation # 2 – Assessment frameworks must be comprehensive and accessible
- Key Observation # 3 – Italian Flag scheme is helpful in communicating known and unknown
- Key Observation # 4 – Preparation and facilitation are important to making good assessments
- Key Observation # 5 – VSM provides a sound basis for assessing organisational health
- Key Observation # 6 – HPM provides helpful structures for assessing organisational health
- Key Observation # 7 – The Italian Flag schemes affords rich analysis and communication
- Key Observation # 8 – Creative adaptation can ensure that method(s) match the situation

Chapter 5 – Assessing the health of the Defence Acquisition System

5.1   Introduction

The aim of this chapter is to describe the AR conducted with regard to the Defence Acquisition System. The main period of activity was from July 2014 through March 2015 (see Figure 5.1) with subsequent monitoring being conducted up to and including July 2018. The description provided in this chapter is based upon project documentation that was produced in the course of the work, research notes that were made contemporaneously as the work progressed, discussions held with the project team (as part of project closure) and interviews conducted with key stakeholders.

Section	Action Research Stage	Jun	Jul	Aug	Sep	Oct	Nov	Dec	2014 | 2015 Jan	Feb	Mar
5.2	Entering the problem situation	█	█								
5.3	Declaring M and F		█	█	█	█	█				
5.4	Establishing roles			█	█						
5.5	Taking part in the change process						█	█	█		
5.6	Exiting the problem situation									█	
5.7	Reflecting on experience										█
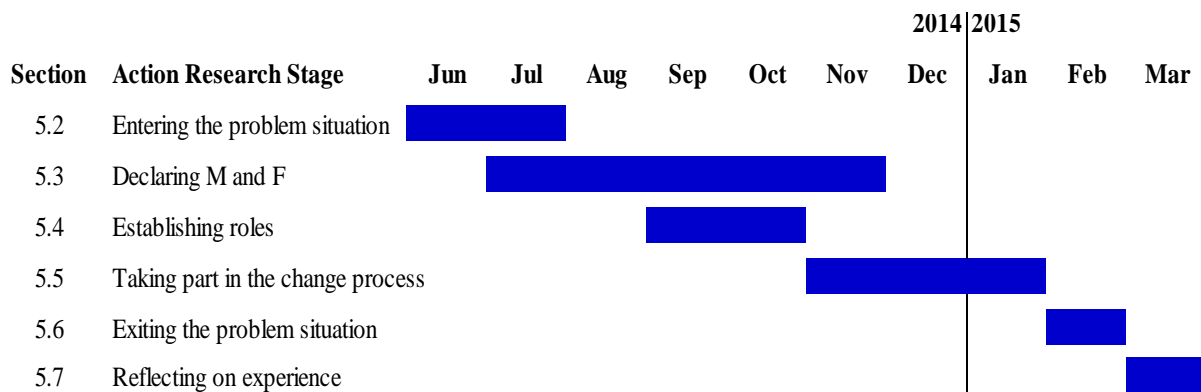
Figure 5.1 – Timeline for Defence Acquisition System Core Action Research Cycle

The 2009 *Review of Acquisition for the Secretary of State for Defence* delivered by Bernard Gray identified three key actions to tackle the complex problem of defence procurement overspending: *"The first was to bring the Defence Equipment Plan into line with future available resources. The second was to streamline relations between Defence Equipment & Support (DE&S), MOD Head Office and the capability staffs, making them more business-like. And the third was to provide DE&S with better tools to deliver the Equipment Plan effectively"*[18]. In 2011, the 'Materiel Strategy' programme was launched by MOD to carry out these actions, and in particular to develop a more robust relationship with Front Line Commands and with Head Office. Most prominently, this included introducing a new operating model for DE&S, with options to either outsource MOD procurement activities under a

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[18] https://www.contracts.mod.uk/features/defence-procurement-reform-goco-versus-des/ [Accessed: 29 May 2019]

Government-Owned, Contractor-Operated Organisation (GOCO) model or to retain it within the public sector under consideration. In 2012 MOD launched the complementary 'Customer Design' programme to ensure that the totality of the Defence Acquisition System would function effectively regardless of which model resulted from the Material Strategy programme. The Customer Design programme included work to develop the Acquisition System Operating Model and an associated handbook and establishing the Acquisition System Authority team in MOD Head office to govern the operation of the system.

The Defence Enterprise Analysis workplan that Dstl agreed with DG Transformation in September 2013 had three phases as described in the previous Chapter – recall Figure 4.2 (p. 79). Phase 2 was intended to focus on the Acquisition system in much the same way as for the Infrastructure System by identifying the risks and opportunities for Defence in transforming DE&S to either a GOCO model or an enhanced version of the current model (DE&S+). However, in November one of the remaining two bidders for the GOCO competition withdrew which put the Material Strategy team under a great deal of pressure and this work was slowed and eventually stopped whilst the situation stabilised.

5.2 Entering the problem situation (Jun 14– Jul 14)

I was introduced to the Head of the newly-established Acquisition System Authority (ASA) in June 2014 at a Defence Enterprise Analysis stakeholder briefing hosted by Director General Transformation's team. The aim of this briefing was to raise awareness of our Defence Infrastructure work and highlight the potential to export this to other parts of the Defence Operating Model, including the Acquire function. By this time the situation had stabilised with DE&S being declared a 'bespoke trading entity' in April with a new operating model and various change activities moving at pace across Defence. We agreed to develop a new proposal which focused on understanding the health of the system as it had now been established in order to inform these ongoing change activities and to track progress over time. Accordingly I worked with a new colleague to develop the workplan displayed in Figure 5.2.

Phase 1

Task 1 – Define the assessment framework (August – October) Previous work by Dstl has developed a generic organisational maturity assessment framework, which was successfully used to assess the Defence Infrastructure Delivery System. This framework will be adapted to develop an appropriate assessment framework for the Defence Acquisition System. Initial development will be undertaken through a review of the available suite of governance documentation provided by Customer Design both for the overall system and for specific entities. It assumed that there will be mature versions of the following documents available by 4th August 2014:
• Framework Agreement
• Corporate Plan
• Acquisition System Operating Model
• Acquisition System Handbook
• Descriptions of DE&S, ISS and FLC operating models

Task 2 – Identify system strengths, weaknesses and unknowns (September – October) The strengths, weaknesses and unknowns associated with the Defence Acquisition System will be identified and discussed in 1:1 interviews with stakeholders drawn from Head Office, DE&S, ISS and each FLC. These interviews will also be used to refine the assessment framework developed in Task 1 to ensure that it is fit-for-purpose.

Task 3 – Assess the health of the system (November) The framework will be used in one or more workshops to (i) develop a set of indicative maturity scales (from What does bad look like? to What does good look like?) for each element of the assessment framework; (ii) assess the acquisition systems current and desired maturity on these scales; and to (iii) identify and prioritise actions to achieve and/or sustain desired maturity.

Task 4 – Report Findings and Recommendations (December) The Phase 1 report and presentation will provide an initial assessment of the health of the Defence Acquisition System, together with recommendations of how system health can be repeatedly assessed (based on reflections upon Tasks 1, 2 and 3).

Phase 2

Task 5 – Support to the ASA (January – March) Provide continuing support to the ASA in line with Phase 1 findings, including optimising the assessed method for future assessments.

Figure 5.2 – Defence Enterprise Analysis for Acquisition Systems Workplan

This proposal had that Phase 1 was to be funded by the core research programme (as for the infrastructure work) at no cost to the ASA but that the second phase was to be funded directly by the ASA. We briefed the workplan to the Head of ASA and her team in July and were commissioned to proceed, agreeing that we would first develop (Task 1) and test an assessment framework for completeness (Task 2), before developing it further by defining desirable states for each framework

element and benchmarking the current situation against these (Task 3), with a view to reporting the findings and making recommendations for how best to monitor health over time in December (Task 4).

5.3   Declaring M and F (Aug 14 – Nov 14)

A key part of negotiating entry to this problematical situation was the potential to transfer the approach from the Defence Infrastructure System. Therefore much of the Framework of Ideas (F) and Methodology (M) that we deployed here were the same. In terms of a specific methodology, we again planned for and executed a Systemic Intervention with its three aspects of Critique, Judgement and Action (Midgley, 2000, pp. 129-132).

In terms of Critique, the use of the system concept as an aid for thinking, communicating and learning was widely accepted by the stakeholders. Whilst this was a new concept for the infrastructure community that we developed with them, the acquisition community were more advanced and had already developed the Acquisition System Operating Model (ASOM) to describe how Defence delivers Equipment, Support, Services and Logistics within a clear boundary – See Figure 5.3. The ASOM comprises three main entity types: Head Office (that acts both as a strategic customer and owner), Front Line Commands (FLCs) including Strategic Programmes that are managed centrally in Head Office (e.g. Carrier Strike, Nuclear Deterrent) and Delivery Agents that respectively align with Defence's Direct, Develop, Generate and Acquire functions. Head Office is responsible for agreeing objectives with Commands and DE&S and for holding them to account for delivery (via Command Plans and DE&S Corporate plan respectively); allocating resources across the Defence enterprise; overseeing the overall performance of the acquisition system; and ownership of DE&S as a Bespoke Trading Entity (BTE). The FLCs are responsible for agreeing the DE&S Programme of Work for DE&S to deliver against via Command Acquisition Support Plans (CASPs), agreeing with ISS, through Joint Forces Command (JFC) as the owner of ISS, the requirements for ISS to manage via Information Service Plans (ISPs), holding DE&S and ISS to account for delivery against the agreed CASPs and ISPs; providing agreed resources to the Delivery Agents; and accepting products into service. The Delivery Agents – DE&S and ISS – are responsible for delivering robust and transparent services to manage and deliver the systems and services required by the Commands (and wider department).
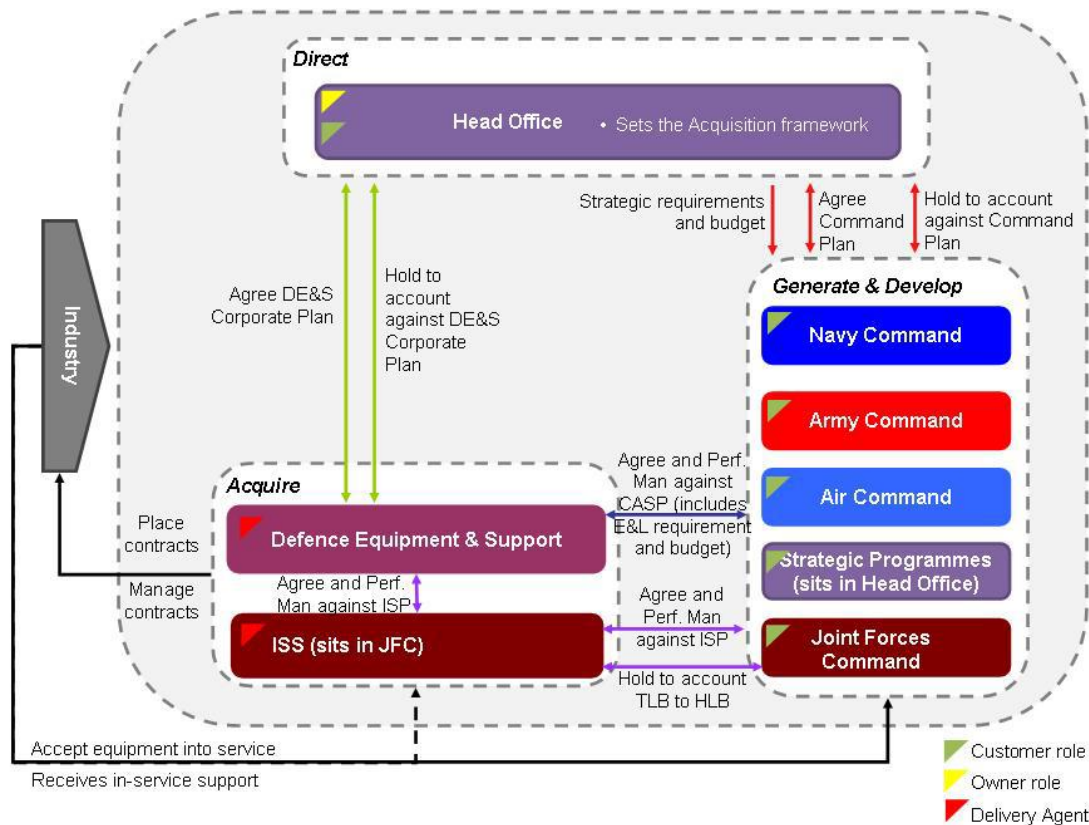
Figure 5.3 – Acquisition System Operating Model

Whilst the facts that the system definition was well advanced and widely accepted were clear advantages over the infrastructure starting position, it should also be recognised that the system is both much larger and more complicated. In terms of complexity, there are multiple delivery agents facing multiple customers with multiple ownership relationships. I therefore recognised that, even before adding in the ongoing political issues surrounding transformation at DE&S, the recent establishment of the ASA and the backdrop of widely-held perceptions of MOD under performance in acquisition (e.g. see for example the 2012 National Audit Office report on MOD Major Projects[19]), this work was going to present significant challenges.

In terms of Judgement, there were a number of ideas that I transferred from the Infrastructure work because I judged that they would be important and effective in this similar situation. Firstly,

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[19] Ministry of Defence – The Major Projects Report 2012 (https://www.nao.org.uk/report/ministry-of-defence-the-major-projects-report-2012/) [Accessed: 17 Sep 2019]

Problem Structuring Methods were judged to be the best way of engaging the large stakeholder group and accessing the multiplicity of expertise therein. As for the infrastructure work we set out to co-create an assessment with the stakeholders that would act as a boundary object (Franco, 2009) to span across them and also up to senior decision makers who had not been part of the work. Secondly, the Italian Flag assessment scheme was judged to be important in affording the ability to register the unknown (white) alongside the known (green and red) (Marashi et al., 2008, p. 363). This affordance proved to be very popular with the customer and the judgement was readily accepted. Thirdly, I also transferred the implications of Viable System Model (Beer, 1979, 1981, 1985) for what each part of the system needed to do. This proved to be less popular with the customer and especially the stakeholders, but I judged that it was important to assess not only the interactions within the system (as defined by the ASOM) but also what each component needs to be doing. For example, if we were only to examine whether the Army produced a CASP and used it to manage delivery with DE&S without also examining how the Army went about developing that CASP via considering their future needs (S4) and balancing across all of their constituent parts (S2) then we would be missing out key aspects of what is required to make the system viable (i.e. the quality of the CASP).

In terms of taking Action for improvement, the intent was for the ASA to brief the results of the assessment to the Acquisition Architecture Board (AAB) who had responsibility for overseeing the maturation of the ASOM as it had been designed, and to seek their endorsement of the associated proposals for action. It was also the intent that repeated assessments could be used to track progress over time to understand how effective the actions had been. Whilst the AAB was chaired by the MOD Permanent Secretary (the most senior civil servant in the department), it was beneficial that the Director General for Transformation also sat on the board given his strong support for our earlier work. The visibility afforded to such senior leaders provided stakeholders with a strong incentive to collaborate effectively, not only to counter the threat of being criticised for not participating fully but to exploit the opportunity to highlight and secure resources to address key issues as they saw them.

5.4   Establishing Roles (Sep 14 – Oct 14)

Over the summer leave period, I left the running of the project to a colleague who was able to expand the core team and to begin to think about how to design the assessment framework. This design

was based around a generic process model of how Head Office, FLCs and the delivery agents need to work within and across these swimlanes – See Figure 5.4.

In order to test this putative framework we tasked team members to arrange interviews with stakeholders from each of the FLCs and their associated networks in DE&S and ISS. The aim of these interviews was to check whether the framework was suitable for capturing the priority issues by posing open questions to identify what was working (green indicators), what was not (red indicators) and what was uncertain (white indicators) and, at the end, to seek direct feedback on the putative framework. The interviews also provided an opportunity for us to introduce ourselves to the stakeholders, explain the workplan that had been commissioned from ASA and surface any concerns that the stakeholders had. Prior to these interviews taking place, throughout September we focused on meeting with Head Office stakeholders to get their perspectives firstly on our task, secondly on who the key stakeholders were, and thirdly on our proposed approach, including the process model.

Title – Acquisition System Health

Phase

Head Office

Strategic direction and budget

Agreement of options and budget

Agree command plan

Ensure coherency between plans

Hold command to account

Hold DE&S to account

Commands

Command planning process

Generation of command plan

Generation of options

Generation and management of detailed requirements incl KPIs

Accept product - contractually

Generation of change options and their impact

Agree POW

Monitor programme & performance

Delivery agents (DE&S and ISS)

Provision of advice-cost, technical and deliverability

Generation of SRD/ TRD

Set-up and deliver programme

Provision of change advice-cost and deliverability

Monitor performance

DE&S ISS

Provide information on performance

Delivery agent corporate plan

Figure 5.4 – Putative process model for acquisition system

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We scheduled the stakeholder interviews for October and November because we wanted to use the Customer Design Working Group (that took place every two months) in early October to formally launch our task. This large meeting was called and chaired by Hd–ASA and attendees were drawn from across the acquisition system. We were invited to present immediately after the key staff who had the responsibility for implementing ASH monitoring. It came as a surprise then that the ASA presentation set out that the purpose of ASH was to *"Check that the Acquisition System is operating in compliance with the guidance and direction issued by the ASA and that it is operating efficiently and effectively"* and that it would serve to: *"(a) Monitor to confirm that the mandated rules, standards and behaviours are embedded and sustained; (b) Identify risk to the defined functioning of the System; (c) Report assessment to different audiences (6 monthly focus); and (d) Where risk is identified diagnose and track (but not lead) resolution."*. This focus on compliance and efficiency was worrying for two reasons. First, this was not what we had proposed to do although ASA staff did later make clear that our analysis was going to be one of four lines of effort for ASH monitoring – see Figure 5.5. Second, and more importantly, this attempt to exert control did not go down well with stakeholders and we had to work to recover the situation through October and November. We achieved this by mapping our roles to ASA's (b) and (d) to highlight how we were focused on taking action for improvement, and distancing ourselves from their (a) in particular.
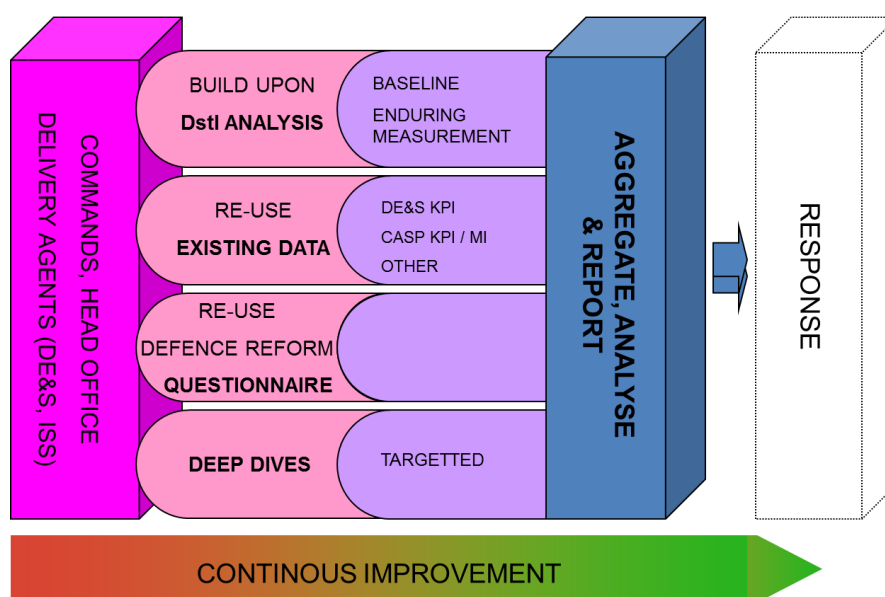
Figure 5.5 – Method of measurement for Acquisition Systems Health (Source: ASA)

Key Observation #9 – Health monitoring can support risk identification and treatment

The assessment of organisational health can contribute to risk identification by highlighting shortfalls that have yet to manifest themselves as issues but that if left unchecked would impact performance. The repeated assessment of organisational health through a process of monitoring can help track the effectiveness of risk treatments and highlight the need for additional or alternative treatments.

5.5 Taking part in the change process (Nov 14 – Jan 15)

The team worked hard through October and November to conduct more than 30 interviews across the acquisition system. I took personal responsibility for engaging Royal Navy and Royal Air Force stakeholders and their counterparts in DE&S and ISS, whilst others did likewise for the Army, Joint Forces Command and Strategic Programmes. Whilst we built good relationships and identified a range of insights from these interviews, by early November it became clear that our putative assessment framework was not going to meet our purpose. The main reason for this was that it was introducing something new into an already heavily congested information environment and there was little conviction expressed by the stakeholders that it was adding much value. I therefore decided to return to the pre-existing ASOM diagram and consider what functional requirements would be generated by applying the VSM for each of the three entity types. These functional requirements are listed in Figure 5.6 below, mapped against the ASOM in Figure 5.7 further below and described in detail at Appendix 5-1 (p. 239).

Functional Requirement	Head Office	Command	Delivery Agent
1. Set strategic direction and allocate budgets	X	X	X
2. Ensure coherence of activities across Defence	X		
3. Hold to account Commands for delivery against Command objectives	X	X	
4. Hold to account DE&S for delivery against corporate objectives	X		X
5. Develop and agree Command objectives with Head Office	X	X	
6. Develop and disseminate capability management strategies and plans		X	
7. Formulate delivery strategy and assign pan-DLOD requirements		X	
8. Place and manage ESLS requirements with Delivery Agents (and other Commands)		X	X
9. Ensure coherence of Command activities		X	
10. Hold to account Delivery Agents (and Commands) for delivery against ESLS requirements		X	X
11. Hold to account ISS for delivery against corporate objectives (JFC only)		X	X
12. Accept ESLS products and services from Delivery Agents		X	X
13. Develop and agree corporate objectives with Owner (HO for DE&S, JFC for ISS)	X		X
14. Develop, agree and manage programme of work with Commands		X	X
15. Formulate delivery strategy and assign work to Delivery Teams (and other Delivery Agents)			X
16. Place and manage contracts with industry			X
17. Ensure coherence of Delivery Agent activities			X
18. Hold to account industry for delivery against contracts			X
19. Hold to account other Delivery Agents for delivery against ESLS requirements			X
20. Hold to account Commands for obligations to Delivery Agents		X	X

Figure 5.6 – Putative Assessment Framework

I was keen to distinguish between functional requirements that relate to interactions between system components (highlighted in grey) and functional requirements that relate to system components or component groups (e.g. across Front Line Commands). Whilst the former type of functional requirement predominate (14/20 or 70%), we knew from the interviews that the inclusion of the latter 30% was going to prove difficult. These six functional requirements can be categorised either in terms of VSM's S2 for ensuring coherence (Functions 2, 9, and 17) or in terms of VSM's S3 translating objectives into activities (Functions 6, 7, and 15) and without them I felt strongly that the requirement set would be incomplete. The problem was that key stakeholders, the Front Line Commands in particular, were keen to restrict our focus – and moreover that of ASA – to the outputs that they produced to enable interaction with other entities and not how they produced them. Specifically, Function 2 relates to

functionality internal to HO; Functions 6, 7 and 9 relate to functionality either internal to Commands or across Commands; and Functions 15 and 17 relate to functionality either internal to Delivery Agents or across Delivery Agents.
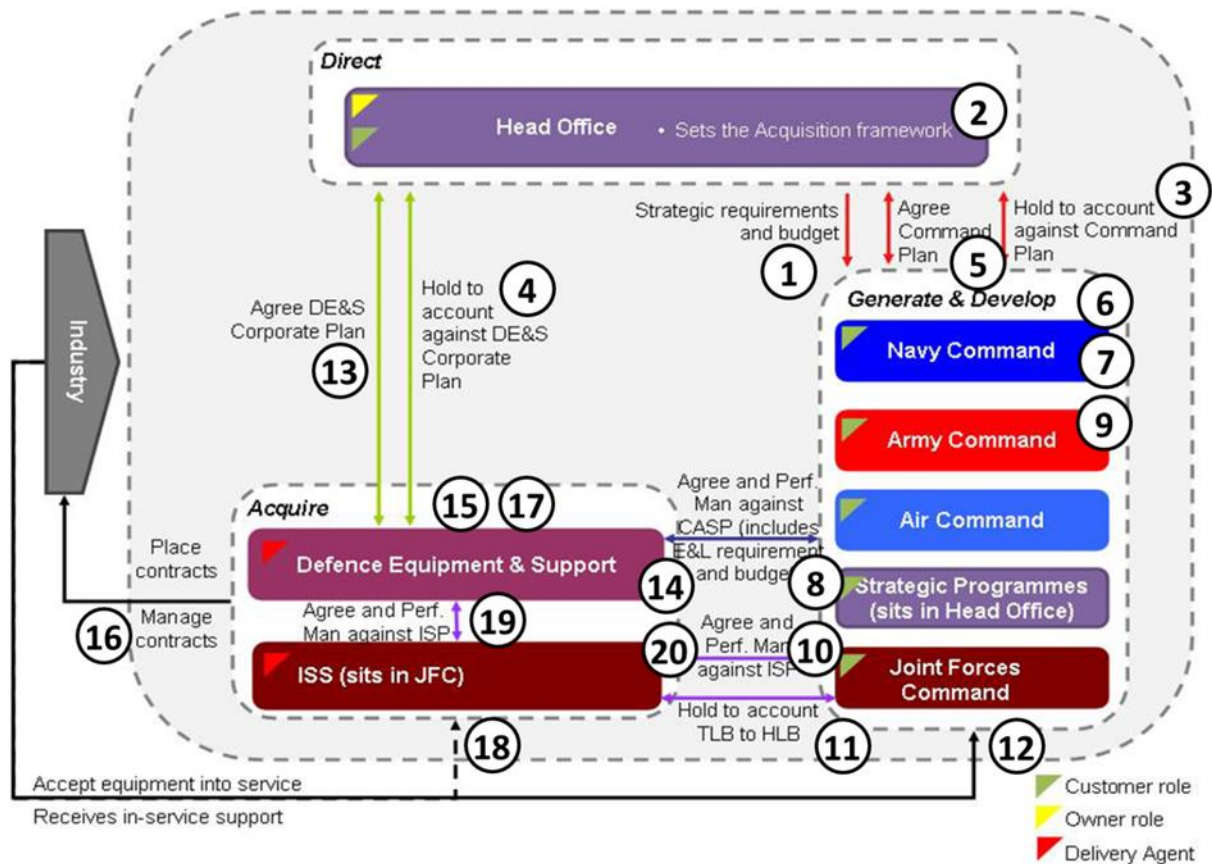
Figure 5.7 – Functional requirements mapped against the Acquisition Systems Operating Model

Key Observation #10 – Theoretical considerations are vital to ensure comprehensive inquiry

Whilst it is tempting to tailor the assessment approach to maximise stakeholder support and participation, it is essential that important theoretical considerations are not sacrificed on the altar of pragmatism. This is because an incompletely scoped inquiry will lead to at best incomplete results and at worst misleading results. It may however be necessary to sequence the scope of the inquiry to build momentum in areas of agreement before expanding to cover all necessary aspects.

At a progress meeting with the ASH team in ASA on 21 November, we proposed that each of these functional requirements be assessed using an 'Italian Flag' scheme which displays the relative weights of the strengths (green), unknowns (white) and weaknesses (red). However, ASA had in parallel identified six dimensions of systems health which they found to provide a simpler assessment framework. These dimensions comprised: (a) Processes; (b) Structures; (c) Roles, responsibilities & autonomy; (d) Skills, expertise & capacity; (e) Behaviours and (f) Information. We compromised and modified our design to propose that each of the twenty functional requirements also be assessed for each dimension using a simple six point scoring scheme was invariable across the functional requirement. This scoring scheme was comparable to the maturity scales being used in FLC and Head Office maturity models being developed by Customer Design and comprised: (0) No awareness; (1) Awareness; (2) Action Planned; (3) Implementing actions; (4) Changes embedded and (5) Target maturity. The target maturity levels for each dimension (score = 5) are displayed in Figure 5.8 below.

Dimension	Target Maturity (Score = 5)
Processes	• Processes are in place and adhered to. • Processes are optimised for function. • Timings of process outputs are aligned.
Structures	• Structures minimise number of interactions. • Structures allow easy interaction between organisations.
Roles, responsibilities & autonomy	• Roles, Responsibilities and Accountabilities defined, communicated and adhered to. • Delegations and empowerment, defined, recorded and adhered to.
Skills, expertise & capacity	• Skills and expertise required is understood and available. • Sufficient people to undertake the function. • Continuity of knowledge is maintained.
Behaviours	• Focus on best for defence rather than individual area. • Incentives in place to encourage positive behaviour. • Collaborative working is normal. • Trusted relationships between Commands, Head Office and Delivery agents
Information	• Information is accurate, assured and auditable. • Information is readily accessible (timely access). • Information is single source.

Figure 5.8 – Target maturity levels for each of the six dimensions developed by ASA

This compromise made for quite a cumbersome framework and to illustrate this we populated it with assessments based upon the evidence gathered through interviews conducted to date – see Figure 5.9 (not real data). We presented this at the December Customer Design Working Group together with an outline plan for how we would undertake a formal assessment and – alongside our ASA customers – experienced a significant amount of negative feedback. The stakeholders (as expected) objected to making assessments of the internal functions necessary for them to have effective interactions externally (i.e. #6 and #7 for the FLCs and #15 for DE&S and ISS) and expressed some confusion over where the dimensions had originated from. But the main concerns related to ASA's proposal that our illustrative population of the framework should be used as a baseline assessment. The stakeholders countered that a baseline should be a collective process (as per Task 3 description) and that this should not take place until April at the earliest because of the developing maturity across the system with FLCs not expected to meet initial operating capability until this time.

Key Observation #11 – Stakeholders get a vote in how and when assessments are made

The design of assessments for organisational health needs to be a collaborative process where stakeholder concerns are respected and addressed. This is because their participation is essential both for making the assessments and for implementing the changes identified as necessary. The process for how and when assessments are made therefore needs to reflect their concerns and opportunities should be seized to respond positively to their feedback.

Functional Requirement	Summary Assessment	Behaviours	Information	Roles, responsibilities & autonomy	Skills, expertise & capacity	Structures	Processes
1. Set strategic direction and allocate budgets	G G G G G G W W R R	1	-		-	-	2
2. Ensure coherence of activities across Defence	G G G G G W W W R R	-	-	3	4	5	1
3. Hold to account Commands for delivery against Command objectives	G G G W W W W W W R	2	3	4	5	1	2
4. Hold to account DE&S for delivery against corporate objectives	Interviews not conducted with corporate DE&S	-	-	-	-	-	-
5. Develop and agree Command objectives with Head Office	G G W W W W W W R R	-	-	3	-	-	4
6. Develop and disseminate capability management strategies and plans	G G G G G G G G R R	5	-	-	1	-	2
7. Formulate delivery strategy and assign pan-DLOD requirements	G G G G G G W R R R	3	-	4	5	1	2
8. Place and manage ESLS requirements with Delivery Agents (and other Commands)	G W W W W W W W W R	3	4	5	1	2	3
9. Ensure coherence of Command activities	G G G G G G G W R R	4	-	5	-	1	2
10. Hold to account Delivery Agents (and Commands) for delivery against ESLS requirements	G W W W W W W W R R	3	4	-	5	1	2
11. Hold to account ISS for delivery against corporate objectives (JFC only)	Interviews not conducted with corporate ISS or HO.	-	-	-	-	-	-
12. Accept ESLS products and services from Delivery Agents	Interviews not conducted with delivery teams	-	-	-	-	-	-
13. Develop and agree corporate objectives with Owner (HO for DE&S, JFC for ISS)	Limited interviews with Delivery Agents	-	-	-	-	-	-
14. Develop, agree and manage programme of work with Commands	G G G G G G G R R R	3	-	4	5	1	2
15. Formulate delivery strategy and assign work to Delivery Teams (and other Delivery Agents)	Limited interviews with Delivery Agents	-	-	-	-	-	-
16. Place and manage contracts with industry	Interviews not conducted with delivery team & industry	-	-	-	-	-	-
17. Ensure coherence of Delivery Agent activities	G G W W W W W W R R	3	4	-	-	5	1
18. Hold to account industry for delivery against contracts	Interviews not conducted with delivery teams	-	-	-	-	-	-
19. Hold to account other Delivery Agents for delivery against ESLS requirements	Assessment not appropriate at this time	-	-	-	-	-	-
20. Hold to account Commands for obligations to Delivery Agents	Added after interviews conducted	-	-	-	-	-	-

Figure 5.9 – Illustrative Assessment of Acquisition System Health (not real data)

In light of this feedback, instead of completing Task 3 as proposed, the Dstl team instead developed a plan for how a baseline assessment should be conducted – see Figure 5.10. This plan put emphasis on stakeholders for conducting the assessments and on ASA for checking and integrating these findings into a final product. It was designed to ensure collaboration by giving the stakeholders maximum flexibility in how they conducted their assessments whilst establishing the ASA as the owner of the assessment. It was also designed to make time for the assessment framework and data collection methodologies to be developed and agreed in a three month period from January to March.

Step	Process	Schedule
1	ASA defines framework and assessment methodology including the functions to be measured and the assessment scales.	April
2	ASA assigns lead responsibility for functional requirements to appropriate stakeholder representatives.	April
3	Stakeholders undertake the assessment using their own methodologies, including reusing information from other assessments and combining with other assessment processes.	May - July
4	ASA agrees stakeholder assessments and provides a level of moderation across the system. Selected stakeholder assessments verified via "show me" meetings.	July
5	ASA compiles responses into a report for Defence Authority for Acquisition.	September - October
6	ASA coordinates report with stakeholders to ensure accurate representation.	November
7	ASA presents report to Defence Authority for Acquisition.	December
8	Deep dives conducted in specific areas where issues have been highlighted.	January - March

Figure 5.10 – Suggested assessment process and schedule for ASH

5.6 Exiting the problem situation (Jan 15 – Feb 15)

The Dstl team delivered the final report in December for ASA consideration before formal delivery in January (as per Task 4). The final report detailed: (i) how Dstl had developed an approach for assessing system health following the repeated application of Viable Systems Model to the three key components of the acquisition system: Head Office, Front Line Commands (incl. Strategic Programmes) and Delivery Agents (DE&S and ISS); (ii) how this approach has been tested and refined via a series of interviews with stakeholders drawn from across the acquisition system to validate the functions, to understand the questions required under each of the functions and to define the assessment scales; and (iii) how this approach should be implemented using the lessons learnt from testing the approach and the feedback provided by the acquisition community. The report did not provide a

baseline assessment of the system because Task 3 had not been completed given the stakeholders strong views described above. This presented an issue for ASA because they wanted to report a baseline to the Acquisition Architecture Board in February. The report was therefore amended in January to include an "illustrative assessment" that contained as much detail as was possible from the interviews, but that made clear that this did not represent a comprehensive "baseline assessment". The reluctant acceptance of this final report brought Dstl involvement to a close with ASA preferring to work with KPMG to implement the ASH process.

Whilst this exit was from the problem situation was far from ideal, I was able to maintain good contact with the ASA team as they took forward their implementation and was afforded access to key stakeholders to conduct longitudinal evaluations as the approach matured over time. Their (mature) implementation of ASH as part of acquisition system operation and assurance is displayed in Figure 5.11.
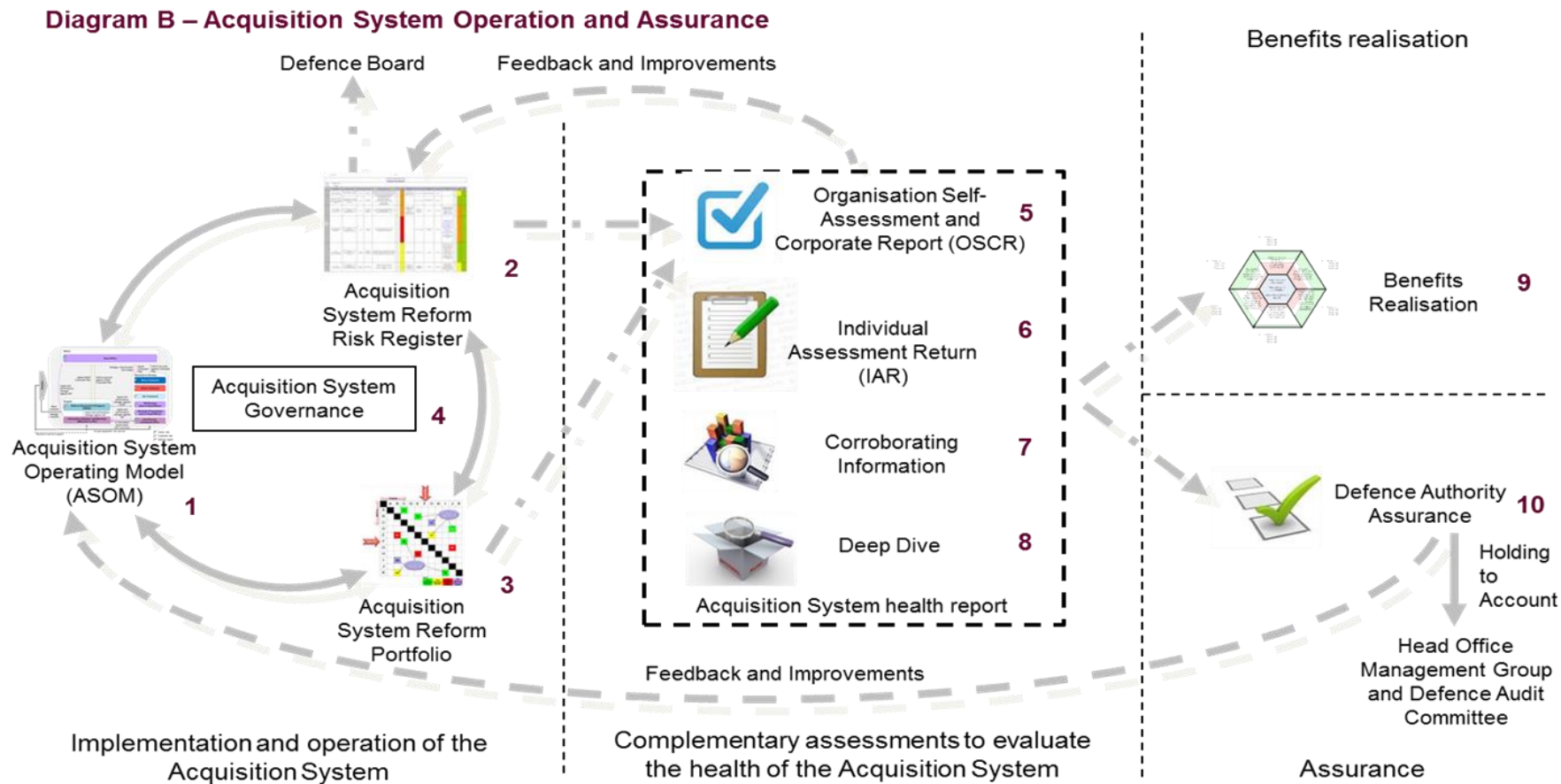
Figure 5.11 – Acquisition System Health for system operation and assurance (Source: ASA)

Referring to Figure 5.11, the ASOM (1) outlines the structure and function of the system and details the roles, responsibilities and accountabilities of organisations responsible for Equipment, Logistics Support and Information Services. The Acquisition System Reform Risk Register (2) is maintained by the ASA to record and monitor identified risks owned by portfolio stakeholders and is reviewed routinely with escalation to the Defence Board if necessary. The Risk Register covers all aspects of the ASOM and is informed both by assessments of acquisition health and by feedback from the Acquisition System Reform Portfolio (3). This portfolio encapsulates the contributions of all stakeholders, to delivering reform in the area of acquisition. Where a new risk is identified, the owner and mitigating action is agreed through Acquisition System Governance (4) and both the Risk Register and the Reform Portfolio are updated to reflect these decisions. The Acquisition System Stakeholder Group (ASSG) is the forum where stakeholders are held to account for progressing their actions. The ASSG is supported by the Acquisition System Working Group (ASWG) – an evolution of the Customer Design Working Group – that is chaired by the Hd,ASA.

The ASH is shown as comprising four elements (5 – 8) that test the implementation and practical application of the ASOM. The Organisation Self-Assessment and Corporate Report or OSCR (5) provides assurance that delegated elements of the model are performing effectively. For the Commands, this covers their perspective on how they are progressing towards Full Operating Capability against the intelligent customer maturity model. For DE&S and ISS this covers their progress in transforming to become customer-facing, trusted Delivery Agents. Through the Individual Assessment Returns or IAR (6) a representative sample of key posts are invited to complete a survey seeking their views on how the interfaces across the ASOM are performing. Analysis of IAR returns provides numerical data and supporting narrative, directly from the workforce distributed across the system. The ASA cross references OSCR and IAR findings against other Corroborating Information (7) derived from a variety of information sources such as routine corporate reporting to reinforce the understanding of issues and to identify common themes. Lastly, Deep Dives (8) are commissioned to independently review aspects of the system. For example, in July 2015, the ASA ran a Stress Test to explore how the system performs under a variety of future scenarios and in December 2015, Defence Internal Audit (DIA) also reported on the roll out of Command Acquisition Support Plans (CASPs)

In addition to feeding back into the implementation and operation of the acquisition system, ASH findings also feed forward into Benefits Realisation (9) and Defence Authority Assurance (10). The core benefits for acquisition Reform (as endorsed by the Permanent Under Secretary (PUS) chaired Acquisition Architecture Board in 2014) are: (i) Reduced cost to stakeholders through more efficient and sustainable operation; (ii) Increased stakeholder confidence in the Acquisition System leading to improved reputation; and (iii) Increased value to Customers through reduction in net capability risk. The ASA linked the realisation of these benefits to the presence (and absence) of blockers along their six dimensions and use a hexagonal graphic to display this (see Figure 5.12 for an expansion of this from Figure 5.10). Note that each segment of the hexagon uses an Italian flag to illustrate the presence (red), absence (green) and uncertainty of these blockers. The ASH findings are also used to enable the Defence Authority for Acquisition (appointed by PUS) to demonstrate clear understanding and control over for how effective the function is, how proportionate its rules are and how its development is in line with changes to regulation or changes to the strategic direction of Defence via an annual report submitted to and discussed with PUS.
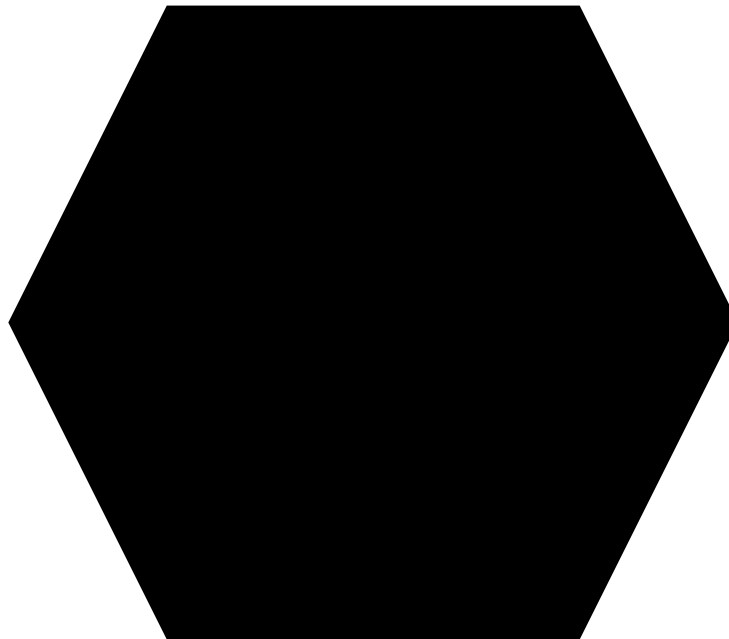
Figure 5.12 – Six dimensions of acquisition system health for realising benefits (Source: ASA) - REDACTED

5.7 Reflecting on experience (and recording learning with regard to F, M and A)

Given the strained client relations towards the end of the project, including but not limited to the ASA decision to eschew our functional framework in favour of their six dimensions, the Dstl team met to reflect on our experience using the adaptation of Midgley's framework presented in Chapter 3 to guide the discussion (Purpose, Context, Methods, Outcome) (Lowe, Murray-Jones, & Yearworth, 2015). The team identified five lessons first with regard to the specifics of assessing organisational health (a. – e.) and five lessons second with regard to consultancy in general (f. – j.) – see Figure 5.13.

Evaluation	Lesson Identified	
Methods	(a)	VSM affords a powerful framework with which to structure comprehensive organisational assessments
	(b)	The Italian Flag visualisation affords the ready communication of qualitative and quantitative data
	(c)	The functional requirement set affords for insightful summary and useful stimulus for discussion
	(d)	Combining multiple methods in a multi-methodology affords close-fit tailoring of a technical approach
	(e)	Do not underestimate the challenge of data collection
	(f)	Do not assume that methods are readily scalable
Context	(g)	Do not underestimate how much inter-organisational friction can restrict progress
Outcome	(h)	It is never too early to consider data collection
	(i)	Actively manage the requirements across the client–consultant boundary no matter the time pressure
Purpose	(j)	Think 'two levels up' to ensure a deep understanding with (and of) the client

Figure 5.13 – Lessons identified from cross-sectional evaluation

Much of the methodological reflection aligns with that from the Defence Infrastructure System (for example (a) aligns with Key Observation #5 – VSM provides a sound basis for assessing organisational health; (b) aligns with Key Observation #3 – The Italian Flag schemes affords rich analysis and communication; and (d) aligns with Key Observation #8 – Creative adaptation can ensure that method(s) match the situation) and so provides further support for these insights. But there are also new insights with regards to data collection (e), scalability (f) and the critical importance of focusing on function over form (c), although this was highlighted previously within Key Observation #5.

The linked reflections regarding data collection and scalability emerged for reasons of feasibility and desirability. In terms of feasibility, I recognised that it would be very difficult to use workshops to collect data and make assessments because the scale of the system under investigation was so much larger than that for the Defence Infrastructure. In particular, I recognised from reviewing interview transcripts that it was rare for a single person to speak authoritatively for their organisation because of the marked diversity of views. In terms of desirability, whilst it had been possible to gather the key stakeholders together for Defence Infrastructure and facilitate them to make an assessment I was uncomfortable that we had not sought views more widely than from a small number of stakeholders, all be them subject matter experts. Our proposal here – that was accepted – to collect data via a survey (ASA employed KPMG to operate the IAR survey) and to discuss this in subject matter expert workshops (ASA chaired Acquisition System Working Groups to discuss their synthesis of survey and other data) affords a much broader sampling whilst preserving the ability to make meaningful assessments.

Key Observation # 12 – Data considerations can drive method when working at scale

The collection and synthesis of data from across the organisation are critical to making organisational health assessments. When working at scale the means by which this will be achieved becomes a driving factor in design because it is neither feasible nor desirable to facilitate large group workshops. Moreover, if the assessments are to be repeated in a monitoring process the efficiency must also be considered if the process is to be affordable and so sustainable.

The reflection on focusing on function as opposed to form – with or without the use of VSM as per Key Observation #5 in Chapter 4 – came to the fore because the research team found this to be essential to ensuring constructive debate between stakeholders. In particular the research team found that phrasing the key functions as processes (i.e. using Gerunds[20]) to be helpful in depersonalising interactions to focus on 'what' should be done and not by 'who' and 'how'. This is especially important

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[20] Gerunds: Verbs in the present participle form in English i.e. verbs ending in '-ing'; having no subject and where the agent (performer) is not specified and expressing a continuous present tense.

in situations where there is disagreement between stakeholders and where dialogue is not always constructive. The research team also found that mapping these functions to stakeholder groups (as per Figure 5.5) to be helpful in identifying where these functions were either the responsibility of one stakeholder group or multiple stakeholder groups. This was an effective signpost to where different stakeholder groups needed to work together and also where they did not need to become involved in the debate. Lastly, and also supported by customer reflection, the focus on function not form was found to enable the stakeholders to discuss what 'could and should exist' to deliver the required function and not 'what currently exists'.

Key Observation #13 – Focusing on function (not form) affords constructive debate

Structuring organisational health assessments to focus on key processes essential to the function of the organisation is helpful in aiding constructive debate when working with divergent stakeholder groups. This is because it elevates the debate to focus on What should be? and not What is? and Who is at fault?

But for all that the Dstl and ASA might have done differently, and for the misgivings that there might have been over the approach that was taken forward, the implementation of a health monitoring process for acquisition was a successful outcome. In particular, the way in which the findings were used to inform key business processes chaired by the most senior civil servants in MOD ensured that this effort was prioritised across the acquisition system. Furthermore, the way in which stakeholders were engaged in debating the findings and in particular in identifying the actions that should be taken helped to suppress resistance sufficiently to enable the approach to be sustained over time.

Key Observation # 14 – Successful implementation requires careful planning on many fronts

The planning required for successful implementation goes beyond the design of the assessment method and how data is to be collected and synthesised. It should also include consideration of how the results will be exploited to incentivise stakeholder participation and how stakeholders will be engaged to sustain the efforts.

The ASH implementation therefore offered an excellent opportunity to not only examine what is necessary to establish an organisational health monitoring process, but also to examine what is necessary to sustain it over time. I maintained good links with the ASA team and the key stakeholders as they progressed their efforts to conduct longitudinal evaluations in support of RQ3: How can organisational health monitoring be used to sustain anticipatory behaviour?

5.8   Summary

This chapter has detailed my experience of designing a bespoke assessment method and supporting process for monitoring the health of Defence Acquisition System. As per the overarching Systemic Intervention methodology this invoked methodological pluralism to blend a number of systems methodologies including VSM and HPM.

This chapter has also yielded a number of key AR observations for the assessment of organisational health, both as a result of continuous personal critical reflection (see observations 9– 11) and as a result of cross-sectional evaluation conducted with stakeholders and research team members (see observations 12 – 14). These key observations comprise:

- Key Observation # 9 – Health monitoring health can support risk identification and treatment

- Key Observation # 10 – Theoretical considerations are vital to ensure comprehensive inquiry

- Key Observation # 11 – Stakeholders get a vote in how and when assessments are made

- Key Observation # 12 – Data considerations can drive method when working at scale

- Key Observation # 13 – Focusing on function (not form) affords constructive debate

- Key Observation # 14 – Successful implementation requires careful planning on many fronts

Chapter 6 – Assessing the health of the Defence Enterprise

6.1   Introduction

The aim of this chapter is to describe the AR conducted with regard to assessing the health of the Defence Enterprise as a whole. This research was conducted from February 2015 through December 2016 with a sustained period of declaring M and F in consultation with key stakeholders informing, and being informed by, two pilot exercises comprising systemic interventions for Permanent Joint Head Quarters (PJHQ) and Head Office – see Figure 6.1. The descriptions provided in this chapter are based upon project documentation that was produced in the course of the work and research notes that were made contemporaneously as the work progressed.
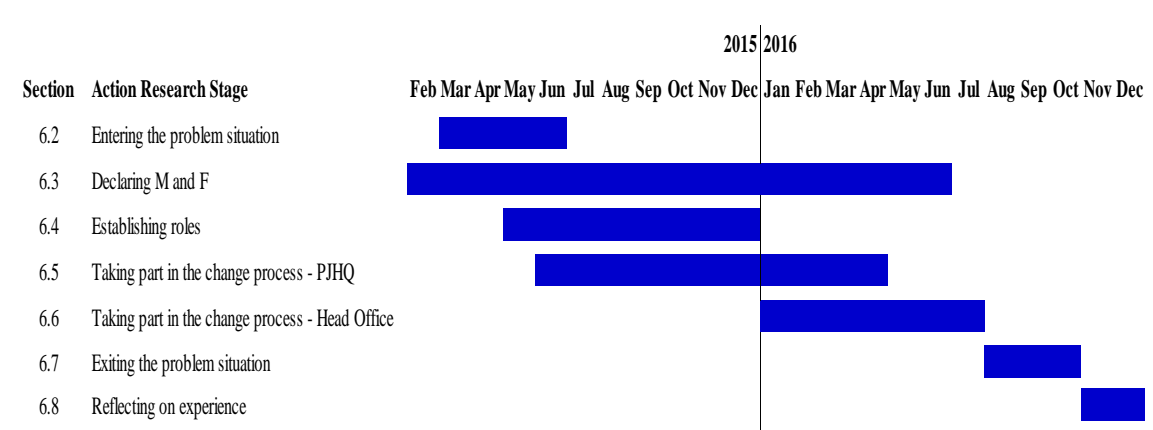
Figure 6.1 – Timeline for Defence Enterprise Core Action Research Cycle

In contrast to the previous two AR accounts where specific needs for 'Action' from a named client drove Dstl's activities, this situation involved Dstl exploring how 'Research' could bring opportunities for an as yet unnamed client. Whilst this effort was readily sponsored by the Defence Reform Unit as part of negotiating entry, it proved difficult to manage this client-researcher relationship and in particular to sustain the focus of our research in the face of competing and conflicting client interests. The AR account begins by describing how I developed a research proposal to negotiate entry with the Defence Reform Unit (Section 6.2) before explaining how I brought together a framework of ideas to propose a new organisational health assessment method that could be scaled to any size (Section 6.3). The account then proceeds to explain how we established our roles as researchers by socialising and refining this method with key stakeholders and how we also used these engagements to

design a monitoring process for potential application to the Defence Enterprise (Section 6.4). The account also describes how this method was trialled in two areas – PJHQ (Section 6.5) and HO (Section 6.6), before presenting reflections (Section 6.7) and conclusions (Section 6.8) as per previous chapters based upon discussions held with the project team (as part of project closure) and stakeholder inputs gathered by interviews (PJHQ) and a survey (HO).

6.2   Entering the problem situation (Mar 15 – Jun 15)

In February and March I leveraged the experience gained during the AR exploited firstly by the Defence Infrastructure Governance Authority (DIGA) (Chapter 4) and secondly by the Acquisition System Authority (ASA) (Chapter 5) to develop a research agenda for the design, test and implementation of a method for monitoring the health of the Defence Enterprise as a whole. Whilst this represented a logical progression, the significant increase in scale presented a major challenge. This step-change, and the common observation that both DIGA and ASA had opted for simple implementations, led me to focus this agenda on conceptualising and testing readily accessible methods that could scaled to be applied to any organisational setting regardless of size.

My development of this research agenda was primarily motivated by the need to define the scope of work to be conducted in MOD research programme, for implementation in FY15/16 and beyond. But it was also motivated by the opportunity to expose this to academic review as part of the Integrating Engineering and Management Systems course, part of my EngD programme at the University of Bristol. This course forms the capstone of the EngD taught element and is specifically designed to help Research Engineers to operationalise their concepts within their business settings. The research agenda then also included consideration of the structures and processes necessary to integrate these assessments within existing business processes.

I opened the agenda by noting that whilst assessing and monitoring organisational health is becoming established as a key area for management focus[21], there is not a universally accepted definition for how it should be conceptualised. I also noted that there is neither a consensus for what

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[21] Why Organizational Health Trumps Everything Else In Business (http://www.forbes.com/sites/ danschawbel/ 2012/03/26/why-organizational-health-trumps-everything-else-in-business/2) [Accessed: 05 Apr 2015]

should be considered when making assessments nor how these assessments should be conducted (including in a process of continuous monitoring).

In order to establish a working definition for what organisational health means, I began by using the Oxford English Dictionary definition that health is "*The state of being free from illness or injury [noun]*" to highlight the implication that healthy organisations are internally unconstrained in their performance and that this applies both to the current and the future. I next observed that in 1946 the World Health Organisation[22] defined health as *"a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity"* and used this to highlight two further implications for organisational health. First, it is insufficient to be absent of negative factors that bring about internal constraints in that a healthy organisation is one that nurtures positive factors to establish and sustain high levels of performance. Second, the health of organisation depends not only on internal characteristics but also on how it interacts with the external environment (i.e. social well being). Lastly, I observed the recent move to redefine health as *"the ability to adapt and to self manage"[23]* and used this to highlight the need for a healthy organisation to be able to both manage itself and to be able to adapt to its external environment. I also set out how organisational health is related to but distinct from organisational performance using the 2x2 described in the Literature Review (Chapter 2) – see Figure 2.7 on page 29. I differentiated that performance relates to the delivery of output(s) in the past (and so provides only lag indicators for the organisation to take reactive action against), health relates to the potential to deliver output(s) in the past and in the future (and so also provides lead indicators for the organisation to take proactive action against).

In order to simultaneously underscore the lack of consensus for what and how to measure organisational health and to illustrate how assessments are generating value in a range of settings, I highlighted four separate implementations used in the private, public and third sectors.

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[22] World Health Organisation Constitution (https://www.who.int/about/who-we-are/constitution) [Accessed: 15 Mar 2015]

[23] How should we define health? (http://www.bmj.com/content/343/bmj.d4163) [Accessed: 15 Mar 2015]

For the private sector I highlighted McKinsey's Organisational Health Index (OHI) [24] that identifies 3 key attributes of organizational health—internal alignment, quality of execution, and capacity for renewal—that are linked to 9 supporting elements which are, in turn, underpinned by 37 management practices that are observable (e.g. one of the practices that underpins "direction" is *"Articulating a clear direction and strategy for winning, and translating it into specific goals and targets"*). McKinsey's research shows that whilst all organizations need to achieve a threshold level of health—above the bottom quartile—for each of the 37 practices, an organisation that is in the top quartile for 6 specific practices has an 80 percent likelihood of being in the top quartile for health overall. McKinsey's recommend that *"the best way for any organization to do a health check is to use the OHI with a large group of employees from all areas and levels, and then augment the findings with fact-based analyses to confirm that perceptions are rooted in reality"*

For the public sector I highlighted that the New Zealand Ministry of Social Development (MSD) has developed an Organisational Capability Tool[25] in response to a challenge that it was not 'fit-for-purpose'. The tool is a questionnaire that is structured around 10 capabilities: (1) Strategic Governance; (2) Financial Viability and Sustainability; (3) Adaptive Leadership; (4) Organisational Management; (5) Workforce Development; (6) Outcomes Focus; (7) Organisational Technology; (8) Innovation; (9) Collaboration; and (10) Organisational Responsiveness. The MSD recommend that *"information is drawn from a range of sources, perspectives and experiences"* and that *"the most accurate self-assessment will come from in-depth discussion [around] tangible evidence"*.

For the third sector, I highlighted two implementations. First I highlighted that the International Development Research Centre (a public corporation created by the Canadian government as part its foreign affairs and development efforts) has developed an Organisational Assessment Framework[26] to provide development practitioners with a systemic approach to *"better understand organizational*

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[24] McKinsey Organisatonal Health Index (https://solutions.mckinsey.com/catalog/media/McKinsey Solutions_OHI.pdf) [Accessed: 27 Mar 2015]

[25] Ministry of Social Development Organisational Capability Self- Assessment Tool (https://www.msd. govt.nz/documents/about-msd-and-our-work/work-programmes/investing-in-services-for-outcomes-full-organisational-capability-self-assessment-tool-all-templates.pdf) [Accessed 27 Mar 2015].

[26] Assessment – A framework for improving performance (https://www.idrc.ca/en/book/organizational-assessment-framework-improving-performance) [Accessed 27 Mar 2015]

performance and to pinpoint the elements that affect performance". This framework posits that Organizational Performance – represented in a multi-dimensional way that includes relevance and financial viability in addition to the more traditional effectiveness and efficiency) – is a function of its enabling Organizational Motivation, Organizational Capacity and Environment. It is suggested that this framework has generic appeal in that it can be used by any practitioner interested in using organisational diagnosis to learn about and to improve an organisation. No specific method is recommended as it is expected that this will be specific to the particular context. Second, I highlighted that Bond (a UK membership body) helps international development organisations to understand their strengths and weaknesses through the provision of Health Check[27] – an online self-assessment tool. Information is collected in a survey format that assesses 79 factors on a 5-point maturity scale, for each of 11 'pillars' that comprise: (1) Identity and Integrity; (2) Leadership and Strategy; (3) Partners; (4) Beneficiaries; (5) Programmes; (6) People; (7) Money; (8) External Relations; (9) Monitoring, Evaluation and Learning; (10) Internal Collaboration; and (11) Influencing. Once responses have been received from staff and external stakeholders (if desired), users receive detailed reports and visualisations and can benchmark results against similar non-government organisations.

My proposal culminated in the work breakdown structure displayed in Figure 6.2 below. Note that it comprises four strands: (1) Review how health is conceptualised and monitored in other organisations; (2) Understand the 'As Is' for Defence; (3) Establish the requirements for health monitoring in Defence; and (4) Design the 'To Be' for Defence.

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[27] Bond Health Check (http://www.bond.org.uk/effectiveness/health-check) [Accessed 27 Mar 2015]

FY15/16 Work Breakdown Structure

It is proposed that this work be broken down into four strands in FY15/16:

Strand 1: Review how health is conceptualised and monitored in other organisations

This strand of work will identify how health is defined and monitored in other organisations and what lessons can be transferred to MOD.

Key activities:

a.   Conduct literature review; and

b.   Engage with select organisations to identify lessons learnt.

Strand 2 – Understand the 'As Is' for Defence

This strand of work will examine how health and performance is currently monitored in order to provide a foundation for the design of future monitoring mechanisms.

Key activities:

c.   Identify key Defence monitoring mechanisms, their scope, ownership and reach; and

d.   Identify interlinkages, dependencies, overlaps and disconnects between mechanisms.

Strand 3 – Establish the requirements for health monitoring in Defence

This strand of work will use the outputs from Strand 1 and Strand 2 to support targeted engagements with potential exploiters of enterprise health monitoring in order to establish a clear set of requirements to serve as a design specification (for Strand 4). It will include a gap analysis between the goals that have been set for the Defence enterprise and the 'As Is' methods that exist for health monitoring.

Key activities:

e.   Review documentation relating to goal-setting for the Defence enterprise;

f.   Conduct a gap analysis between the Defence enterprise goals and the 'As Is' methods that exist for health monitoring;

g.   Interview key senior stakeholders in Head Office; and

h.   Draft a set of key user requirements and discuss in a workshop format.

Strand 4 – Design the 'To Be' for Defence

This strand of work will propose options for how enterprise health might be monitored, both through adaptations of existing mechanisms (i.e. 'quick wins') and the introduction of new ones.

Key activities:

i.   Identify how current assessment mechanisms might be used more effectively;

j.   Identify what new mechanisms should be introduced to meet the Defence need; and

k.   Present options and discuss in a workshop format.

Figure 6.2 – Research work breakdown structure for FY15/16

In parallel to my development of this research agenda, the DRU had developed a conceptual model for how establishing set of guiding principles could be used to positively influence behaviours in Defence in order to result in better outputs and outcomes. This endeavour was a major priority for the DRU and I was invited to link behaviours and health work together in an integrated approach. I therefore extended this model to show how healthy behaviours are one of the aspects of a healthy enterprise – see Figure 6.3. This extended model situates how the embedding of principles across the enterprise, together with the effective treatment of blockers and enablers, will drive health behaviours as part of healthy enterprise (lead indicators of performance) that in turn will lead to better outputs and outcomes for Defence (lag indicators of performance). I also intended this to shows how outputs and outcomes are driven by factors wider than behaviours but this point was hard to land and late became a source of tension with our DRU sponsor representative as we progressed.
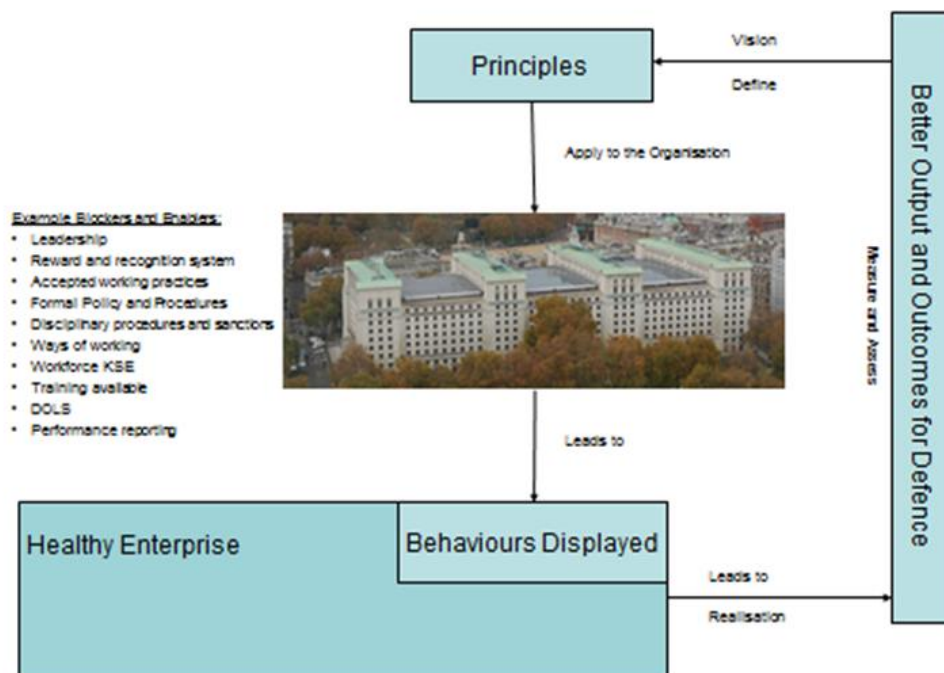
Figure 6.3 – Linking behaviours and Health for improved Defence outputs and outcomes

We brought the negotiation over entry to a positive conclusion in June when the Head of the Defence Reform Unit visited Dstl to discuss and agree the research proposal. I hosted her along with a colleague who had been working on the interface between Dstl and the broader Head Office &

Commissioning Services (HO&CS) area of Head Office to define and agree research requirements. I presented the integrated proposal and introduced members of the Dstl research team who would be supporting me, including with delegated technical leadership responsibilities (because I was concurrently pursuing a number of parallel interests including acting as a technical reviewer for an unrelated research project, spending time at the University of Hull Centre for Systems Studies as a Visiting Fellow and taking a leading role within the UK Operational Research Society's Public Policy Design special interest group). Through what was a very positive set of discussions, we mutually identified how this work would be important for DRU delivery against a key objective within the recently released Defence Plan to *"Ensure the continued resilience of the Defence Operating Model"* which provided direction to *"monitor, evolve and improve the Operating Model to ensure that it continues to coherently enable the effective delivery of Defence Output"*. Under this objective, DG HO&CS was tasked to assure annually the coherence and continued relevance of the operating model design and Hd, DRU was tasked to monitor and report 6-monthly on the risks to the Operating Model including actively exploiting opportunities to simplify and improve its corporate structures, processes and behaviours.

The introduction of the term resilience provided a new focus for literature review. Resilience has been the subject of much scholarly debate in the systems literature since Holling first put forth the concept in the context of ecosystems in 1973 and defined it as *"the measure of the ability of these systems to absorb changes of state variables, driving variables and parameters and still persist"* (Holling, 1973). An increasingly commonly held view is that resilience concerns *"the intrinsic ability of a system to adjust its functioning prior to, during, or following changes and disturbances, so that it can sustain required operations under both expected and unexpected conditions"* (Hollnagel, 2013). This broader definition reflects the fact that there are at least two types of resilience – robust resistance (also known as static resilience or ecological resilience) and agile adaptability (also known as dynamic resilience or engineering resilience) (Mallak, 1998).

The application of resilience concepts at an enterprise level (also referred to as organisational resilience) – as inferred here – is not new. A systematic literature review using a Scopus search of

business and management journal articles mentioning "organi*ation* resilience" conducted in 2015 revealed 62 papers, with the earliest being Mallak (1998) and with the ten most highly cited papers spanning subjects such as production, disaster prevention and crisis management, human resources and business strategy and the environment. A very recent review (at that time) by Annarelli & Nonino (2015) neatly summarised prior work focused on strategic and operational management and offered new ideas for research directions. In particular this review recommended that research be conducted to investigate *"the impact of introducing information systems on organizational resilience"* (Annarelli & Nonino, 2015, p. 11).

It is this research challenge that aligns most closely with my work. Further, the concept of Resilience Engineering (Hollnagel, 2013; Hollnagel, Woods, & Leveson, 2007) has that monitoring sits alongside responding, learning and anticipating as one of four cornerstones for resilience in the dynamic sense. The concept of Resilience Engineering – as per the concept of High Reliability Organisation – focuses on the elimination of unwanted variance in performance through the simultaneous management for both prevention and containment (Sutcliffe, 2011). Prevention requires that organisations try to anticipate and identify events that must not happen, identify all possible causal precursors and create procedures for avoiding them (Schulman, 2004). Containment requires that the organisation operates reactive capabilities to detect, contain and recover from events that could not have been anticipated (Weick & Sutcliffe, 2006).

It is important to note that a system cannot be said to be resilient in a Resilience Engineering sense if any one of these four cornerstones is missing and that the absence of one cannot be compensated for by the increases in any of the others. The degree to which a system can realise each of these potentials – and maintain congruence between them – will determine whether or not it is resilient (Hollnagel, 2013). At the most basic level if a system is going to survive for any length of time (if not be resilient) then it must have the ability to respond to issues as they arise. At a higher level, a system will also have the ability to monitor its internal and/or external environment in order to respond more quickly before a situation becomes critical. At the next level, the resilient system adds the ability to learn and uses this learning to inform both how it monitors and how it responds. At the highest level,

a system will shift from reactionary to anticipatory by adding the ability to anticipate issues and manage them before they arise.

Key Observation # 15 – Health monitoring can support organisational resilience

Health monitoring is a cornerstone for organisational resilience important for both prevention and containment modes of resilience, with the emphasis shifting from primarily supporting an organisation's ability to anticipate to primarily supporting its ability to respond.

6.3 Declaring M and F (Feb 15 – Nov 16)

I again invoked Systemic Intervention with its three core aspects of Action, Critique and Judgement (Midgley, 2000, pp. 129-132) as the overarching methodology.

In terms of Action for improvement, the agreed aim of this research was to design, test and support the implementation of a method for monitoring the health of the Defence Enterprise in support of the design and implementation of organisational change across the Defence Enterprise. Whilst this action was sponsored by the DRU, it was recognised that sponsorship would be required from very senior levels if health was to be considered alongside performance as per the Secretary of State's very helpful exhortation in January 2015 that *"MOD must not merely be match-fit, it must be permanently fit"*[28]. Senior stakeholder engagement was therefore identified as a key task within the work breakdown structure (see Activity g. under Strand 3).

In terms of Critique for setting an appropriate boundary for the inquiry, the Defence Enterprise was defined to refer to all aspects of the Defence Operating Model (DOM) for which MOD is held to 'Account' – i.e. all elements within the 'Account' dashed rectangle of Figure 6.4. It therefore excluded 'upstream' suppliers, 'downstream' consumers and 'sidestream' partners and stakeholders. These exclusions were judged to be appropriate for two reasons. First, given the aim was to guide intervention within the MOD then setting the boundary to be that which MOD is held to account for was judged to be logical. Second, and perhaps more importantly, the MOD is a very large organisation with an annual

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[28] Reforming Defence: keeping fighting fit (https://www.gov.uk/government/speeches/reforming-defence-keeping-fighting-fit) [Accessed: 07 Jan 2019]

budget of £35B (FY16/17), comprising more than 250,000 employees and supported by more than 30 agencies and public bodies. Setting the boundary wider was judged to be impractical.
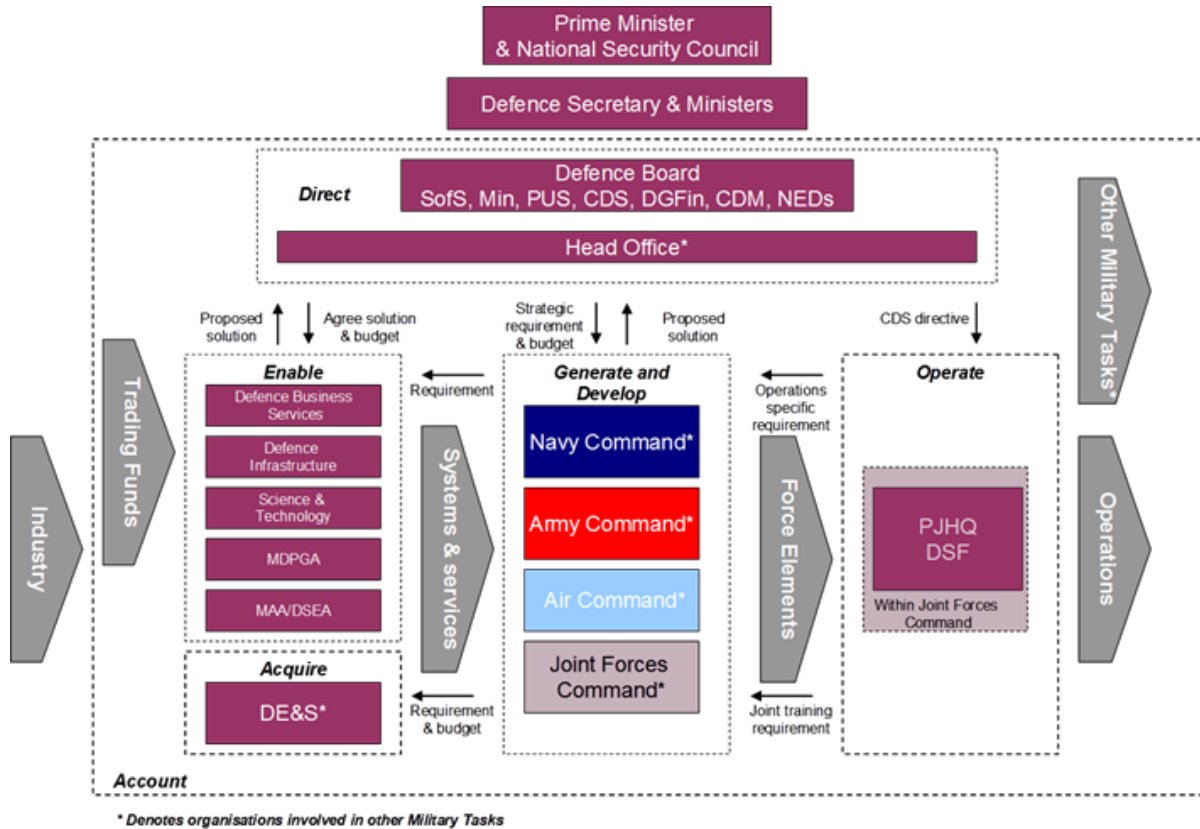
Figure 6.4 – Setting the boundary for Defence Enterprise using the DOM

In terms of Judgement, with regard to which method(s) to use I was heavily influenced by the recent experience with the Acquisition System in two ways. First, I was struck how the simple 'consultancy-style' assessment scheme – similar to those described above – was adopted by the Acquisition System Authority in preference to our comprehensive assessment scheme developed by applying VSM across the Acquisition System Operating Model. I was therefore interested in drawing upon the ideas put forward by McKinsey, IDRC, Bond and MSD to ensure that the assessment method was readily accessible to senior decision makers. Second, it became clear in designing the assessment method for Acquisition that accessing data that could be considered representative of this large system was not going to be achieved by facilitating workshops with a selection of experts, no matter how many could be squeezed into a room. Stepping up from Acquistion where a survey formed part of a multi-

component approach to data collection to work at the scale of the whole department convinced me that we needed to do something different. I therefore decided that rather than try to decompose the DOM into the essential functions needed to ensure its resilience, that I would take a fully scalable approach where a common framework could be applied at any level of the department. This section now proceeds to describe how I developed this framework that represents a generic constitutive definition for organisational health.

At a high level I proposed (following from the VSM) that organisational health involves four key elements: **Identity:** Setting coherent internal context for guiding and motivating operations (S5); **Resources:** Developing the capability and capacity of internal components (S1); **Management:** Coordinating and controlling how resources interact and are deployed (S2, S3, S3*); and **Adaptability:** Reconfiguring the above in response to changing circumstances (S4). Note that this aligns closely to Rosen's (M,R) model where M = metabolism (what the systems needs to do exist) and R = repair (what the system needs to do to counteract disturbances in its operating environment) (R. Rosen, 2012) and also aligns closely to my concept for health in that it includes both the ability to perform in the here and now and the ability to adapt for the future.

At a more detailed level I mapped the various elements of the assessment methods developed by MSD, McKinsey, Bond and IDRC to identify the necessary supporting elements – see Figure 6.5. This yielded a 20-component process model for which I developed definitions in the Gerund style as per Hierarchical Process Modelling (see Figure 6.6) and for which I identified 75 indicators to support assessment (see Figure 6.7). These indicators were developed first by expanding upon what positive evidence would look like for each component (from VSM theory and from empirical assessment methods) and second by linking to available data sources within MOD to consider what evidence might be forthcoming (e.g. survey questions).

Health Characteristic		Health Monitoring Approach			
		Ministry of Social Development	McKinsey	Bond	IDRC
IDENTITY	a. Purpose	6. Outcomes Focus	1. Direction	4. Beneficiaries	2. Mission
IDENTITY	b. Values		3. Culture &Climate	1. Identity & Integrity	1. History 3. Culture
IDENTITY	c. Leadership	1. Strategic Governance	2. Leadership 4. Accountability	2. Leadership & Strategy	5. Strategic leadership
IDENTITY	d. Incentives		4. Motivation		4. Incentives
IDENTITY	e. External Orientation		8. External Orientation	8. External Relations	
RESOURCES	f. Personnel	5. Workforce Development 10. Organisational Responsiveness	6. Capabilities	6. People	7. Human Resources
RESOURCES	g. Technology	7. Organisational Technology			
RESOURCES	h. Infrastructure				9. Infrastructure
RESOURCES	i. Information			9. Monitoring	
RESOURCES	j. Commissioning			3. Partners	
MANAGEMENT	k. Control	4. Operational Management	5. Coordination and Control		6. Structures
MANAGEMENT	l. Coordination			11. Influencing	12. Inter-organisational links
MANAGEMENT	m. Processes			5. Programmes	8. Financial management
MANAGEMENT					10. Program management
MANAGEMENT					11. Process management
MANAGEMENT	n. Decisions				
MANAGEMENT	o. Communications			10. Internal Communications	
ADAPTABILITY	p. Innovation	8. Innovation	9. Innovation and Learning		
ADAPTABILITY	q. Change Management	3. Adaptive Leadership			
ADAPTABILITY	r. Organisational Learning				
ADAPTABILITY	s. Social Networks	9. Collaboration			12. Inter-organisational links
ADAPTABILITY	t. Financial Flexibility	2. Financial viability		7. Money	

Figure 6.5 – Developing the framework to identify a set of 'health characteristics'

Health Characteristic		Process definition (in gerund form) in support of a transformation of "Maintaining the health of the enterprise"
IDENTITY	a. Purpose	Working from a clear purpose that provides motivation for activity across the enterprise
	b. Values	Working to a set of positive values that are used to guide operations across the enterprise
	d. Leadership	Providing inspiring leadership that motivates the workforce and creates the right environment for success
	e. Incentives	Ensuring that incentives align with Purpose and Values
	f. External Orientation	Understanding role within broader enterprise(s) and integrating effectively with peers
RESOURCES	f. Personnel	Maintaining a suitable qualified, experienced and professionalised workforce
	g. Technology	Exploiting technology to increase efficacy, effectiveness and efficiency
	h. Infrastructure	Maintaining physical infrastructure necessary to effectively and efficiently support the delivery of outcomes
	i. Information	Maintaining information infrastructure necessary to effectively and efficiently support the delivery of outcomes
	j. Commissioning	Ensuring timely access to the right partners and suppliers of products and services
MANAGEMENT	k. Governance	Governing through clear structure, roles and responsibilities, risk management and assurance
	l. Coordination & Control	Coordinating efforts across the enterprise to maximise synergies and minimise duplications
	m. Processes	Adhering to processes that balance the need for control of risk against the need to innovate in critical areas
	n. Decisions	Delegating decision-making authority appropriately throughout the enterprise
	o. Communications	Maintaining clear and open lines of formal bi-directional communication both vertically and horizontally (across silos)
ADAPTABILITY	p. Innovation	Encouraging and rewarding staff for using their knowledge to solve problems and/or improve delivery in innovative ways
	q. Change Management	Bringing expertise to bear in the conception, design and implementation of change programmes
	r. Organisational Learning	Continuously learning and developing across the enterprise including from experience (i.e. lessons learnt)
	s. Social Networks	Minimising silos through maintenance of informal networks (including for knowledge sharing)
	t. Financial Flexibility	Maintaining financial flexibility to exploit opportunities and/or respond to threats

Figure 6.6 – Defining health characteristics as processes (in 'gerund' form)

Health Characteristic	Indicator
a. Purpose	There is a clear purpose with which individuals/groups identify
	There is a clear vision with which individuals/groups identify
	Individuals/groups understand how their work contributes to the achievement of purpose / vision
b. Values	There is a clear articulation of the values to be shared across the enterprise
	These values used to guide the actions of individuals/groups
	The values foster clear performance and behavioural standards
	The values encourage honesty, transparency and open dialogue
c. Leadership	Leaders are empowered, equipped and supported in their leadership roles
	Leaders are visible and accessible to the workforce
	The workforce has confidence in their leaders
	The enterprise promotes leadership at all levels
d. Incentives	Incentives exist that recognise and reward individuals/groups for their contributions
	Incentives align with purpose and values
	Incentives are applied coherently across the enterprise
e. External Orientation	The purpose / vision of the enterprise shared and supported externally
	Individuals/groups know who benefits from their activities
	There are effective mechanisms in place to manage relationships with customers / beneficiaries outside the Enterprise
	There are effective mechanisms in place to manage relationships with peers outside the Enterprise
f. Personnel	The workforce has the required capacity
	The workforce has the required capability (knowledge, skills and experience)
	The workforce is engaged
	The workforce representative of the population
	There is a strategic workforce plan for the future
g. Technology	The enterprise routinely exploits technology to increase effectiveness and/or efficiency
	There are effective mechanisms in place for technology watch / horizon scanning to identify opportunities and threats
	Technology is rapidly exploited after a need / opportunity is identified
h. Infrastructure	The working accommodation provided is fit for purpose
	The living accommodation provided is fit for purpose
	The sports/recreation facilities provided are fit for purpose
	The physical infrastructure is sustainable
i. Information	The information infrastructure enables effective and efficient access of information

Health Characteristic	Indicator
	The enterprise routinely exploits this infrastructure to manage information
j. Commissioning	The enterprise has links to requisite external expertise
	The enterprise delivers effectively through partners and suppliers (manage requirements, establish win-win incentives, manage contracts)
	The enterprise is able to sustain competition (avoid monopolies)
k. Control	There are effective mechanisms to govern the enterprise and its constituent parts
	There are effective mechanisms to identify and prioritise demand/requirements within constraints
	There are effective mechanisms for setting strategy and developing associated plans
	There are effective mechanisms for identifying and managing strategy implementation issues
	There are effective mechanisms to establish, assign and manage roles and responsibilities
	There are effective mechanisms to identify and address performance issues
	There are effective mechanisms to allocate and balance resources in a timely and flexible manner
	There are effective mechanisms to manage risk
	There are effective mechanisms to assure and audit performance and management of risk
	There is clear identification, dissemination and understanding of the relevant standards and policies which must be met by the enterprise
l. Coordination	There are effective mechanisms to coordinate action
	There are effective mechanisms to identify and manage conflicts
m. Processes	The processes that support control and coordination effective and efficient
	Good practice is used in process design and implementation
n. Decisions	Decision authority is delegated to the right level
	There are effective mechanisms to hold to account over performance
	Decision making is informed and underpinned by appropriate evidence
o. Communications	There are effective mechanisms for dissemination of information down the organisation
	There are effective mechanisms for feedback of information up the organisation
	There are effective mechanisms for communication across the organisation (eg communities of practice)
	The value of ongoing conversations is recognised, enabled and undertaken at all levels
p. Innovation	New ideas are frequently implemented within the enterprise
	Staff are incentivised, equipped and empowered to identify potential improvements and implement change
	There are safeguards in place to mitigate risk of innovation
q. Change Management	Change programmes produce the intended outcomes
	There are effective mechanisms for coordination of change activities across the enterprise
	Effective communications plans are developed and implemented for all key change activities

Health Characteristic	Indicator
r. Organisational Learning*	DOLS1: The Leaders of my organisation value the importance of learning and act as effective role-models
	DOLS2: A climate of openness and trust permeates my organisation
	DOLS3: Leaders encourage a climate of critical thinking, rigorous analysis and root cause identification for everyone
	DOLS4: Individuals across the organisation are open to trying out new ideas and different ways of working
	DOLS5: We routinely utilise effective processes for critical reflection, review and development of our work (eg an after action review)
	DOLS6: We make appropriate information and examples of good practice (including lessons learnt from experience) readily available
	DOLS7: Judgements are made on the basis of strong evidence and access to appropriately experienced individuals (internal or external)
	DOLS8: Sufficient time and resources are allocated for education and training for all personnel including at induction and at job handover
	DOLS9: Actions specifically related to (individual and group) learning are set, reviewed, tracked and implemented
	DOLS10: Performance management measures (e.g. objective setting and promotion criteria) positively assess behaviours consistent with organisational learning such as a willingness to question, experiment and share information
s. Social Networks	Staff network effectively across the breadth of the enterprise
	Staff network effectively outside the boundary of the enterprise
t. Financial Flexibility	Budgetary freedoms exist to respond to threats and/or exploit opportunities

Figure 6.7 – Defining indicators for each of the health characteristics

*Note that the indicators for Organisational Learning corresponds to the success factors identified for the Defence Organisational Learning Scheme (DOLS) so that organisational health assessment can be informed by and/or inform the DOLS change programme.

It is interesting to note that whilst there is in good support for the four dimensions, the amount of support for the individual characteristics is variable. For example, all four approaches map to the individual characteristics of a. Purpose, d. Leadership and f. Personnel whereas eight characteristics map to only one of the methods (g. Technology, h. Infrastructure, i. Information, j, Commissioning, n. Decisions, o. Communications, s. Change Management and u. Financial Flexibility).

Key Observation # 16 – Health is: Identity, Resources, Management and Adaptation

Combining theoretical insights from Beer's Viable System Model and Rosen's Metabolism–Repair model with empirical insights from MSD's Organisational Capability Self- Assessment Tool, McKinsey's Organisational Health Index, Bond's Health Check and IDRC's Organisational Assessment Framework yields a generic constitutive definition for organisational health that comprises: Identity, Resources, Management and Adaptation.

6.4 Establishing roles (May 15 – Dec 15)

It should be noted that the above development took place over a number of months with me generating and debating a number of versions with colleagues before I set upon this version in November 2015 after presenting it at the Anticipation conference. In particular, I developed an early version of the framework with a colleague who brought a management science perspective to complement my systemic perspective (see Figure 6.8) whilst I was tasked to work on the Strategic Defence and Security Review in June and July of 2015. This early version formed a key part of our first update meeting with Hd, DRU against the delivery schedule at the end of July that was important for establishing our sponsor-researcher relationship and roles. This early version also formed the basis for Dstl support to PJHQ that was led by this colleague and that will be described in the next section.

At this update meeting we also outlined plans for socialising this assessment framework with stakeholders across Defence after the summer holiday break. The aims of these engagements were to (i) solicit feedback on the assessment framework; (ii) identify how health monitoring would complement / overlap with existing processes; and (iii) begin to gather requirements for the putative enterprise health monitoring system. The update meeting went well with the DRU agreeing that we had developed our thinking sufficiently to expose it to others. Consequently we scheduled and held a

number of interviews in late September and early October with stakeholders drawn from across Head Office. In particular we held interviews with Director for Defence Audit Risk and Assurance and his staff who provide support to the Defence Board in the Direct function that they perform, and with the Hd-ASA and Hd-DIGA to respectively check in on how Acquisition and Infrastructure health monitoring was progressing. In November, we held interviews with Hd Corporate Strategy and Governance and his staff who oversee quarterly performance and risk reporting from across the department.

Enterprise Health

The ability of an enterprise to sustain performance (inc. via adaptation)

Identity	**Resources**	**Management**	**Relationships**
• Purpose	• Workforce	• Governance	• Customers
• Leadership	• Infrastructure	• Control	• Beneficiaries
• Motivation	• Information	• Coordination	• Partners
• Values	• Knowledge	• Processes	• Suppliers
• Culture	• Technology	• Decisions	• Competitors

Adaptability
• Focus on outcomes   • Learning and Development   • Team Working
• Communication   • Change Management

Figure 6.8 – Early definition of Enterprise Health

The results of these interviews were used to inform further interviews with very senior stakeholders in early December that included the Defence Board secretary, the Chief of Staff to the Secretary of State and the Director General for Head Office and Commissioning Services. Based on these interviews it was agreed with DRU that Dstl would conduct a pilot assessment in Head Office to prove the concept and in particular the ability to support assessments using existing data. The design of this pilot was also influenced by experience drawn from parallel work that had recently concluded for PJHQ. I describe this parallel work that was conducted by colleagues in the next section before returning to describe this pilot activity in the subsequent section.

6.5   Taking part in the change process – PJHQ (Jun 15 – Apr 16)

In June 2015, Dstl delivered a report that confirmed that PJHQ was *"running hot"* as feared by the Commander Joint Operations (CJO) based upon a quick analysis of readily available quantitative data (e.g. length of working days based on swipe access). On the basis of this report and the relationships developed, Dstl were tasked to provide 'actionable intelligence' of where the issues were most acute and to recommend interventions to improve ways of working.

To gain an understanding of the current health status of PJHQ, the Dstl study team conducted a range of unstructured interviews across all divisions and ranks/grades over three week-long site visits during September, October and November 2015. These interviews were used to identify commonly held perspectives (stated by two or more personnel) that were then mapped against the organisational health characteristics as per an earlier version of the framework (Identity; Resources; Management; Networks; Adaptability). The balance of evidence arrayed against the characteristics was used to summarise the organisational health and to make recommendations for improvement.

Key Observation # 17 – Organisational health provides a useful frame for stakeholder inquiry

The organisational framework was found to be helpful in synthesising unstructured interview data into a coherent assessment that provided a robust basis for making recommendations.

In order to provide a visual summary of the findings, the Dstl team developed an innovative balance scale for each component of organisational health with a desirable 'balanced' position located between undesirable 'left of arc' and 'right of arc' imbalance positions – see Figure 6-9 below for an illustration of how this visual was presented and Figure 6-10 further below for the supporting balance scale. This visualisation was found to be highly effective in summarising large amounts of detailed qualitative data, via the report and Command Board briefing that were both delivered in January 2016.
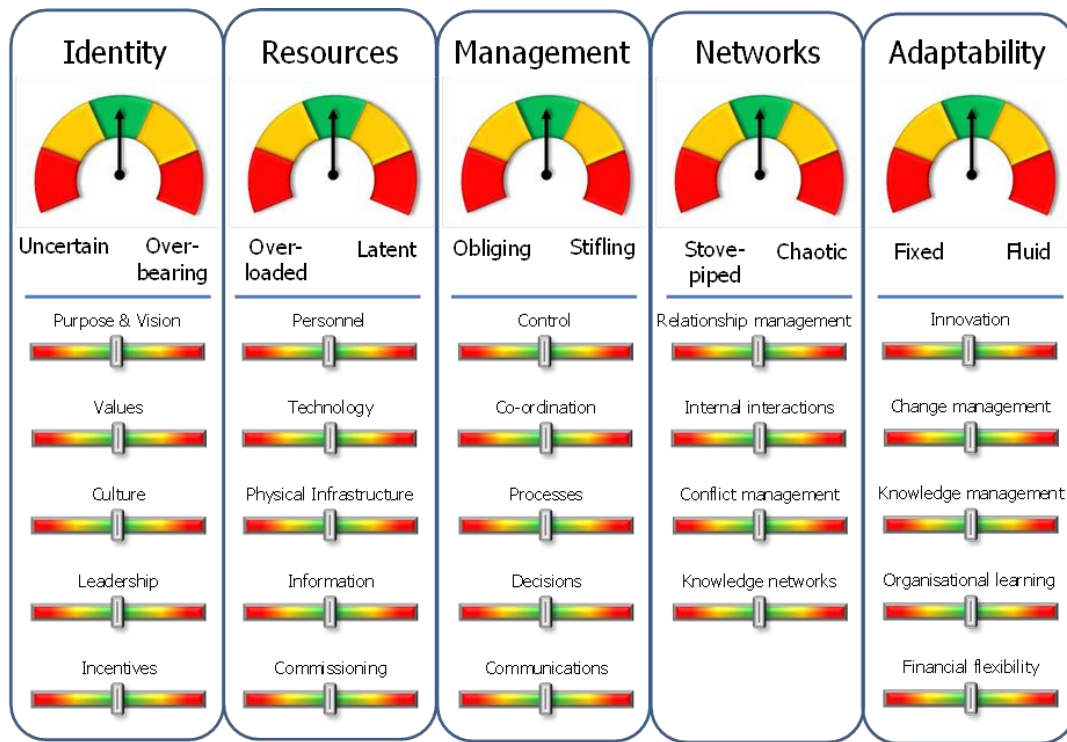
Figure 6.9 – Results from PJHQ health assessment (illustrative data only)

Key Observation # 18 – The Italian Flag is not the only way to powerfully visualise results

The balance scale proved to be an effective way to communicate organisational health. In particular, it displayed at a glance where there was deviation away from a desired balanced position towards imbalanced bookend positions.

The recommendations made by the Dstl study team were readily accepted by CJO who used them to structure an ambitious change programme and who tasked Dstl to provide further support to this programme over time. The Dstl team delivered another report in April 2016 based on large-scale conceptual activity modelling conducted with PJHQ staff that proposed 12 key processes to comprehensively describe the key activities required for an effective future PJHQ and so set a vision for the transformation. Subsequent evaluation of progress at PJHQ tasked in July 2016 and delivered in December 2016 showed that good progress had been made with substantial progress observed in two key areas. Therefore the assessment, as part of a wider multi method approach, can be seen to be a success.

Characteristic	Left of arc	Balanced	Right of arc
Identity	Uncertain: Purpose and values are weak; weak leadership. Staff feel unsupported by colleagues or management; positive behaviour is not incentivised.	Strong Vision and clear understanding of purpose in wider system; clear and unifying values. Inclusive and enriching culture. Motivating and respected leadership; positive behaviour is incentivised.	Overbearing: Entrenched culture that can be divisive and tribal. Incentives promote poor behaviours. Little consideration of the wider system. Leadership is dominant and can be aggressive.
Resources	Overloaded: Staff are overworked; contingent capacity is not maintained. Poorly served by support, equipment and infrastructure. Unable to effectively access information or external resources.	People have good work balance and contingent capacity is in place. People are enabled by support services, equipment and infrastructure. Information is current and accessible; external resources are easily obtained.	Latent: Contingent capacity rarely deployed. People are not stretched; skills are not exploited. Equipment and infrastructure are a burden rather than a support. Information is available but under-used.
Management	Obliging: Processes are not used to achieve control or co-ordination. Poor monitoring and assurance mechanisms. Uncontrolled, contradictory communications.	Proportionate processes provide required control and co-ordination. Delegated authority empowers decision making. Well planned and coherent communications.	Stifling: Bureaucratic and rigid processes that hinder rather than support work. Staff disempowered by lack of freedom or delegation. Hierarchical communications routes employed.
Networks	Stove-piped: Failure to establish internal and external relationships. People act in isolation. Conflict in interactions is common. Poor availability of knowledge and information.	Well established and formally managed relationships. Conflict is managed and easily resolved. Established and productive knowledge and information network.	Chaotic: Failure to coherently manage internal and external relationships. Multiple uncontrolled points of contact. Over-reliance on individual networks and relationships.
Adaptability	Fixed: Rigid and unchanging ways of working that fail to adapt to changing circumstances. Organisation fails to learn from experience or harness new ideas.	Recognises when there is a need for change, which is well considered and managed. Innovation is harnessed where this brings benefit. Able to maintain abilities against changing circumstances.	Fluid: Constant and unmanaged change that is not well-considered. Organisation does not give time to learning or bedding in new approaches. Ideas are implemented without due consideration.

Figure 6.10 – Organisational positioning descriptions for each health characteristic

6.6   Taking part in the change process – Head Office (Jan 16 – Jul 16)

When I met with DG HO&CS in December 2015 he was intrigued by the potential for enterprise health monitoring to *"tell me something that I don't know"* and set me the challenge of doing this within Head Office without access to staff via interviews or workshops (because he was keen to minimise the costs to his organisation). Whilst this represented a significant challenge, I knew from preparatory work that a large number of the organisational health indicators that we would want to assess for (recall Figure 6.7) mapped to existing data sources such as annual staff surveys. Therefore I accepted the challenge after negotiating to conduct the pilot in the first three months of the following financial year (April – June 2016) when Dstl would be better placed to allocate the right technical resources.

I was therefore very pleased to recruit an excellent technical lead for the pilot upon returning to work after the Christmas break who was unexpectedly available. I arranged to provide support to this colleague as she brought the team together and led the engagement with the DRU who were also providing resources to help. However, it proved very difficult to recruit and retain supporting resources within Dstl in part because of the novelty of the work and in part because of the difficulty in accessing data we knew to be available. My colleague and I therefore arranged and held meetings with various offices across MOD to try and expedite this access in January and February. We also held engagements with Director, Head Office to make her aware of the pilot and to seek her support and the Director for Performance and Analysis who was a likely lead exploiter for the technology.

Despite the challenges in accessing data and recruiting and retaining the wider team, the pilot kicked off in April with a stakeholder meeting that was very well attended. We briefed on the challenge as defined by DG HO&CS and our proposed approach before outlining how we would keep them appraised of progress in two further stakeholder meetings scheduled for May and July. As the work to access and process data continued, it became increasingly clear that the alignment was not any better than I knew it to be back in December. The fact that we had not uncovered much in the way of new data sources was disappointing and so we cast our nets wider to seek additional data relevant to the 20 characteristics as opposed to the 75 indicators. Where we were able to find new data that was relevant

we expanded the indicator set to include what was available. At the same time we eliminated some indicators that did not stand up to detailed scrutiny as we worked through the logic in detail.

We considered a range of aggregation and visualisation approaches and selected Hierarchical Process Modelling (HPM) for two main reasons. First the structure and language used to define organisational health leant itself readily to being implemented as an HPM and in particular the provided for a number of automated aggregation algorithms (Marashi et al., 2008). Second, the Italian Flag representation had been popular with a large number of the stakeholders that we had engaged with and so we had confidence that the visualisation would be well received. I used the PeriMeta software that I had access to as a Research Engineer at Bristol to build 20 separate HPMs (one for each characteristics) that together combined more than 200 data points via more than 70 indicators. After an intense final push we shared the results displayed in Figure 6.11 with our DRU sponsors at the end of June.

	Characteristic	Assessment
IDENTITY	a. Purpose	
	b. Values	
	c. Leadership	
	d. Incentives	
	e. External Orientation	
RESOURCES	f. Personnel	
	g. Technology	
	h. Infrastructure	
	i. Information	
	j. Commissioning	
MANAGEMENT	k. Control	
	l. Coordination	
	m. Processes	
	n. Decisions	
	o. Communications	
ADAPTABILITY	p. Innovation	
	q. Change Management	
	r. Organisational Learning	
	s. Social Networks	
	t. Financial Flexibility	

Figure 6.11 – Results from Head Office health assessment (illustrative data only)

In early July my colleague and I stepped through these results during our final working group meeting that was notably less well attended than the first. For each characteristic we displayed the

summary Italian Flag and detailed the areas of identified strength, the areas of identified weakness and the areas of uncertainty together with suggested actions to close data gaps. We finished our briefing by summarising the key findings as we saw them: (1) The model is technically feasible, but our assessment was constrained by data availability; (2) The pilot identified areas of strength, areas of weakness, and areas where better information is required; and (3) The model could be scaled to cover the breadth of MOD but interrogation below Top Level Budget (TLB) groups is challenging due to key data sources not being available below this level.

Before the meeting closed we invited the eight stakeholders present to provide feedback using a bespoke survey linked to methodological factors that I had identified as important. The results were somewhat disappointing with stakeholders on balance disagreeing with the statements that *"The method was comprehensive (it addressed all relevant aspects)"*, *"The results align with my personal view of the health of HO&CS TLB"*, *"The results can enable anticipatory action (to address root causes of performance)"*. However, the stakeholders on balance did agree with the statements that: *"The method enabled broad participation (it represented views from across HO&CS TLB)"* and *"The results can focus discussions / further work on the key issues facing HO&CS TLB"*.

Key Observation # 19 – Remote data collection misses the opportunity to engage stakeholders

Whilst the feedback showed that this assessment method enabled broad participation it was notable how stakeholder engagement dropped as the working groups progressed and how the stakeholders neither recognised the results as aligning with their personal views nor were committed to taking action based on the results. Remote data collection therefore limits the ability to connect with stakeholders.

From a researcher perspective the pilot could be considered to be a success because it established feasibility of assessing organisational health using existing data and how this approach could be scaled up to be applied to the whole of MOD via TLB building blocks (noting that this would miss the interactions between TLBs). But from a sponsor perspective the pilot had demonstrated three significant flaws in the method and they discouraged our briefing results back to the Director General.

First and foremost it was observed that there was "too much uncertainty" in what had been produced. Whilst I put that this was a data problem and not a method problem and that identifying knowledge gaps is a useful result, I conceded that the results in all likelihood would not meet his *"tell me something that I don't know"* challenge. Second and third, we were asked whether weights should be applied thoughout the model to reflect aspects that were more important, and how much health is enough such that attention can be focused in areas that were insufficiently healthy. My common response to these questions was that whilst we could establish weights (to place emphasise on some aspects over others) and benchmarks (to indicate where health was sufficient) there was not yet any basis for setting these values. It was agreed that this should be an area for further work.

Key Observation # 20 – Identifying uncertainty is both an opportunity and a threat

Using the Italian Flag representation to simultaneously display strength, weakness and uncertainty provides the opportunity to take two types of action – addressing shortfalls in performance and addressing shortfalls in knowledge. But when there are high levels of uncertainty it can cause stakeholders to challenge the efficacy of the method.

6.7 Exiting the problem situation (Aug 2016 – Oct 2016)

Towards the end of July we met with Director, Head Office (as champion for the pilot) and Director, Defence Assurance, Risk and Audit and Director, Performance and Analysis (as potential actionees for implementing enterprise health monitoring) in order to decide how best to operationalise the concept of enterprise health within the MOD. We reviewed the various experiences of assessing health across MOD including briefing the results of the Head Office Pilot. Despite making sure to go beyond summary results to illustrate how to use them as an opportunity to identify, understand and action areas of weakness and to identify, understand and action areas of uncertainty, neither D,DARA nor D,PandA appeared convinced that the approach added a substantial amount of value. Therefore when it came to deciding between the options to: (i) Do nothing further; (ii) Support performance reporting by D,PandA for Defence Board; (iii) Support assurance reporting by D,DARA for Defence Board and (iv) Support assessment of effectiveness of change programmes by DRU for DG(HO&CS), it was decided that the exploitation should be limited to (iv). Whilst this reflected the discussion in the

room, I was later made aware that a major stumbling block was the presentation of results in the Italian flag format when the Defence Board were attuned to being presented results in a traffic light format. This was particularly disappointing given that this incompatibility had not ben flagged in any of our requirement capture activity and the way in which the richer Italian Flag presentation had drawn positive reactions.

Key Observation # 21 – The presentation of results must be attuned to business environment

When seeking to introduce a new reporting process into a congested business reporting environment, steps should be taken to ensure that results can be readily assimilated alongside others to minimise the chance of rejection. Once entry has been achieved, further steps can be taken to evolve the reporting format to make best use of the reporting (i.e. from inside the established order as an 'ally', rather from the outside as an 'enemy').

After a period of reflection over the remainder of the summer holidays, my colleague picked upon the areas of further work identified by the DRU with a view to taking it forward to assist them in assessing the need for, and impact of, organisational change initiatives. My personal involvement was curtailed in October when I left my technical role to take up a management position. Plans were developed and meetings were held but the inconvenience for the DRU was that the research needed to establish a basis for setting weights and benchmarks was large in scale, long in duration and far from guaranteed to be successful. The fundamental difference then can be seen to be ontological – the DRU were seeking an objective model of the real world based on data whereas Dstl was offering a subjective model based on perceptions of multiple actors. The work then came to a close with the publication of a final report summarising the work completed published in March 2017, following little contact after December 2016.

6.8   Reflecting on experience

This AR described in this chapter has involved the development, testing and reflection on a new assessment method for organisational health. The most obvious criticism of this new method is that the development of this framework was largely based on concepts that are empirical only. This criticism

is analysed from a Critical Realist perspective based on the approach developed by (Mingers, 2000) and with specific reference to Figure 1 of Mingers (2004, p. 94), that presents a useful stratification of the 'Real' domain and that is redrawn below in Figure 6.12.

The REAL: mechanisms and structures with enduring properties

The ACTUAL: events (and non-events) that are generated by the mechanisms

The EMPIRICAL: events that are actually observed and experienced
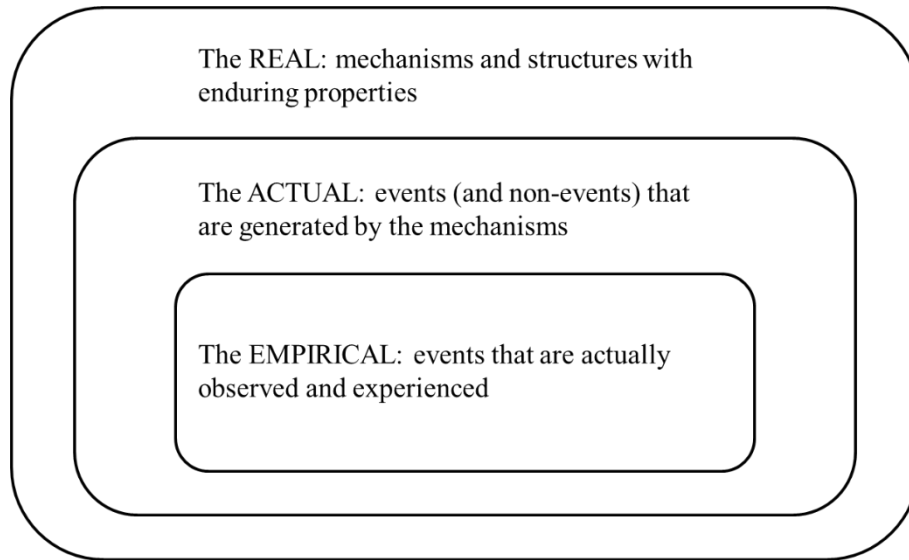
Figure 6.12 – The real, the actual and the empirical redrawn from Mingers (2004)

Within the developed framework, only Purpose, Values and Leadership can be considered to emerge from the interplay of those *"mechanisms and structures with enduring properties"* (ibid). The dilemma, however, is that whilst these characteristics offer the greatest potential for understanding the mechanisms and structures that underpin organisational health (e.g. historical, cultural, institutional, technological and physical structures), it is these characteristics that are fraught with problems of contested definition and that defy direct measurement. A potential way forward is to shift the expectation from one in which the framework is used as a measurement device in an imagined control loop of action, to one in which it is used as a conceptual device to bring about shared understanding and shared commitment to taking action. This of course mirrors the epistemic shift associated with the introduction of Checkland's Soft Systems Methodology (Checkland & Holwell, 2004). Implementation as per the soft systems paradigm puts a different perspective on the DRU challenge to identify how much health is enough. The challenge shifts from one of how to set and achieve a specific benchmark to one of how to go about achieving a shared level of ambition.

> **Key Observation #22 – Organisational health models are best conceived as learning devices**
>
> Whilst models of organisational health are reflective of stakeholder perceptions of the real world context in which they work many of their constituent parts defy measurement. It is therefore recommended that they are best used as learning devices to identify and agree upon the need for intervention rather than a measurement device in a control loop.

Setting aside criticism of the model that has been developed, it was striking to note that the employment of much the same model led to very different outcomes for PJHQ and Head Office. For PJHQ the use of framework as basis for synthesising data gathered through unstructured interviews, communicating summary results via the balance dials and motivating actions for intervention led to a very successful outcome with the recommended actions readily accepted and implemented. For Head Office the use of the framework for targeting data collection from existing sources, for structuring the automatic aggregation of this data and for presenting summary results led to a poor outcome with stakeholders questioning the value of the assessment and disinclined to take the work forward. The major difference of course between the two employments is the degree to which immediate stakeholders were involved making the assessment. This ability to interest, build commitment and mobilise stakeholders as driving factor for sustaining anticipatory behaviour is examined in the next chapter through the lens of Actor Network Theory (Callon, 1986; White, 2009).

> **Key Observation # 23 – Stakeholder engagement is critical to successful implementation**
>
> The potential for assessment of organisational health to initiate and to sustain anticipatory action is dependent on the degree to which stakeholders have been engaged through the process.

In designing a system for monitoring the health of an organisation it is therefore at least as important to consider how to engage stakeholders as it is to consider how to design the model and how to populate the model. These multiple considerations are neatly summarised by the concept of a Group Support System (GSS) that has been defined as socio-technical system that comprises Group(s), Technology for processing data and visualizing results and Facilitation for engaging with groups and synthesis of data (Ackermann, Franco, Gallupe, & Parent, 2005). In particular the Groups can be considered to comprise the accountable group (decision-makers); the working group (data owners) and

the stakeholder group (all affected). Whilst the PJHQ activity engaged well with all of these groups via extended contact time on site, the Head Office activity was limited in its engagement (albeit over a much larger size) with the stakeholder group engaged passively through accessing previously generated data, the data owners largely only engaged through emails and telephone calls and the accountable group engaged insufficiently throughout.

Key Observation # 24 – Health Monitoring can be seen as a Group Decision Support System

The process of monitoring organisational health can be designed as a socio-technical Group Decision Support System comprising three primary elements: stakeholder groups, enabling facilitators and supporting technology.

6.9 Summary

This chapter has detailed my experience of developing a generic assessment method for organisational health and how it was tested in two distinct areas of MOD – PJHQ and Head Office. As per the overarching Systemic Intervention methodology this invoked methodological pluralism to blend a number of theoretically-derived systems methodologies (including VSM and HPM) with empirically-derived consultancy methodologies.

This chapter has also yielded a number of key AR observations for the assessment of organisational health, through a process of continuous personal critical reflection, through group reflection as a project team and through seeking stakeholder perspectives via interviews (for the PJHQ activity) and a survey (for the Head Office pilot exercise):

- Key Observation #15 – Health monitoring can support organisational resilience
- Key Observation #16 – Health is: Identity, Resources, Management and Adaptation
- Key Observation #17 – Organisational health provides a useful frame for stakeholder inquiry
- Key Observation #18 – The Italian Flag is not the only way to powerfully visualise results
- Key Observation #19 – Remote data collection misses the opportunity to engage stakeholders
- Key Observation #20 – Identifying uncertainty is both an opportunity and a threat
- Key Observation #21 – The presentation of results must be attuned to business environment
- Key Observation #22 – Organisational health models are best conceived as learning devices

- Key Observation #23 – Stakeholder engagement is critical to implementation

- Key Observation #24 – Health Monitoring can be seen as a Group Decision Support System

Chapter 7 – Presenting my research findings

7.1 Introduction

The aim of this chapter is to present my research findings. These comprise my responses to my three primary research questions (RQ1, RQ2 and RQ3) as per my research methodology described in Chapter 3, together with my response to my supplementary research question (RQ4) that arose along the way:

RQ1: How can systems methodologies be applied to assess organisational health?

RQ2: How can organisational health assessments be used to initiate anticipatory action?[29]

RQ3: How can organisational health monitoring be used to sustain anticipatory behaviour?[30]

RQ4: What should a practitioner be doing when applying the Viable System Model?[31]

My responses to my three primary research questions take increasingly sophisticated approaches to cross–case evaluation. For RQ1, I summarise the four cases using the Purpose-Context-Methods-Outcomes framework developed by Midgley and co-workers (Midgley et al., 2013) and draw out four themes from the relevant 'key observations' reported in Chapters 4, 5 and 6 to highlight significant methodological learning points for the assessment of organisational health (Section 7.2). For RQ2, I identify nine key methodological factors for taking anticipatory action based upon organisational health assessments through a focused literature review, before applying Qualitative Comparative Analysis (Ragin, 1987) to highlight which are the most important (Section 7.3). For RQ3, I describe my longitudinal studies of the Infrastructure and Acquisition cases and leverage these to identify how organisational health assessments can be repeated in a process of monitoring to sustain anticipatory

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[29] Note that my response to RQ2 in Section 7.3 includes material that was presented at the International Federation of Operational Research Societies in 2017 (Lowe, Clark, Midgley, & Yearworth, 2017) for which I was the main author.

[30] Note that my response to RQ3 in Section 7.4 includes material that was presented at the 15th Annual Conference on Systems Engineering Research in 2017 (Lowe, Oliver, Midgley, & Yearworth, 2017) and the 29th European Operational Research conference in 2018 (Lowe, Clark, Midgley, & Yearworth, 2018), for which I was the main author in both cases.

[31] Note that my response to RQ4 in Section 7.5 includes material that has been submitted for publication in the European Journal of Operational Research (Lowe, Espinosa, & Yearworth, In review) for which I was the main author.

behaviour using Realistic Evaluation (Pawson & Tilley, 1997) and with reference to Actor Network Theory (Callon, 1986). The way in which I draw upon the cross-sectional key observations reported in Chapters 4, 5 and 6 that were generated through personal reflection and/or through group reflection with colleagues and/or practitioners in the course of the work are displayed below – see Table 7.1. Note that whilst the majority of these observations support established positions that can be found in the existing literature (e.g. relating to problem structuring methods), there are seven that are new. These seven, which are highlighted in Table 7.1 through the use of bold font (#5, #6, #9, #15, #16, #22 and #24), all relate to the comparatively under-researched area of organisational health assessment.

Key Observation	RQ1	RQ2
# 1 – Collaborative working is vital to beginning transformational change		X
# 2 – Assessment frameworks must be comprehensive and accessible	X	
# 3 – Italian Flag scheme is helpful in communicating known and unknown	X	
# 4 – Preparation and facilitation are important to making good assessments	X	
# 5 – VSM provides a sound basis for assessing organisational health	**X**	
# 6 – HPM provides helpful structures for assessing organisational health	**X**	
# 7 – The Italian Flag schemes affords rich analysis and communication	X	
# 8 – Creative adaptation can ensure that method(s) match the situation	X	
# 9 – Health monitoring can support risk identification and treatment		**X**
# 10 – Theoretical considerations are vital to ensure comprehensive inquiry	X	
# 11 – Stakeholders get a vote in how and when assessments are made	X	
# 12 – Data considerations can drive method when working at scale	X	
# 13 – Focusing on function (not form) affords constructive debate	X	
# 14 – Successful implementation requires careful planning on many fronts		X
# 15 – Health monitoring can support organisational resilience		**X**
# 16 – Health is: Identity, Resources, Management and Adaptation	**X**	
# 17 – Organisational health provides a useful frame for stakeholder inquiry	X	
# 18 – The Italian Flag is not the only way to powerfully visualise results	X	
# 19 – Remote data collection limits the opportunity to engage stakeholders		X
# 20 – Identifying uncertainty is both an opportunity and a threat	X	
# 21 – Presentation of results must be attuned to the business environment		X
# 22 – Organisational health models are best conceived as learning devices		**X**
# 23 – Stakeholder engagement is critical to successful implementation		X
# 24 – Health monitoring can be seen as a Group Decision Support System		**X**

Table 7.1 – Cross-sectional key observations used to inform RQ1 and RQ2

My response to RQ4 is based upon additional research conducted with Dr. Angela Espinosa at the University of Hull and with Prof. Mike Yearworth at the University of Exeter (Lowe et al., In review). Through this collaboration I developed a set of constitutive rules – including an explicit epistemology – to guide the generation of knowledge via the application of the VSM, and so help practitioners to make rigorous use of VSM theory. The epistemology is expressed as a performative model that can be used as an aid to reflecting on practice, as an aid to designing VSM approaches and as aid to diagnosing the organisation in focus. For RQ4, I describe this development and illustrate how the performative model can be used to aid reflection through application to the systemic intervention described in Chapter 4 with regard to Defence Infrastructure (Section 7.5).

7.2   How can systems methodologies be applied to assess organisational health?

The AR accounts presented in Chapters 4, 5 and 6 describe how system methodologies were applied to assess organisational health in four different phases of core AR – hereafter referred to in shorthand as the Infrastructure, Acquisition, PJHQ and Head Office cases. Whilst the overarching aim (guiding intervention for improvement) and overarching methodology (Systemic Intervention) were common for each area, there was variation across the systemic evaluation dimensions of Purpose, Context, Method and Outcome – see Table 7.2. The largest variation was in Method. This was primarily driven by the variation in Context, which in turn was driven by variations in the scope of inquiry, the preferences of the research sponsors and, most importantly, the access afforded to stakeholders. The Outcomes were very positive for Infrastructure and PJHQ, mixed for Acquisition and poor for Head Office where insufficient data was available to make an assessment with a high degree of confidence. However, this failure yielded valuable methodological learning and in many ways can be seen as a success given the purpose was to test whether synthesising existing data would bring new insights. This key dependency on stakeholder engagement to achieve a successful outcome, together with other key methodological learning points are discussed below.

	1. Infrastructure	2. Acquisition	3a. PJHQ	3b. Head Office
Purpose	Understanding how to get the best from the introduction of a Strategic Business Partner to run the DIO.	Identifying and treating risks in the maturation of the Defence Acquisition System following organisational change.	Understanding how best to treat issues threatening long term performance within the Head Quarters.	Investigating whether conducting health assessments by synthesising existing data would add value to the management information already available to senior managers.
Context	Very good engagement with a small group of stakeholders.	Limited engagement with a large group of stakeholders.	Very good engagement with a medium-sized group of stakeholders.	Limited engagement with a medium-sized group of stakeholders.
Method	Bespoke model developed to assess infrastructure in the wider Defence context, populated via workshops and displayed using Italian flags in a HPM.	Bespoke model developed to assess acquisition as a closed system, populated via survey and self-assessments and displayed using Italian flags in a six-dimensional visualisation.	Generic model of organisational health used to guide data collection via interviews, structure synthesis and brief results using dials.	Generic model of organisational health developed into a full HPM that was used to import data from pre-existing sources, make assessments and visualise results.
Outcome	Success – Sponsor highly satisfied with assessments and results used to set the scope of the Defence Infrastructure System programme.	Mixed – Sponsor not completely satisfied with risks identified using a simpler method following adaptation driven by the sponsor.	Success – Sponsor highly satisfied with assessments and interventions made in areas identified as priorities from the assessment.	Failure – Insufficient data available to make an assessment with confidence, with sponsor unwilling to take further action.

Table 7.2 – Purpose-Context-Methods-Outcome summaries for each case

These results highlight the challenge of assessing organisational health with limited access to stakeholders. When working with small to medium groups with good opportunities for engagement (e.g. workshops for Infrastructure, interviews for PJHQ) then system methodologies deliver excellent

results. When the opportunity to engage directly with stakeholders is limited (Acquisition, Head Office), not only must alternative means for collecting data be explored but alternative means for confirming the findings must also be explored. Whilst both data collection via survey and confirmation via extant working groups worked well for Acquisition, data collection from existing sources and confirmation via bespoke working groups for Head Office did not. The challenges of applying system methodologies at scale (without the ability to hold interviews or run workshops) have been well documented in the past (Shaw, Westcombe, Hodgkin, & Montibeller, 2004; White, 2002) but little seems to have been done since. This then appears to be a fruitful avenue for future research, not least because advances in technology (Yearworth & White, 2019) appear to offer better support to interactions distributed over space and/or time (Morton, Ackermann, & Belton, 2007).

Setting the challenge of making assessments at scale aside for the moment – I will return to this in the next chapter – thematic analysis of the 15 key observations relevant to this research question that were identified in Chapters 4, 5 and 6 (see Table 7.2) highlights 4 key affordances of system methodologies for conducting organisational health assessments. These comprise: Providing an overarching methodology for boundary setting and mixing methods; Guiding inquiry to ensure comprehensive assessment; Bringing multiple stakeholder perspectives together to achieve accommodation(s); and Visualising assessment results in ways that accurately represent the complexity of the situation. Each is described below:

Providing an overarching methodology for boundary setting and mixing methods

The selection and employment of Systemic Intervention (Midgley, 2000) as an overarching methodology to bring about improvement was important in all four cases. In particular it provided the framework to critically reflect and set the boundary for the intervention and to creatively combine a variety of ideas to yield an assessment method tailored to the specific context.

The setting of boundaries is influenced by a range of factors including the purpose of the intervention, the context (in terms of political, organisational and geographical factors) and the availability of data (Key Observation # 12 – Data considerations can drive method when working at

scale). It is helpful to be reminded, and to remind others including sponsors and stakeholders, that boundary setting represents a choice and that there are trade-offs to be made in making this choice. Whilst no specific techniques were used such as Critical System Heuristics (Ulrich, 1983), critical reflection on boundary issues and constructive debate with sponsors was important in each case. For Infrastructure, the boundary was expanded from focusing on the DIO (as the delivery agent) to also include Front Line Commands (as the primary customers) and Head Office (as owners) to ensure that all aspects relevant to the health of system were assessed. For Acquisition, the boundary was constrained to only consider the interactions between system components so as to respond positively to stakeholder concerns and so maintain their engagement (Key Observation # 11 – Stakeholders get a vote in how and when assessments are made) whilst recognising this choice would negatively impact the comprehensiveness of the assessment .

The encouragement to combine multiple methods was helpful in every case to tailor the design and application of assessment method to the specific purpose in the specific context (Key Observation # 7 – Creative adaptation can ensure that method(s) match the situation). This creativity was challenging for some Dstl colleagues who felt more confident applying established methods rather than establishing new methods. The permission afforded by the methodological pluralism aspect of Systemic Intervention therefore helped to build their confidence that our practice was rigorous. This permission also helped to build credibility with sponsors and with external reviewers of our work. For example, my publication with regards to the Infrastructure case (Lowe, Martingale, et al., 2016) demonstrated and promoted methodological creativity.

Guiding inquiry to ensure comprehensive assessment

The Viable System Model (VSM) specifies the necessary and sufficient conditions for an organisation to continuously adapt to perform in changing environments by harnessing the principles of complexity and variety management (Beer, 1979, 1981, 1985). The VSM therefore formed a consistent part of the framework of ideas from which I developed and applied each of the assessment methods because of the way that it ensured comprehensive coverage of the key functionality required (Key Observation # 5 – VSM provides a sound basis for assessing organisational health).

The strong theoretical foundations and wide and varied use of the VSM also added credibility to our research proposals and this enabled me and my consultancy team to negotiate entry as expert VSM practitioners, or at least more expert than the sponsor and stakeholders. For example, during the Infrastructure intervention when I briefed that the assessment framework was based on the highly-regarded and widely used VSM, this helped me to quickly transition the workshop participants into the making of the assessments without delay. The use of VSM also ensured that the scope of inquiry for Acquisition System Health included both consideration of the performance of key functions and the interactions between them (Key Observation # 10 – Theoretical considerations are vital to ensure comprehensive inquiry).

It should be noted however that the VSM was used increasingly in disguise as the interventions progressed to ensure that the methods were accessible to non-expert stakeholders (Key Observation # 2 – Assessment frameworks must be comprehensive and accessible). At the beginning, the VSM was used in adapted form (with each key function renamed and S2, S3 and S3* combined into a single function) to recursively model the health of the infrastructure system in the wider context of the Defence Enterprise. By the end, the detail beneath this four component model had been simplified further to yield a generic framework that could be applied to any organisation (Key Observation # 16 – Health is: Identity, Resources, Management and Adaptation).

Bringing multiple stakeholder perspectives together to achieve accommodation(s)

Whilst Jackson originally identified VSM as a functionalist approach in his System of System Methodologies (Jackson & Keys, 1984) he later conceded that *"the functionalist paradigm certainly does not exhaust the possibilities opened up by the VSM"* (Jackson, 2001). Under the functionalist paradigm (or perhaps more accurately the structuralist-functionalist paradigm), VSM practitioners act in expert mode to compare the 'reality' of the problem situation to VSM theory and recommend actions accordingly using methods such as Viable Systems Diagnosis (Flood & Jackson, 1991) and Systemic Management Control (Schwaninger, 1990). Under an interpretivist paradigm, VSM practitioners act in facilitator mode to work with organisations to understand their (dis)function, identify actions to improve their effectiveness and viability and to follow through building on the consensus that has been

established (Beckford, 1995; Espejo, Bowling, & Hoverstadt, 1999; Espinosa, Harnden, & Walker, 2008; Espinosa & Walker, 2017).

This more recent and increasing use of VSM in this interpretivist sense has been highlighted by others. Harwood (2019) has firmly stated that there are reasonable grounds for concluding that the way that the VSM is used would classify it as a PSM, based on a clarification of the characteristics of PSMs described by Smith and Shaw (2019). In his most recent work, Jackson (2019, p. 332) recognises that the methodologies developed by Espejo and Reyes (2011) and Espinosa and Walker (2017) seek to engage individual perceptions in a learning process using VSM as a guide. Jackson also considers that Beer's 'Team Syntegrity' (Beer, 1994) was his last methodological development to deal with the complexity of VSM's 3/4/5 Homeostat in that it *"steers clear of functionalism"* (Jackson, 2019, p. 464) and that it *"comes to terms with the pluralism and coercion that can arise in social systems"* (ibid, p. 467).

The focus that VSM puts on organisational function (the actions that an organisation needs to perform) over organisational form (the way in which organisation is structured) was found to be very helpful in my interpretivist use of VSM as a PSM with multiple stakeholders. For both the Infrastructure and Acquisition interventions I was acutely aware of the potential for the background tension between the various stakeholder groups to make it difficult to achieve accommodation(s) or indeed complete the assessment process. But the focus that VSM places on organisational function over organisational form made for constructive interactions, with all groups open to a variety of worldviews (Key Observation # 13 – Focusing on function (not form) affords constructive debate). Going further, by surfacing, discussing and at least in part resolving deep-lying systemic issues in a group setting, the use of VSM as a PSM could be considered to be therapeutic. Note that interaction, worldviews and therapeutic are all key aspects of PSMs as defined by Yearworth and White (2014).

More broadly, the use of PSM theories and techniques were important in facilitating stakeholders to agree on what action should be taken next for improving the messy, problematical situation. In particular, for the Infrastructure intervention where the assessments hinged on two workshops, the work that was done in advance to pre-brief participants so that they knew what to expect from me and my

consultancy team (and I and my consultancy team knew what issues – if any – to expect from them) together with carefully planned facilitation during the events were critical to the success of these workshops (# 4 – Preparation and facilitation are important to making good assessments). The use of PSM theories and techniques can be also be seen to be important by considering the Head Office case where the assessment method failed in large part due to the lack of a facilitation to elicit and then work with stakeholder inputs. Note that facilitation, together with the attendant skills to manage process and content, are key aspects of PSMs as defined by Eden and Ackermann (2006) and that messiness, and improvement activity are again key aspects of PSMs as defined by Yearworth and White (2014).

Visualising assessment results in ways that accurately represent the complexity of the situation

Hierarchical Process Modelling (HPM) was developed at the University of Bristol as a systems modelling approach with a strong process ontology and a calculus for assessing the probability of a system failure (J. Hall et al., 1998). The approach was developed over a number of years to support decision making under uncertainty in engineering management (Marashi & Davis, 2006, 2007) and as a modelling approach to support problem structuring (Davis et al., 2010). Whilst HPM has not been used widely outside researchers based at the University of Bristol, the use of HPM to build models of organisational health was found to be very effective for two primary reasons.

First, HPM as the name suggests affords a hierarchical structure that enables the practitioner and the stakeholders to span from detailed low-level assessments in well-defined areas up to high-level assessments covering a broad range (Key Observation # 6 – HPM provides helpful structures for assessing organisational health). This affordance proved particularly effective for the Infrastructure case both as a logical means to structure the workshops (and so keep participants orientated throughout the day) and as a logical means to structure the presentation of results (and so keep the audience orientated throughout the briefing).

Second, HPM uses the Italian flag representation to simultaneously visualise areas of strength (green), weakness (red) and uncertainty (white) (# 3 – Italian Flag scheme is helpful in communicating known and unknown). This proved popular with stakeholders across cases who were keen to acknowledge areas of strength – particularly in areas of the system operated by other stakeholders –

along with the uncertainty associated with their judgements. It also proved effective in analysing and communicating results to senior stakeholders (# 7 – The Italian Flag schemes affords rich analysis and communication). For example, in preparing the final briefing to DG Transformation for the Infrastructure work, I used the scheme to size the text boxes containing strengths, weakness and uncertainties – see Figure 4.9

It should be noted that the Italian Flag was not the only effective visualisation scheme that was used to visualise organisational health. For the PJHQ work, the Dstl team used a set of dials to indicate where the various organisational health characteristics were in/out of balance (#18 – The Italian Flag is not the only way to powerfully visualise results). It should also be noted that identifying uncertainty is both an opportunity because it broadens the intervention scope to include actions to address knowledge gaps in addition to actions to address weaknesses and a threat because highlighting large amounts of uncertainty can undermine confidence in the assessments (# 20 – Identifying uncertainty is both an opportunity and a threat). For the Infrastructure case, recommendations to address weakness and to address knowledge gaps were readily accepted and used to define the scope of the Defence Infrastructure System Programme. For the Head Office, a lack of data lead to a large amount of uncertainty being shown which led the sponsors to (perhaps unfairly) conclude that the assessment method as being of limited utility.

7.3   How can organisational health assessments be used to initiate anticipatory action?

When conceptualising change, much of the published theory boils down to, or at least can be linked back to, Kurt Lewin's Unfreeze–Change–Refreeze model (Lewin, 1952). Many change initiatives fall at the first of these hurdles for the lack of a sense of urgency (Kotter, 1995). In this section I examine how the application of system methodologies can establish sufficient urgency to initiate change where issues have yet to manifest themselves – or at least have not yet fully manifested themselves – in ways that can be readily observed. In particular, I examine how making organisational health assessments via PSM processes can lead to anticipatory behaviour.

The novelty here is that the vast majority of PSM use is triggered by at least one issue that has manifested itself in terms of current performance and so therefore relates to initiating change under a reactive paradigm. Such reactionary use of PSMs is typically facilitated by external consultants operating under time pressures that limit their ability to fully access an organisation with which they are unfamiliar, and the focus tends to be restricted to what action should be taken and not whether any action should be taken at all. My inquiry against this research question seeks to examine how the use of PSMs in absence of performance issues – or at least in the absence of acute performance issues that demand attention – can guide interventions. The barriers to initiating action through such anticipatory use are clearly higher, because of the need to effect unfreezing as a precursor to change in addition to shaping the change activity.

My supplementary literature review focused on ten key references for how PSMs can initiate change and highlighted 70 potential factors that could be important. These references spanned practice evaluation (Franco, 2007, 2009; Gregory & Midgley, 2000; Midgley et al., 2013), the use of models as boundary objects (Black & Andersen, 2012; Franco, 2013), Group Decision Making and Negotiation (Ackermann, Eden, & Pyrko, 2016; Eden & Ackermann, 2014), and multi-organisational collaborations (Ackermann et al., 2005; Huxham, 1991). These 70 factors were clustered into a set of 4 context factor and 13 method factors by considering which might be grouped together – see Appendix 7–1 (p. 243). In order to test these putative causal factors for initiating anticipatory action using 'fuzzy set' QCA techniques I assessed whether each factor was Present, Absent or Mixed in a 'truth table' that forms the basis for my logical inference – see Table 7.3.

	Core Action Research Phase			
	Infrastructure	**Acquisition**	**PJHQ**	**Head Office**
Causal Conditions – Context Factors:				
C1. Agreed purpose	Present	Mixed	Present	Mixed
C2. Agreed participants	Present	Present	Present	Absent
C3. Lack of politics & power issues	Absent	Absent	Mixed	Absent
C4. Commitment to work together	Mixed	Mixed	Present	Absent
Causal Conditions – Method Factors:				
M1. Apply appropriate methods	Present	Mixed	Present	Present
M2. Facilitate participation	**Present**	**Present**	**Present**	**Absent**
M3. Structure multiple perspectives	Present	Present	Present	Present
M4. Enable systemic thinking	Present	Mixed	Present	Present
M5. Enhance mutual understanding	Present	Absent	Mixed	Absent
M6. Manage process (and content)	Present	Present	Present	Mixed
M7. Ensure procedural justice	Present	Mixed	Absent	Present
M8. Create boundary object	Present	Present	Present	Present
M9. Support thinking differently	Present	Mixed	Present	Present
M10. Strengthen inter-relationships	Present	Mixed	Present	Absent
M11. Agree the issue(s)	**Present**	**Present**	**Present**	**Absent**
M12. Achieve accommodations	Present	Present	Mixed	Absent
M13. Identify actions	Present	Present	Present	Present
Outcome:				
Taking anticipatory action	Success	Success	Success	Failure

Table 7.3 – Truth Table for putative causal conditions vs. phases of Action Research

First, by considering which method factors are present for each of the three successes and absent for the single failure reveals that 'M2. Facilitate Participation' and 'M13. Agree the issues' to be necessary factors. It is therefore possible to be categorical that if these methodological factors are absent, then the assessment will not lead to anticipatory action. This seems logical because if stakeholders are reluctant to participate and cannot agree the issues then it is unlikely that the assessment will be acted upon. These methodological factors are bolded in Table 7.3.

Second, by considering the method factors present for each of the three successes reveals that the necessary and sufficient set of methodological factors to comprise: M1. Apply appropriate methods; M2. Facilitate participation; M3. Structure multiple perspectives; M4. Enable systemic thinking; M6. Manage process (and content); M8. Create boundary object; M9. Support thinking differently; M10. Strengthen inter-relationships; M11. Agree the issue(s); M12. Achieve accommodations; and M13. Identify actions. It is therefore possible to be categorical about success if all of these factors are present. The two methodological factors omitted from this set because they were absent from the Acquisition and PJHQ success are respectively M5. Enhance mutual understanding and M7. Ensure procedural justice are greyed in Table 7.3.

Third, by considering which of the context factors are present (or at least mixed) for each of the three successes reveals that each of the above two findings are likely to transfer to other situations in which there is C1. Agreed purpose; C2. Agreed participants; and C4. Commitment to work together. This seems logical because all make for a positive working environment. It also seems logical that if these three are present (in some amount) then the fourth context factor – C3. Lack of politics & power issues – can be overcome.

7.4   How can organisational health monitoring be used to sustain anticipatory behaviour?

The term monitoring refers to the act of repeatedly assessing organisational health, if not continuously then at a frequency sufficient to provide useful information. Whilst the ability to monitor has been identified as a key functionality for sustaining performance via anticipatory behaviour (Hollnagel et al. 2007) it is not clear how to design the monitoring to affect this. To address this research question I conducted interviews with key stakeholders associated with the Infrastructure and Acquisition cases to elicit their observations and to jointly develop and refine theories for why, respectively, the monitoring was not and was successful as part of a Realistic Evaluation approach.

Infrastructure (August 2014 – December 2016):

In July 2014 MOD readily accepted the actions that were recommended to reduce uncertainties and to address weaknesses in the Defence Infrastructure System, and used these to define the forward work plan for the Defence Infrastructure System Programme. These actions are reproduced below in

Table 7.4 because they form part of the structure of this evaluation. In March 2015, Deloitte delivered their first maturity assessment to baseline this major change programme which was based upon their own product. The idea was that this would then continue in a process of monitoring, but it was not to be.

Recommended Actions	Systemic Problem
#1 – Define scope of Infrastructure Delivery System	Uncertainty
#2 – Test, formalise and communicate internal interfaces	Uncertainty
#3 – Test, formalise and communicate external interfaces	Uncertainty
#4 – Accelerate roll-out of management information systems	Weakness
#5 – Link Infrastructure delivery to Defence objectives	Weakness
#6 – Establish incentives for 'Defence first' behaviours	Weakness
#7 – Manage Infrastructure Delivery System as a whole	Weakness
#8 – Develop Intelligent Customer status (Head Office and Armed Forces)	Weakness

Table 7.4 – Recommended action for intervention within Defence Infrastructure System

In November 2016 the UK National Audit Office[32] found that whilst MOD *"has not yet set out how it will fully address the significant challenges it faces sustaining the whole of its estate and the resulting risks to military capability"* and went on to make a number of recommendations for further intervention. Earlier that same year in July, the Director General for Head Office and Commissioning Services announced a full review of the way in which MOD delivers infrastructure projects and services. If the DG HO&CS announcement suggested that the original health monitoring had failed to sustain all the changes necessary for long term performance, then the NAO report confirmed it.

In the period from September through November 2016 I designed and conducted six structured interviews with stakeholders drawn from all aspects of the Defence Infrastructure System – two from Head Office, two from Armed Forces and two from the DIO. This structure drew upon the principles of Realistic Evaluation to pose a set of open questions relating first to Context, then to Outcome and lastly to Mechanism. Of these six interviews, four were conducted with staff who were involved in the

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[32] Delivering the defence estate - https://www.nao.org.uk/report/delivering-the-defence-estate/ [Accessed: 27 Sep 2016]

initial assessment and two were conducted with staff who were new in their posts (both in the Armed Forces).

In response to the opening set of questions, stakeholders reported that the Context over the intervening two years had been challenging in three key aspects and that these had limited the implementation of the actions identified in 2014. First, it was noted that the DIO had experienced service provision issues at the Infrastructure Operational Delivery level where Customers were dissatisfied with the service delivered through a number of related contracts and that this had led to relationships with the Armed Forces to become strained. Second, and as a direct result of these service provision issues, it was highlighted that Head Office had been unable to maintain a broad system-wide perspective at the Infrastructure Strategic Leadership level and instead had focused in one or two areas. The fact that this narrow–focus developed despite MOD establishing a dedicated change programme highlights the acute nature of these service provision issues. Third, it was observed that the installation of a Strategic Business Partner at the Infrastructure Operational Management level had yet to realize all of the expected benefits and had, in some areas, led to significant additional complications. More positively though, the stakeholders reported that, compared to the assessment made for September 2014, there were now reduced levels of uncertainty owing to the work conducted by the Defence Infrastructure System Programme.

The way in which this change programme had / had not delivered Outcomes was the subject of the next section of the interviews which examined how the actions detailed above in Table 7.4 had been progressed. It was established that seven out of these eight actions – #1, #3, #4, #5, #6, #7 and #8 – had been progressed substantially and that each had delivered a positive Outcome. For example, it was evidenced that improvements in the collation, processing and dissemination of management information has directly led to improvements in decision making with specific reference to estate lifecycle, maintenance backlogs and footprint rationalization. Whilst feasible, Action #2 had proven to be less desirable than the other recommended actions and so had deprioritized within the Defence Infrastructure System Programme. It was also established that the recommended actions were a comprehensive set and this was attributed to the broad nature of the actions that meant that even with

the benefit of hindsight nothing additional could and should have been recommended. It was acknowledged however that not all of the actions identified had yet to fully pay off – primarily due to the challenging context described above but also due to their long-term nature.

The final section of each interview examined what it was about the Method that had delivered a comprehensive set of actions that had proven to be largely both desirable and feasible. The interviewees identified three key aspects. First, the interviewees found that by engaging and gathering together a broad range of stakeholders to exchange views, and from their unique perspectives on the current 'as is' operating model, the Method yielded high levels of stakeholder engagement that persisted over time. Second, the interviewees found comparing the intended 'to be' operating model against a pre-established framework in a structured way to be helpful in identifying important areas of uncertainty where more definition was required. Third, the interviewees found that conducting the baseline assessment that identified both strengths and weaknesses (in addition to these uncertainties) to be helpful in establishing a common stepping off point from which direction could be set with confidence.

Reflecting upon these findings led me to identify three key processes for taking and sustaining anticipatory action, namely: Building commitment; Building awareness and Building confidence. Notwithstanding the acute performance issues that were no doubt taking up the majority of senior management bandwidth, it seemed to me that whilst the original health assessment had built commitment between multiple stakeholders and had built awareness of where to intervene, it had not fully built sufficient confidence to carry through the actions at pace. In particular it became clear through the interviews that this lack of confidence was particularly acute at senior levels, above those involved in making the original assessment and conducting the subsequent monitoring.

I therefore turned my attention to Actor Network Theory that had been used to identify four pre-conditions necessary for successful (reactionary) interventions (White, 2009) following earlier work (Callon, 1986). These comprise: (1) Problematisation: What is the problem that needs to be solved?; (2) Interessement: Are the actors interested and negotiating the terms of their involvement?; (3) Enrolment: Do the actors accept the roles that have been defined?; and (4) Mobilisation of allies: Do the actors have the support of wider actors? Working under the premise that organisational health

monitoring can bring about these pre-conditions as necessary steps to delivering anticipatory behaviour, I developed three starting hypotheses: (a) Organisational health monitoring can identify risks that need to be addressed (problematisation); (b) Organisational health monitoring can convince immediate stakeholders that they have roles to play in addressing risks (interessment, enrolment) and (c) Organisational health monitoring can convince wider stakeholders that resolving risks should have their support (mobilisation of allies).

For the Infrastructure evaluation, I concluded that hypotheses (a) and (b) were supported by the interview data but that hypothesis (c) was unsupported. I further concluded that the inability to sustain anticipatory behaviour was due to the failure to impact key stakeholders located between the working level and the Director General level both of which were convinced to take action. I next proceeded to test these hypotheses that were developed with Infrastructure stakeholders with Acquisition stakeholders.

Acquisition (February 2015 – September 2016):

Since February 2015 when the Dstl consultancy team withdrew, the Acquisition System Authority (ASA) had conducted multiple assessments in a process of monitoring Acquisition System Health (ASH) working initially with KPMG to produce their first findings in July 2015. These findings were based on the first individual assessment survey returns cross-referenced against relevant corroborating information. This was followed on a six-monthly drumbeat with the second report produced in February 2016 (based on all four aspects of ASH) and the third report produced in July 2016 (based upon self-reports from Front Line Commands only). Each report was submitted to the Acquisition Architecture Board after being first endorsed at senior levels across the Defence Acquisition System and were reported to have found the products to be insightful.

Over the period from November 2016 to March 2017 I designed and conducted discussions with stakeholders drawn from all aspects of the Defence Acquisition System – one from Head Office, two from the Armed Forces and one from Defence Equipment & Support. These discussions were informed by detailed review of the available monitoring reports to understand what had changed. For example,

see Figure 7.1 for a typical monitoring summary that highlights the key findings that are either or new or still in progress from the previous report, all set against the six dimensions of organisational health.
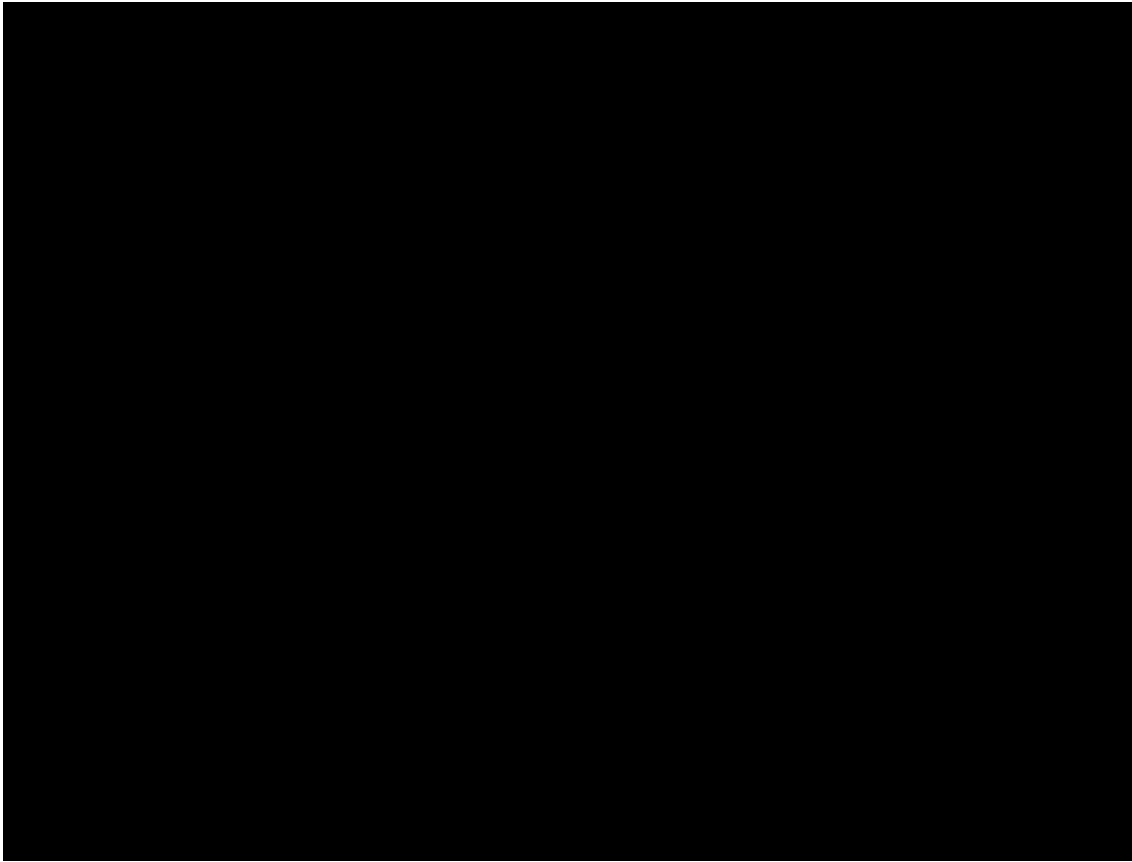
Figure 7.1 – Acquisition System Health report as of February 2016 (from ASA) - REDACTED

Based upon a detailed review of ASH monitoring reports and the discussions held via interview with key stakeholders I was able to array a range of positive and negative evidence against the three hypotheses - see Table 7.5. From the balance of this evidence I concluded that each of the hypotheses (a), (b) and (c) were supported and that provides a plausible explanation for why anticipatory behaviour was sustained for Acquisition, but not for Infrastructure.

Hypothesis	Positive Evidence	Negative Evidence
(a) Organisational health monitoring can identify risks that need to be addressed	a. ASH reporting highlighted key risks in six categories b. Structured reporting brought confidence that risk identification was comprehensive c. Insights were seen to be "adding value" by stakeholder community	d. Nothing new was discovered e. Coverage increasing over time (significant gaps to begin with)
(b) Organisational health monitoring can convince immediate stakeholders that they have roles to play in addressing risks	f. ASH reporting assigned 'owners' to each of the risks with responsibility for mitigation g. Staffing of ASH reports provided an opportunity for stakeholders to endorse mitigations (and so take ownership) h. ASA staff acted as the *"constant conscience"* for progressing these issues (with the potential to flag progress - good or bad - to very senior leaders)	i. Large number of mitigations perhaps diluted stakeholder attention (prioritisation could have strengthened ownership) j. ASH seen as "burdensome" by some stakeholders (despite efforts)
(c) Organisational health monitoring can convince wider stakeholders that resolving risks should have their support	k. ASH seen as a useful way to seek help from senior leaders - both across the department and within stovepipes l. ASH reports delivered to most senior leaders via Acquisition Architecture Board m. ASH reporting well aligned with existing business reporting processes (format, frequency)	n. ASH reporting is only one of many information streams and perhaps could have been more impactful o. Local performance issues also driving change (difficult to maintain dual foci on current/future and local/global)

Table 7.5 – Hypothesis testing with Acquisition stakeholders

7.5 What should a practitioner be doing when applying the Viable System Model?

The VSM provides a powerful framework to aid the design and diagnosis of organisations. However, the cognitive accessibility of VSM as a modelling approach often presents a significant barrier to application. This issue is particularly acute when using it interpretively with non-expert stakeholders as a basis for problem structuring. In the face of such difficulties, VSM practitioners often

take steps to adapt the classic presentation of VSM to suit the needs of their particular operational context. This raises an important research question: *How much adaptation is acceptable before the model being used to support interventions in terms of organisational and process design no longer considered to be the VSM?* It also raises other interesting research questions in the performative idiom (Ormerod, 2014; Pickering, 1993; White, Yearworth, & Burger, 2015) such as: *How is the VSM actually being used in practice as a PSM and with what variability?* and *What is it that a VSM practitioner is doing when they're using the VSM as a PSM?*

In order to address these questions, I followed the approach taken by Checkland with regard to his Soft Systems Methodology (SSM) to firstly to develop a set of constitutive rules and secondly to develop an explicit epistemology[33]. The constitutive rules for Soft Systems Methodology were set out by (Checkland, 1981, pp. 252-254) as a means to guard against the non-rigorous use of SSM, but originated from earlier work by Naughton to aid the teaching of SSM at the Open University (Naughton, 1977). Checkland and Scholes expanded on these constitutive rules for SSM practice (Checkland & Scholes, 1990, pp. 280-284) and introduced an explicit epistemology for SSM (ibid, p.288-289). The question of the validity of an intervention in the sense of whether it was, or was not, an SSM intervention can be answered performatively by examining what the practitioner was doing when they claimed to be conducting an intervention using SSM.

The utility of defining constitutive rules for methodology was further underlined by Jackson (Jackson, 2003, pp. 305-311), who developed constitutive rules for the use of generic system methodologies as part of Critical Systems Practice (CSP). These, together with the original constitutive rules for SSM led to Yearworth and White (2014) adopting a similar approach for developing a Generic Constitutive Definition (GCD) for PSMs. Whilst the original intention for the GCD was to identify non-codified use of problem structuring methods, it is also useful in the design of problem structuring

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[33] Note that this use of epistemology by Checkland and Scholes (1990, pp. 288-289) refers the *"language through which a methodology's process makes sense"* and thus it is somewhat narrower than might normally be expected. Taking a broader definition of epistemology – e.g. the *forms of knowledge and knowledge creation that the method(ology) uses and forms of representation in modelling"* (Mingers, 2003) – would appear to involve both Checkland's constitutive rules and explicit epistemology together.

interventions. I used each of these sets of constitutive rules – for SSM, for CSP and for PSMs – to develop a set of seven constitutive rules to guide the interpretivist use of the VSM performatively in Gerund form – see Table 7.6. Each is expanded on below.

VSM Constitutive Rule	Linked SSM Constitutive Rule	Linked CSP Constitutive Rule	Linked PSM Constitutive Rule
1. Aiming to bring about improvements	1	1	1
2. Using models as learning devices	2, 3b, 3c ,3d		7
3. Making no assumption that an observer has an objective view or that different observers share the same worldview	3a	8	5, 6, 8
4. Tailoring application to real world situation	4	7	9
5. Using methods and techniques creatively to examine the problematical situation		2, 5, 6	3
6. Extracting methodological lessons through reflection	5	9	4
7. Studying organisational function using VSM distinctions and principles as an explicit epistemology to identify necessary interventions	2	1, 3,4	2

Table 7.6 – Putative constitutive rules for a VSM process.

(1) Aiming to bring about improvements: The aim of using VSM as a PSM to guide interventions is to bring about improvement in a problematical situation. It is important to recognise that whilst definitive answers or solutions may be sought, this is impractical in almost every case and so improvement is sought instead (Rittel & Webber, 1973).

(2) Using models as learning devices: VSM-guided interventions use models as a means to structure debate and so enable stakeholders to learn from each other about the problematical situation. This model can be viewed as a negotiative device, transitional object or boundary object (Ackermann & Eden, 2011; Eden, 1995; Franco, 2013).

(3) Making no assumption that an observer has an objective view or that different observers share the same worldview: It is important to recognise that when addressing problematical situations that

different stakeholders will bring different perspectives and that they will also not necessarily share the same world view. The first point has implications for how content is elicited and managed and the second has implications for how the process is implemented (Eden, 1990).

(4) Tailoring application to real world situation: The VSM provides a robust framework for intervening in real world situations, but since every such situation will be different, no implementation will ever be the same. There is therefore a need to tailor the application of VSM through a process of conscious thought that seeks to balance rigour and relevance (Robey & Markus, 1998).

(5) Using methods and techniques creatively to examine the problematical situation: Matching the approach to the real world situation will typically involve adapting the classic form of the VSM to ensure cognitive accessibility and/or embedding VSM with a multi-methodology alongside other complementary methods. Such blending of complementary methods should be based on an appreciation of their respective strengths and weaknesses (Jackson, 1993).

(6) Extracting methodological lessons through reflection: The use of VSM as a PSM should yield research findings in addition to improving the real world situation. These findings will typically be methodological in nature because they relate to the procedural nature of the intervention rather than the substantive nature (which will be different in every case) (Pidd, 2004).

(7) Studying organisational function using VSM distinctions and principles, as an explicit epistemology to identify necessary interventions: If VSM is to be used as a PSM for studying organisational function and for identifying interventions, then the PSM should adhere to the distinctions and principles laid down by the VSM. Ensuring that the PSM as implemented adheres to the underpinning theory is critical not only for the validity of results but also for long-term credibility of VSM – and PSMs in general – as a rigorous undertaking (Ackermann et al., 2014; Jackson, 2003)

Jackson (2003) and Yearworth and White (2014) avoided the question of specific epistemologies beyond that laid down in their generic constitutive rules, but the VSM process – as per the SSM process – requires one. This is because it is specific enough to be both desirable and feasible, unlike the CSP and GCD definitions that cover a much broader range of methodologies. Drawing principally upon Beer (1985), Schwaninger and Scheef (2016) and Espinosa and Walker (2017), I identified 14 key

elements, grouped by 3 sequential phases of inquiry, that I found to constitute a comprehensive epistemology for the VSM. Each is presented in turn below in Gerund form as per process modelling:

Defining the system in focus:

1.   Organisational identity: Establishing the purpose of the organisation (products or services), its stakeholders and its boundaries

2.   Levels of recursive organisation: Identifying the sub-organisations directly responsible for implementing core products or services and the larger system of which the system in focus is part.

Identifying & assessing the sub-systems within the system-in-focus:

3.   Operational Units (S1) – Delivering the products or services, with requisite variety to deal with their environment(s).

4.   Harmonisation (S2) – Preventing recurrent conflicts among primary units, by providing shared values, languages, standards and protocols for information, communications and processes.

5.   Self-Regulation and Synergies (S3) – Supporting self-regulation for each of the operational units and realising synergies among them for improved organizational performance.

6.   Monitoring (S3*) – Informal monitoring of operational performance.

7.   Adaptation (S4) – Making sense of environmental changes (constraints and opportunities), to shape strategy and long-term orientation.

8.   Identity and Closure (S5) – Creating corporate identity, ethos and policies to provide a consistent framework for operations.

Identifying & assessing the interactions within the system-in-focus

9.   Resource bargaining (S3 - S1) – Negotiating expected results, and matching resources for each of the operational units.

10.   Inter-operational management (S1 - S2 - S3) – Managing operational complexity and enabling effective decision making.

11. Strategy Development Process (S4 – S3) – Combining internal and external perspectives on feasible and desirable future developments, to support strategy development for the organisation.

12. Maintaining balance (S5-S4-S3) – Balancing between present and future orientations and between internal and external perspectives in order to keep in homeostatic balance with its niche.

13. Recursive governance – Ensuring that each embedded organisation operates as a viable system itself (with appropriate autonomy to self-govern).

14. Algedonic signals – Raising alarm to trigger interventions outside of the normal regulatory channels.

This epistemology can be seen to provide a performative description of what the VSM practitioner needs to be doing that is specific to the VSM (as opposed to generic for any systemic approach focused on improvement). In order to test this putative epistemology, I made an assessment with regard to my practice with regard to the Defence Infrastructure System using an Italian Fag scoring scheme where green and red are used respectively to denote where I did or did not address the particular element of the epistemology based on the coverage of the methodology, and white is used to denote how much uncertainty might be associated with this assessment based on the quality of the assessments made– see Figure 7.2.

VSM Epistemology	Assessment
1. Organisational identity	
Excellent coverage (green) with minor uncertainty (white)	
The purpose of the organization was clearly established and set in the context of the wider enterprise. Stakeholder involvement was comprehensive but not exhaustive (workshop participant limited to key representatives only).	
2. Levels of recursive organisation	
Excellent coverage (green) with minor uncertainty (white)	
The sub-organisations responsible for delivering key VSM functions were identified and their contributions assessed in the workshop settings. The operation of the DIO was set in wider context of the MOD enterprise	
3. Operational Units (S1)	
Good coverage (green) with minor shortfalls (red) and moderate uncertainty (white)	
The ability of the operational units to deal with the variety of their environments was assessed but the evidence gathered was subjective with only limited triangulation possible.	

4. Harmonisation (S2)	🟩		🟥
Good coverage (green) with minor shortfalls (red) and moderate uncertainty (white)			
The ability of the DIO to coordinate the operations of primary units so as to avoid conflict was assessed but the evidence gathered was subjective with only limited triangulation possible.			
5. Self-regulation and Synergies (S3)	🟩		🟥
Good coverage (green) with minor shortfalls (red) and moderate uncertainty (white)			
The ability of the DIO to support self-regulation of the operational units and to realise synergies between them in order to meet stakeholder needs was assessed but the evidence gathered was subjective with only limited triangulation possible.			
6. Monitoring (S3*)	🟩		🟥
Good coverage (green) with minor shortfalls (red) and moderate uncertainty (white)			
The ability of the DIO to monitor performance independently of management communication channels was assessed but the evidence gathered was subjective with only limited triangulation possible.			
7. Adaptation (S4)	🟩		🟥
Good coverage (green) with minor shortfalls (red) and moderate uncertainty (white)			
The ability of the DIO to understand its external environment and to identify the implications for its current and future operations was assessed but the evidence gathered was subjective with only limited triangulation possible.			
8. Identity and Closure (S5)	🟩		🟥
Good coverage (green) with minor shortfalls (red) and moderate uncertainty (white)			
The ability of the DIO to establish a clear identity and to produce policy that provides a consistent framework for its operation was assessed but the evidence gathered was subjective with only limited triangulation possible.			
9. Resource bargaining (S3-S1)	🟩		🟥
Good coverage (green) with minor shortfalls (red) and moderate uncertainty (white)			
The ability of the DIO to allocate and balance resources in accordance with was assessed but the ability of operational units to negotiate these expected results was not. As before the evidence gathered was subjective with only limited triangulation possible.			
10. Inter-operational management (S1-S2-S3)	🟩		🟥
Good coverage (green) with minor shortfalls (red) and moderate uncertainty (white)			
The ability of the DIO to leverage information systems in order to inform decision making was a major focus of the assessments but the interplay between S3 and S2 was not explicitly addressed (recall that Beer's S2, S3 and S3* were collapsed into a single layer). Also, as before the evidence gathered was subjective with only limited triangulation.			
11. Strategy development process (S4-S3)	🟩		🟥
Good coverage (green) with minor shortfalls (red) and moderate uncertainty (white)			
The ability of the DIO to make strategy by combining both external and internal perspectives was assessed but the evidence gathered was subjective with only limited triangulation possible.			
12. Maintaining equilibria (S5-S4-S3)	🟩		🟥
Limited coverage (green) with major shortfalls (red) and moderate uncertainty (white)			
The ability of the DIO to balance 'inside and now' against 'outside and then' was only partially assessed. Also, as before the evidence gathered was subjective with only limited triangulation.			
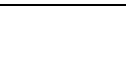
13. Recursive governance			

Limited coverage (green) with major shortfalls (red) and moderate uncertainty (white)

The autonomy afforded to sub organisations within the DIO was assessed but this was not a major focus of inquiry. Also, as before the evidence gathered was subjective with only limited triangulation.

14. Algedonic signals			

Good coverage (green) with minor shortfalls (red) and moderate uncertainty (white)

The ability of individuals and sub-organisations within the DIO to transmit alarm signals outside management communication channels and so trigger interventions was assessed but the evidence gathered was subjective with only limited triangulation possible.

Figure 7.2 – Reflection on method developed for the Defence Infrastructure context

These assessments were used to build a HPM model of *<Studying organisational functions using VSM>* – see Figure 7.3. The aggregations up the hierarchies were carried out using the JUNIPER algorithm (Marashi, 2006) with necessity and sufficiency values set to the defaults of 0.3 and 0.4 respectively and with no dependency assumed between leaf nodes. Note that whilst it is the overall performance of the top-level process that addresses the existential question of valid use, it is the scoring of individual processes that contribute to the reflective understanding (and so methodological learning) of how well the VSM process has been implemented. It can be seen that whilst there is good coverage of the VSM epistemology (green) there are some shortfalls (red) where the scope of inquiry could and should be widened to yield better coverage. It can also be seen that there is a large degree of uncertainty (white) and in particular with regard to 'Identifying & assessing the five sub-systems' and 'Identifying & assessing the interactions within the system-in-focus'. This is due to the evidence gathered via the workshop being subjective in nature (stakeholder expert opinions) with only limited triangulation possible within the time available. Despite these shortcomings in coverage and depth, the bespoke method developed for this context can be seen to be representative of VSM (with an overall process assessment of [0.51, 0.84] – i.e. 51% green, 16% red and 33% white).
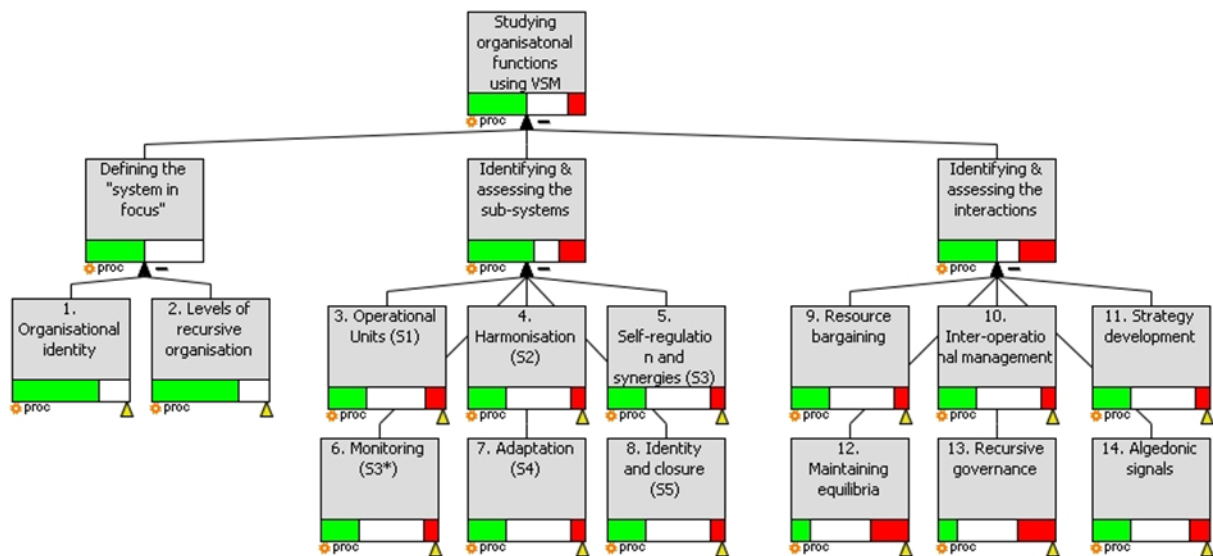
Figure 7.3 – Reflection on method developed for the Defence Infrastructure

The HPM then can be used as a reflective device to support the practitioner in identifying methodological learning points ('reflecting'). It can also be used as an instructional device for guiding a practitioner, especially the newcomer, in the design of their method specific to a real world situation and so make for better use of the VSM ('designing'). Lastly it can be used as a diagnostic device to structure the collection of data – of all types – and present results clearly to participants for discussion and to the client for decision-making ('diagnosing').

7.6   Summary

In this chapter I have presented my findings against my three primary research questions and a fourth research question that arose along the Action Research journey.

For RQ1 I found that system methodologies are well suited to assessing organisational health. In particular, through cross-case evaluation I found that system methodologies bring four specific affordances that are of direct benefit: Providing an overarching methodology for boundary setting and mixing methods; Guiding inquiry to ensure comprehensive assessment; Bringing multiple stakeholder perspectives together achieve accommodation(s); and Visualising assessment results in ways that accurately represent the complexity of the situation.

For RQ2 I found that organisational health assessments can be used to initiate anticipatory action with such action taken in three out of the four cases. In particular through qualitative comparative analysis I found that for these cases that facilitating high levels of participation and reaching agreement on the issues to be necessary causal method factors and that as many as nine further make up the necessary and sufficient set. I also found that these heuristics are likely to transfer to other contexts where the conditions are favourable.

For RQ3 I found that organisational health monitoring can be used to sustain anticipatory behaviour with such behaviour observed in one out of the two cases where further assessment(s) were conducted subsequent to the initial assessment in a process of monitoring. In particular, through conducting realistic evaluation with key stakeholders I found that it is important that this monitoring (a) identifies risks that need to be addressed (problematisation); (b) convinces immediate stakeholders that they have roles to play in addressing risks (interessment, enrolment); and (c) convinces wider stakeholders that resolving risks should have their support (mobilisation of allies).

For RQ4 I developed a set of constitutive rules (including an explicit epistemology expressed as a performative model) to guide the generation of knowledge via the application of the VSM. In particular, through applying the explicit epistemology to my own practice I found that this model can be used as an aid to reflecting on practice, as an aid to designing VSM approaches and as aid to diagnosing the organisation is focus.

Chapter 8 – Discussing the implications of my research findings

8.1   Introduction

The aim of this section is to reflect on my research findings. For each of my research questions I critique my findings to reflect on the various strengths and limitations, I highlight the methodological learning transferrable to other situations, and I identify the potential for further research to address particular challenges (including in relation to new academic literature). The aim of this section is also to reflect on my Action Research process, and in particular how it compares to established quality criteria.

8.2   RQ1: How can system methodologies can be applied to assess organisational health?

My Action Research has demonstrated how system methodologies are highly relevant to organisational health assessment. In Chapters 4 I described how I blended the Viable System Model (VSM) with Hierarchical Process Modelling (HPM) in an innovative multi–methodology to develop and apply a bespoke method for assessing the health of the Defence Infrastructure System. In Chapter 5 I described how I again leveraged VSM and HPM to develop a bespoke method for assessing the health of the much larger Defence Acquisition System. In Chapter 6 I described how I combined theoretical principles with empirical methods to develop a generic assessment method that could be applied at any scale and how this was tested this in the areas of Permanent Joint Head Quarters (PJHQ) and Head Office.

Whilst the bespoke assessment methods developed for Infrastructure and Acquisition are not transferable to other situations (by definition), the generic assessment method developed and applied for PJHQ and Head Office has the potential to be transferable. The way in which the assessment framework was derived through combining theoretical considerations with the best of what is being used in various consultancy settings, together with the successful application at PJHQ suggest that it can be effective in other contexts where there is access to sufficient data. It would be insightful however, before promoting this generic method more widely, to compare and contrast it against existing methods (e.g McKinsey's Organisational Health Index) in a new setting with practitioners, sponsors and stakeholders who are unfamiliar with them. This avenue for further research would make for an objective test for the four key affordances of system methodologies for conducting organisational health

assessments that I identified in Chapter 7: (1) Providing an overarching methodology for boundary setting and mixing methods; (2) Guiding inquiry to ensure comprehensive assessment; (3) Bringing multiple stakeholder perspectives together to achieve accommodation(s); and (4) Visualising assessment results in ways that accurately represent the complexity of the situation.

As per my Action Research methodology, I have continuously reflected throughout these chapters to identify 24 detailed methodological observations (as reported throughout Chapters 4, 5 and 6), including through the use of an established framework for evaluating systemic problem structuring methods (Midgley et al., 2013). In both learning activities I involved colleagues, sponsors and stakeholders to get as broad a set of perspectives as possible and so minimise the impact of any personal biases that I might have. This has therefore enabled me to distil a number of methodological learning points that appear transferrable to other situations.

In addition to making a contribution to the emerging field of organisational health assessment, I also identify that these methodological learning points are directly relevant to the field of Problem Structuring Methods or PSMs. This is because I assess that my research has made contributions against seven of the eight challenges identified for problem structuring research and practice by Ackermann et al. (2014). These comprise: (1) maintaining high quality standards in problem structuring work; (2) identifying generalisable model findings; (3) building on prior problem structuring research; (4) developing effective support for multi-organisational collaborative working; (5) ensuring the desired level of neutrality in modelling process and content; (6) developing effective procedures for mixing methods; and, (8) borrowing and developing theory to understand and inform problem structuring practice. In fact the only challenge that I have not made a contribution against is (7) developing and using problem structuring support in non–western cultures, which is difficult to achieve given the context for my research.

The most prominent avenue for future research arising from my research against this research question is to investigate how problem-structuring style organisational assessment methods, where stakeholder participation is critically important to agree the issues and decide upon actions, can be scaled for application to large organisations. The accessing of large numbers of stakeholders was desirable for all but the PJHQ assessment (because the scale was small enough for interviews to be able

to engage all affected parties) but this largely proved infeasible. Instead, for Infrastructure I led the facilitation of a small group of around 15 senior stakeholders that were representative of all parties; for Acquisition the Acquisition System Authority distributed surveys across the MOD and solicited summary assessments from key organisations; and for Head Office I worked with the consultancy team to identify and leverage existing data including survey responses. None of these approaches could be said to have succeeded in getting *"the whole system in the room"* (Seel, 2001, p. 493) and so could be criticised for not being truly representative of the system in question.

There are a number of approaches for engaging large numbers of actors that collectively have been termed Large Group Intervention Methods (LGIMS) (Bryson & Anderson, 2000). These include methods such as Open Space Technology (Owen, 1992), Team Syntegrity (Beer, 1994), Future Search (Weisbord & Janoff, 1995), Participative Design (Emery, 2000), Search Conferencing, Interactive Strategic Planning (Dannemiller-Tyson Associates, 1994), Real-Time Strategic Change (Dannemiller & Jacobs, 1992), Simu-Real (Klein, 1992), and the Conference Model (Axelrod & Axelrod, 1999). But whilst it has been observed that LGIMS fall short of PSMs in that *"they are too focused on problem consultation and not enough on problem structuring and defining agreed portfolios of actions to be acted upon by participants"* (Shaw et al., 2004, pp. 461-462) and that they are better suited to engaging 'publics' than facilitating 'groups' (Morton et al., 2007, p. 554), it seems that there is potential to transfer aspects of these methods to enable organisational health to be assessed at scale.

From personal experience of facilitating – or trying to facilitate – large groups of more than fifty I can relate to the recommendations that, in order to scale PSMs to handle large groups, adaptations are needed to address the difficulties of managing group dynamics and the difficulties of synthesising large amounts of data (Shaw et al., 2004, p. 462). But rather than working harder as a facilitator to manage process and content (Eden, 1990) through detailed preparation, close control during the interaction and detailed follow up to extract the value, I would assert that advances in technology can enable facilitators to work smarter. In particular, rather than focusing on the incremental gains of facilitating large group interactions at the same time in the same place I would further assert that research should be focused on harnessing technology to enable a step change through facilitating distributed large group interaction – either same time, different places or different times, different places (see Figure 2 from Yearworth

and White (2019, p. 5) for a helpful 2x2 that illustrates the four modes of workshops defined by time and place of group working). This is because it would allow for the greatest possible interaction with actors distributed in space (by removing the barrier of having to travel to, and be suitably hosted within, a single location) and/or distributed in time (by removing the barrier of having to be available at the same time).

Such distributed interactions have long been a focus in the Group Support Systems literature – see for example (Hiltz et al., 1996; Mittleman, Briggs, & Nunamaker, 2000; Paul, Samarah, Seetharaman, & Mykytyn Jr, 2004; Tung & Turban, 1998; Turoff, Hiltz, Bahgat, & Rana, 1993). Whilst, the similarities between this technology-driven field of research and the model-driven field of research associated with PSMs have been noted (Morton, Ackermann, & Belton, 2003) and the potential for distributed interaction enabled by technology to facilitate large groups (Morton et al., 2007), there seems to have been little progress made. This is perhaps due to concerns over whether such technology can support the negotiation necessary during the convergent phases of problem structuring workshops to build commitment to taking actions. This is perhaps also due to reluctance and/or difficulties to adapting exiting PSMs to work in distributed settings, although the recent development of Group Explorer to support distributed SODA (Yearworth & White, 2019) would appear to be a notable exception.

The opportunity then for assessing organisational health is to leverage these advancements in parallel fields, together with recent advances in low-cost cloud-based computing services and the possibility of overlap and synergies with social media platforms (Yearworth & White, 2018), to develop a means for delivering organisational health assessments that are much more representative of views held across the organisation and not just by a subset. In taking the first steps in this direction I would envisage a research project centred around a staged approach to making assessments in fixed time windows much as per the Delphi method (Delbecq, van de Ven, & Gustafson, 1975) where divergent phases of inquiry (where opinions are sought from participants) are sequenced with convergent phases of inquiry (where differences in opinions are highlighted for resolution). The role of the facilitator during the assessment would then be limited to managing this sequencing (process) based upon the analysis of returns (content) in the context of meeting the needs of the sponsor. The role of the facilitator

outside the assessment would involve understanding and managing the needs of the sponsor, motivating stakeholder engagement with the assessment (including via others) and communicating the actions to be taken. But the scope here for innovation is vast, and in a fast–moving technology field a driving research question might be *"How can artificial intelligence be applied to automate the facilitation during assessment?"*

In addition to the potential for delivering better organisational health assessment products, the process of taking a large group approach offers the potential to increase the health of the organisation by increasing 'industrial democratisation' (White, 2002). In addition to being a laudable goal for an organisation, affecting industrial democratisation offers the potential for generating the high levels of workforce engagement necessary for organisations to respond to the threats and opportunities presented by *"environmental discontinuities"* (White, 2002, p. 151) that increasing characterises the turbulence of the modern, hyper-dynamic operating environment. Therefore the evaluation of any future research in this area should taken into account both the potential to improve the quality of the assessment products and the potential of the process to improve the health of the organisation. In particular, the evaluation should consider the potential for the process of organisational health assessments to enhance organisational learning at all levels – *"The organisations that will truly excel in the future will be those organisations that discover how to tap people's commitment and capacity to learn at all levels in an organisation"* (Senge, 1997, p. 4)

8.3   RQ2: How can organisational health assessments initiate anticipatory action?

The use of models at the heart of anticipatory systems that can take pre-emptive action to in advance of issues that threaten their survival (R. Rosen, 2012). In Chapter 7, I considered how the assessments made in each of the areas of Infrastructure, Acquisition, PJHQ were, and in the area of Head Office was not, used to initiate anticipatory action. In particular, I identified a wide range of potentially causal conditions for determining whether organisational health assessment lead to anticipatory action and evaluated which were necessary and sufficient using Qualitative Comparative Analysis (Ragin, 1987).

The most obvious angle for critiquing these findings is to question: Why these casual conditions? The most obvious response is that these conditions were distilled from a much larger set of factors that

were identified by vastly experienced researchers in heavily cited papers that were published in respected journals. These researchers drew upon a powerful combination of theoretical understanding and practical experience to investigate how models are used to initiate action (albeit typically in reaction to performance issues of some sort). This is not to say that there was not other research that should have been included, but it was noticeable that the 70 factors that were extracted from these 10 papers clustered fairly readily into the set of 17 that were used to frame the evaluation. Perhaps a useful test of the robustness of this distillation, and a direction for future research, would be consider how they correspond to another set developed independently.

A potential source of independent comparison might be from the field of Behavioural Operational Research that involves investigation of *"the role and impact of behavioural aspects related to the use of OR to support problem solving and decision making"* (Franco & Hamalainen, 2016, p. 791). This field of research that is expanding at a rapid rate (White, 2016) and offers the potential to identify causal conditions from detailed examination of the micro-processes within workshops by analysing recordings in the context of supporting theories such as activity theory (White, Burger, & Yearworth, 2016). This mode of discovery is quite different to that used by the ten papers considered here which primarily exploited cross-sectional evaluation after the event.

The other obvious angle for critique, is to observe that four cases does not make for much discriminating power. Whilst I accept that more cases would have been better, I would observe that the variety in methods deployed, coupled with the variety in outcomes, enabled me to draw some clear logical inferences for what enables anticipatory action, even if tentative. A clear direction for future research then is to expand the number of cases to test these tentative inferences and or generate new ones. In particular, there appears to be potential for research collaboration with researchers drawn from the Anticipation community that have declared *"identifying what structures and processes are necessary for anticipatory action"* (Poli, 2014) to be an important research objective.

The challenge of overcoming organisational inertia has been recognised in the change management literature for some time (Hannan & Freeman, 1984; D. Kelly & Amburgey, 1991), there has been relatively little written on how it can be overcome, with two notable exceptions. In the first

of these, Dutton and Duncan (1987) identified three critical events in the creation of momentum for change: activation, assessments of urgency and assessments of feasibility. In the second, Schein (1996) identified a very similar set of three processes of unfreezing: Disconfirming the status quo (where key information leads to dissatisfaction in current conditions); Inducing survival anxiety and/or guilt (where stakeholders respectively either fear organisational failure or fear not achieving organisational goals); and Overcoming learning anxiety (where stakeholders build confidence that there is another viable way to succeed).

I map the method factors that I identified through literature review as potentially important for taking anticipatory action against these three processes in Table 8.1. It is interesting to note that the majority of these factors map to at least one of these processes. The exceptions are 'M6. Manage process (and content)' that whilst could be considered to be important enabler is unlikely to be considered to be an effector and 'M7. Ensure procedural justice' that was neither identified as necessary nor sufficient in my QCA analysis. It is also interesting to note that one of the two factors identified through QCA as being necessary for initiating anticipatory action is the only one to map to more than one of the unfreezing processes. Whilst these results are far from conclusive, they do offer some support to the tentative conclusions from the QCA analysis.

Processes for unfreezing			
Dutton and Duncan (1987)	Activation,	Establish urgency	Establish feasibility
Schein (1996)	Disconfirming the status quo	Inducing survival anxiety and/or guilt	Overcoming learning anxiety
M2. Facilitate participation	X		X
M11. Agree the issue(s)		X	
M1. Apply appropriate methods	X		
M3. Structure multiple perspectives	X		
M4. Enable systemic thinking	X		
M6. Manage process (and content)			
M8. Create boundary object		X	
M9. Support thinking differently	X		
M10. Strengthen inter-relationships			X
M12. Achieve accommodations			X
M13. Identify actions			X
M5. Enhance mutual understanding	X		
M7. Ensure procedural justice			

Table 8.1 – Mapping method causal factors against processes for unfreezing

8.4   RQ3: How can organisational health monitoring sustain anticipatory behaviour?

Internal monitoring has been identified as a key functionality for sustained performance via anticipatory behaviour – both for High Reliability Organisations (Roberts, 1990a; Weick et al., 1999) and as per the concept of Resilience Engineering (Hollnagel, 2013; Hollnagel et al., 2007). In Chapter 7, I used longitudinal evaluation in the areas of Infrastructure and Acquisition to theorise how the monitoring respectively was not / was able to engage key stakeholders to affect such behaviour. With reference to Actor Network Theory (Callon, 1986; White, 2009), I found that I found that for organisational health monitoring to sustain anticipatory behaviour it needs to (a) Identify risks that need to be addressed (so achieving problematisation) and (b) Convince immediate stakeholders that they have roles to play in addressing risks (so achieving interessment and enrolment) and (c) Convince wider stakeholders that resolving risks should have their support (so achieving mobilisation of allies).

The most obvious critique of my findings here is again that they are based on a small number of cases and this this number is even less than for RQ2 because only two longitudinal evaluations were undertaken. As per RQ2 I would observe that the variety in approach taken and in outcomes achieved made this a rich environment for conducting an evaluation into what worked and what did not (albeit once each) over a period of years. Longitudinal evaluations have benefits both for researchers and for participants. For researchers, such evaluations can reveal the blockers and enablers for long term impact that follow from their initial work. For participants, such evaluations provide a useful stimulus to revisit original issues, reflect and perhaps reinvigorate or at least maintain momentum. Both types of benefits were realized in this case.

I would also observe that the excellent access afforded to stakeholders involved in the change processes also made for excellent opportunities to engage and co-theorise with multiple viewpoints. In fact, since conducting this Realistic Evaluation I have worked with the sponsor for Acquisition System Health to take the evaluation up a level to consider whether his monitoring approach could be considered to have brought about 'mindful organising' associated with High Reliability Organisations. The results of this evaluation – see Table 8.2 – show that introducing monitoring had a high impact on: Preoccupation with failure; Reluctance to simplify interpretations; and Sensitivity to operations.

Processes of Mindful Organising	Acquisition System Health Monitoring
1. Preoccupation with failure	**High Impact** – Explicitly linking health monitoring to the Acquisition System Reform Risk Register helped to ensure exploitation and to promote the need for action across the portfolio of activities.
2. Reluctance to simplify interpretations	**High Impact** – Working through the findings from the health monitoring first with the Acquisition System Stakeholder Group and then with the Acquisition System Working Group helped to interpret them and ensure that appropriate treatment actions were implemented.
3. Sensitivity to operations	**High Impact** – Reporting on health alongside performance helped to surface weaker signals that would not otherwise have been brought to senior leader attention and also provided insights on the cause of performance symptoms.
4. Commitment to resilience	**Medium Impact** – The 6-month periodicity of assessments helped to ensure progress on treatment actions when they might otherwise have lapsed.
5. Under-specification of structures	**Low Impact –** No detectable impact was observed

Table 8.2 –Acquisition System Health Monitoring for Mindful Organising

In terms of future research direction, the impact of introducing information systems on an organisation's resilience been identified as a key area for research (Annarelli & Nonino, 2015). In particular, it has been highlighted that the introduction of enterprise systems that enable the integration and exchange of data between various departments within an organisation can facilitate enhanced organisational control through centralisation of knowledge (Ignatiadis & Nandhakumar, 2007). These researchers note that this can have both positive effects (e.g. avoidance of harmful organisational drift) and negative effects (e.g. increase power differentials between the centre and the edge of the organisation which can lead to increased rigidity).

Other researchers have highlighted that technology facilitates control in three ways: by empowering decision making structures, by monitoring implementation activities and by formalizing expected behaviour (Finnegan & Longaigh, 2002). The key then for implementing and leveraging information systems in support of organisational resilience is to balance the tension between centralised control and decentralised action, much as in the ways envisaged by the VSM. In the VSM information is passed up from the operational units to the meta-system in order to inform pan-organisational

strategising and planning, and the meta-system shares this fused picture back with the operational units. The operational units share information willingly because they recognise the need to contribute to – and benefit from – a bigger picture and because the meta-system takes care to ensure that their agency in any subsequent decision making processes.

8.5   RQ4: What should practitioners be doing when using the Viable Systems Model?

The VSM (Beer, 1979, 1981, 1985) provides a powerful framework to aid the design and diagnosis of organisations that has been used in a wide variety of organisational settings. However, it is a model not a method or methodology and one that is notoriously difficult for non-experts to access. In Chapter 7 I combined a detailed literature review of key VSM texts together with access to case study accounts to develop a set of constitutive rules (including an explicit epistemology) to guide, and support reflection upon, VSM practice.

This work was initiated in response to a challenge that I received at a conference where I was briefing the Infrastructure work. The challenge related to my adaptation of VSM into a simpler four layer model (combining S2, S3 and S3* under the heading of operational management). As described in Chapter 4, I had identified and resolved to address the question of "How far it is possible to adapt VSM before the links with underpinning cybernetic theory are broken such that the results are no longer valid?". The problem was that I had no basis for assessing how far I had departed from the classic form of VSM.

My research[34] then addressed a gap in the knowledge base about the constitutive rules that underpin VSM practice. In particular, my presentation of the explicit epistemology for the VSM as a performative model provided a means for assessing the specificity of a particular intervention being considered as a VSM engagement and so solved my problem. My development of a scoring schema at the 'leaf nodes' to evidence the alignment of each aspect of my practice against VSM principles as interval numbers enabled the propagation of that evidence up the HPM into an overall figure of merit.

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[34] It should be noted that this research and the associated reflection was developed in a close working relationship with Professor Mike Yearworth and to a lesser extent Dr. Angela Espinosa, and that much of the material presented here is taken from my paper that is currently in review (Lowe et al., In review)

When used as a reflective device in this way, the HPM provides support to the practitioner in identifying methodological learning points. But whilst this figure of merit provides a means to summarise the degree of alignment, the main reflective value comes from using these summary measures to seek out the reasons for variances across practice, including down to the assessment of performance at the 'leaf nodes'. The potential to use the HPM to facilitate methodological learning across the practice of multiple practitioners is an exciting direction for future research. This potential for methodological learning might even be sufficient to build a community of practice.

When used as a pedagogic device, the HPM provides a hand-rail to guide a practitioner, especially those new to VSM, in the design of their method to match the specifics of their real world situation and so make for more rigorous use of the VSM. Whilst the potential for such a pedagogic device to aid expert practitioners in their application of VSM is assessed to be limited (and perhaps even some might find it to be an oversimplification of Beer's writings), the potential for this to provide scripts to encourage novice practitioners (Tavella & Papadopoulos, 2015) to apply VSM is assessed to be significant. The way in which this encouragement for novice practitioners could act to broaden the use of VSM – perhaps even to mainstream the use of VSM – in a world that is faced with ever–increasingly wicked problems that demand systemic solutions is exciting.

When used as a diagnostic device the HPM provides a means to evaluate the viability of the system in focus by assessing the organisation at each leaf node in the structure, including by blending different data types (e.g. workshop judgements, survey results, management information). The potential here is that this approach can be used to more precisely assess organisational diagnostic archetypes as Beer and others have suggested (Espinosa & Walker, 2017, pp. 485-492). This new direction also appears worthy of further research.

8.6   Reflecting upon the quality of my Action Research

In Chapter 3, I described 12 contentions that *"suggest some of the standards to which action research might aspire"* (Eden & Huxham, 2002, p. 76). I now revisit these to reflect upon the quality of the Action Research that I have conducted by evidencing which contentions I assess to be either TRUE, PARTIALLY TRUE or FALSE:

(i) AR must have implications beyond those required for action or generating knowledge in the immediate domain of the project (TRUE) – The research questions that I have addressed have broad methodological implications for the assessing organisational health that extend beyond the immediate domain of the UK MOD. This knowledge generated includes how systems methodologies can be applied to assess organisational health, how organisational health assessments can be used to initiate anticipatory action and how organisational health monitoring can be used to sustain anticipatory behaviour.

(ii) AR delivers both research and action outcomes (TRUE) – In addition to delivering the research outcomes described immediately above against contention (i), my work has also guided action taken by MOD to improve its ability to Enable (with regard to Infrastructure), Acquire and Operate. Whilst my work failed to guide action to improve how MOD Directs its internal operations, this failure proved critical to identifying key success factors for my research agenda.

(iii) AR demands an explicit concern with theory (TRUE) – I have leveraged existing theory to examine how organisational health assessments can be used to initiate anticipatory action (RQ2) and how organisational health monitoring can be used to sustain anticipatory behaviour (RQ3). For RQ2, I used QCA to identify the necessary and sufficient set of problem-structuring method factors initiating anticipatory action in contexts where there is agreed purpose, agreed participants and a commitment to work together. For RQ3, I used Realistic Evaluation to develop and test hypotheses based on Actor Network Theory for the conditions that must be achieved if anticipatory behaviour is to be sustained.

(iv) AR generates emergent theory (TRUE) – In addition to the deductive testing of existing theory described against contention (iii), I also worked inductively to generate theory from data. In particular, for RQ1 I theorised that systems methodologies bring four key affordances that make them well-suited to assessing organisational health. These affordances comprise: (1) Providing an overarching methodology for boundary setting and mixing methods; (2) Guiding inquiry to ensure comprehensive assessment; (3) Bringing multiple stakeholder perspectives together to achieve accommodation(s); and (4) Visualising assessment results in ways that accurately represent the complexity of the situation.

(v) AR builds theory incrementally (PARTIALLY TRUE) – Whilst I have developed generalisable theories for RQ1, RQ2 and RQ3 across four case studies in small steps, I assess that there have been insufficient steps to refer to this as 'general theory'. In particular, my theories have not been tested and refined in more than one operational context.

(vi) AR produces descriptive theory that is useful for practical applications (TRUE) – I have taken care to ensure that my work produces descriptive findings that other practitioners can make use of by transferring them to their operational contexts. I have communicated these findings clearly in this thesis, numerous conference presentations and at least one journal publication.

(vii) AR generates insights through reflection (TRUE) – I adopted a high degree of method and orderliness in my research to ensure that my findings can be understood and recognised by others to be rigorous. In particular, through this thesis I have highlighted how reflection has generated 24 key methodological observations, built up incrementally over four separate episodes of engagement.

(viii) AR processes must be replicable or at least demonstrable to others (TRUE) – I have taken care to produce detailed case study descriptions of my core action research in Chapters 4, 5 and 6 that describes my data collection clearly and in detail. I have also taken care to describe the evaluations methods by which I have explored this data to yield answers to the three research questions that comprise my thesis action research in Chapter 7.

(ix) AR can be considered to be internally valid if contentions (i) – (viii) are satisfied (TRUE) – Based on the evidence presented above, I asses my research to be internally valid. I now consider the below criteria necessary for external validity (x) – (xii).

(x) AR use should be justified by focusing on the aspects that other research strategies cannot address (TRUE) – In Chapter 3 I justified my selection of Action Research as the most appropriate research methodology based upon how well it aligned with: (1) my research questions that I developed in Chapter 2 to be relevant to both academic and practitioner audiences; (2) my practice situation where I was required to guide intervention and to conduct research; (3) my episodic research processes where I was constrained to working on bounded projects for specific customers; and (4) my participative approach to practice and research where I worked with

customers and their stakeholders to agree the work and reflect on the efficacy and effectiveness through evaluations.

(xi) AR should make use of opportunities for triangulation (TRUE) – My participative approach to evaluation brought a large degree of triangulation through the way that I involved other practitioners, customers, stakeholders and, on one occasion, my supervisor, in evaluating the phases of core action research. In particular, for RQ3 I jointly developed and tested hypotheses with those customers and stakeholders involved in making repeated assessments of organisational health in a process of monitoring. Whilst this was necessary given my lack of access to longitudinal data, it also afforded important opportunities to create a dialectic for the development of theory.

(xii) AR findings should only be transferred to other settings after careful consideration of contextual factors (PARTIALLY TRUE) – Whilst in Chapter 8 I have put forward that my methodological findings in response to RQ1, RQ2 and RQ3 are likely to be broadly transferrable to any large complex organisation, I have not conducted organisational health assessments in other settings to determine if there is something specific to the history and context of the UK MOD that limits how widely applicable the findings may be.

From the above assessment against the 12 contentions I find that I have conducted Action Research that is both internally and externally valid. Whilst this is a very reassuring finding, it is not surprising. This is because I took care to plan and conduct my Action Research with these and other quality criteria (Checkland & Holwell, 1998) in mind.

8.7   Summary

In this chapter I have reflected on my research process and findings to critique the various strengths and limitations, to highlight the methodological learning transferrable to other situations, and to identify the potential for further research to address particular challenges. With regard to this last point the following recommendations are made for future research:

a.   Trial the generic health assessment method developed in Chapter 6 against existing methods (e.g McKinsey's Organisational Health Index) in a new setting;

b.   Investigate how technology can assist in scaling organisational assessment methods for application to large organisations (e.g. facilitate different place, different time working);

c.   Compare and contrast the causal conditions identified for how organisational health assessment can trigger anticipatory action against insights generated through Behavioural Operational Research;

d.   Expand the QCA analysis of causal conditions for anticipatory action to include more cases via the Anticipation research community;

e.   Conduct a detailed case study of how the information generated by the Acquisition Systems Health initiative was used to aid organizational resilience; and

f.   Establish a VSM Community of Practice centred on methodological learning, derived from using the HPM formulation of the VSM epistemology to compare across a variety of practice.

Chapter 9 – Summarising my research findings

9.1   Introduction

The aim of this chapter is to summarise the major academic contributions from my research. These contributions comprise: (1) Establishing how organisational health should be conceptualised; (2) Demonstrating how system methodologies can be used to assess organisational health; (3) Investigating how organisational health assessments can initiate anticipatory action; (4) Theorising how organisational health monitoring can sustain anticipatory change; and (5) Guiding what practitioners should be doing when using the Viable System Model. The aim of this chapter is also to summarise my recommendations for further research.

9.2   Establishing how organisational health should be conceptualised

Whilst organisational health is a growing area of interest of management science and practice, there is little in the way of consensus for how it should be conceptualised and defined. In Chapter 2, I presented a comprehensive literature review going back more than 70 years to trace the developments in thinking over this period and to propose my own conceptualisation. This conceptualisation has that a healthy organisation is one that is able achieve both high levels of performance in the here and now and high levels of adaptability to perform in the future. Notably this theoretically-grounded conceptualisation rebuts much of what is being marketed by consultancy firms that has performance and health being orthogonal.

In Chapter 6, I developed my conceptualisation to yield a generic constitutive definition for what makes for a healthy organisation in four key areas of Identity, Management, Resources and Adaptability. This development was achieved by bringing together important systems theories on viability and anticipation with assessment methods based upon empirical evidence. This definition is expressed as a 20–component hierarchical process model supported by a set of 75 indicators. It was tested in two different areas of MOD and found to provide a comprehensive basis for assessment. The model is widely transferrable to other contexts and is designed to scale to organisations of any size.

9.3   Demonstrating how system methods can be used to assess organisational health

In Chapters 4, 5 and 6 I provided four detailed accounts for how system methodologies have been applied to assess organisational health in Infrastructure, Acquisition, PJHQ and Head Office. These accounts are valuable contributions in themselves because they provide rare, highly-detailed and unsanitised chronological descriptions of real–world practice (Ormerod, 2014). These accounts also provide empirical evidence for how hard and soft systems methodologies can be mixed to support multi-organisational collaborative working – key challenges identified for problem structuring research and practice (Ackermann et al., 2014).

In Chapter 7, I went further to identify methodological lessons generalisable to other organisational health assessment approaches by evaluating across each of the four accounts using an established framework for evaluating systemic problem structuring methods (Midgley et al., 2013). In particular I found Systemic Intervention with its tri-focus on boundary critique, methodological pluralism and action for improvement to provide a necessary and sufficient framework to make assessments. In matching assessments to specific situations (i.e. for the Infrastructure and Acquisition systems) I found the blending of Viable System Model (VSM) with Hierarchical Process Modelling (HPM) in bespoke problem structuring methods to be highly effective. In developing a generic assessment method that can be applied to any situation (i.e. for the Defence Enterprise) I found the VSM to be helpful in providing a theoretical basis for the high-level structure that was used to arrange the factors found to be important empirically in a range of sectors. In applying a generic assessment method (i.e. for PJHQ and for Head Office) I found data collection via stakeholder engagement to be the critical factor in determining success.

9.4   Investigating how organisational health assessments can initiate anticipatory action

The use of models at the heart of anticipatory systems that can take pre-emptive action in advance of issues that threaten their survival (R. Rosen, 2012). My research has investigated the structures and processes needed to translate organisational health assessments into anticipatory action as per the research challenge identified by Poli (2014). In Chapter 7 I identified a number of factors that could contribute positively to the initiation of anticipatory action based on an assessment of organisational

health. I followed a Quantitative Comparative Analysis (Ragin, 1987) approach in firstly assessing the presence/absence of these factors for each of the Infrastructure, Acquisition, PJHQ and Head Office cases and secondly applying logical inference to draw three main conclusions.

First, for the cases under consideration, I concluded that if it is not possible to facilitate high levels of participation and reach agreement on the issues to be necessary factors then anticipatory action will not be initiated. Second, again for the cases under consideration, I concluded that if a further nine factors could be achieved then anticipatory action will be initiated. These nine further success factors comprised: applying appropriate methods; structuring multiple perspectives; enabling systemic thinking; managing process in addition to content; creating an effective boundary object; and support a change in thinking, strengthening inter-relationships; achieving accommodations; and identifying actions. Third, I concluded that these heuristics are likely to transfer to other contexts where there is agreement on the purpose of the assessment, participants are readily identifiable and there is a commitment for them to work together.

9.5 Theorising how organisational health monitoring can sustain anticipatory behaviour

The term organisational health monitoring refers to the act of repeatedly assessing organisational health, if not continuously then at a frequency sufficient to sustain anticipatory change. Whilst the ability to conduct such monitoring has been identified as a key functionality for sustained performance via anticipatory behaviour – both for High Reliability Organisations (Roberts, 1990a; Weick et al., 1999) and as per the concept of Resilience Engineering (Hollnagel, 2013; Hollnagel et al., 2007) it is not clear is how such monitoring should be designed to affect such behaviour. My research has used a Realistic Evaluation approach to theorise how organisational health can sustain anticipatory behaviour over time via longitudinal interviews conducted with Acquisition and Infrastructure stakeholders.

In Chapter 7, I described how I leveraged Actor Network Theory (Callon, 1986; White, 2009) to develop three hypotheses with stakeholders to explain why the monitoring for Acquisition System Health succeeded in sustaining anticipatory behaviour, whilst the monitoring for Defence Infrastructure Maturity did not. I found that for organisational health monitoring to sustain anticipatory behaviour it needs to (a) Identify risks that need to be addressed (so achieving problematisation) and (b) Convince

immediate stakeholders that they have roles to play in addressing risks (so achieving interessment and enrolment) and (c) Convince wider stakeholders that resolving risks should have their support (so achieving mobilisation of allies). These conclusions make a contribution to understanding the impact of introducing information systems on an organisation's resilience – a key research challenge identified by Annarelli and Nonino (2015) in their systemic literature review of organisational resilience.

9.6 Guiding what practitioners should be doing when using the Viable System Model

The VSM (Beer, 1979, 1981, 1985) provides a powerful framework to aid the design and diagnosis of organisations to survive and thrive in complex operating environments. However, the cognitive accessibility of VSM as a modelling approach presents a significant barrier to application and appears to have limited its use to a small number of academics and practitioners who have dedicated themselves to study it in detail. In Chapter 7, I developed a set of constitutive rules – including an explicit epistemology – to guide the generation of knowledge via the application of the VSM by non-experts and so broaden the accessibility of this important model.

The epistemology is expressed as a performative model and I applied this model retrospectively to my own novice use of VSM when assessing the health of the Infrastructure system in Chapter 4. It proved to be a helpful aid for personal reflection – for both myself and another VSM practitioner – and offers the potential to provide a common framework to compare and contrast practice across the VSM community. Of course the utility of this model is not limited to retrospective checking on the rigour of VSM use, it can also be deployed as an aid for designing VSM approaches in order to help novice practitioners to make rigorous use of the VSM theory in real world settings.

9.7 Identifying areas for further research

In Chapter 8 I identified six areas for further research: (a) Trial the generic health assessment method developed in Chapter 6 against existing methods (e.g. McKinsey's Organisational Health Index) in a new setting; (b) Investigate how technology can assist in scaling organisational assessment methods for application to large organisations (e.g. facilitate different place, different time working); (c) Compare and contrast the causal conditions identified for how organisational health assessment can

trigger anticipatory action against insights generated through Behavioural Operational Research; (d) Expand the QCA analysis of causal conditions for anticipatory action to include more cases via the Anticipation research community; (e) Conduct a detailed case study of how the information generated by the Acquisition Systems Health initiative was used to aid organizational resilience; and (f) Establish a VSM Community of Practice centred on methodological learning, derived from using the HPM formulation of the VSM epistemology to compare across a variety of practice. Of these, I would highlight (b) as having the most potential for impact by not only enabling the assessment of organisational health at scale but also for extending the reach of problem structuring methods into contexts where it proves impossible to gather the necessary stakeholders together into the same room at the same time.

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Appendix 4–1: Closed questions for assessing Defence Infrastructure Systems (Mar 2014)

Organisational Element/Interface	Question	Yes	Do not Know	No
Function 1 - Defence Enterprise Operational Management				
1.1 Defence Enterprise Operational Management				
1.1.1	Does a robust process exist to translate 'Defence Strategy' into 'Delivery Direction' (e.g. programming to deliver against external and internal requirements)?	🟩		🟥
1.1.2	Is 'Delivery Direction' to Infra DLoD coherent with external strategic requirements? What mechanisms are in place to ensure coherence?	🟩		🟥
1.1.3	Is 'Delivery Direction' to Infra DLoD coherent with internal strategic requirements? What mechanisms are in place to ensure coherence?	🟩		🟥
1.1.4	Is 'Delivery Direction' coherent across the 'Enterprise'? What mechanisms are in place to ensure coherence?	🟩		🟥
1.1.5	Are clear and measureable success factors set for Infra DLoD that are clearly linked to 'Defence Strategy' success factors?	🟩		🟥
1.1.6	Are appropriate delegations / limits of autonomy set for Infra DLoD?	🟩		🟥
1.1.7	Is autonomy optimised across delivery units? Are limits of autonomy set to ensure that a single delivery unit of the 'Defence Enterprise' cannot threaten the survival of the 'Defence Enterprise' as a whole?	🟩		🟥
1.1.8	Are appropriate mechanisms in place for decision making by 'Defence Enterprise Operational Management'?	🟩		🟥
1.1.9	Are appropriate mechanisms in place to allocate resources to each delivery unit of the 'Defence Enterprise'?	🟩		🟥
1.1.10	Are appropriate mechanisms in place to manage risk across the 'Defence Enterprise'? Are these mechanisms informed by appropriate MI from delivery units?	🟩		🟥
1.1.11	Does the 'Defence Enterprise Operational Management' body possess the people, skills, information, process, ways of working, infrastructure to operate effectively?	🟩		🟥
1.1.12	Is the 'Defence Enterprise Operational Management' body appropriately incentivised to encourage positive behaviours and drive efficiencies?	🟩		🟥
1.2 Linking Defence Enterprise Operational Management to Defence Enterprise Delivery Units				
1.2.1	Does the 'Defence Enterprise Operational Management' body communicate effectively with the Infra DLoD and other delivery units (e.g. 'Delivery Direction', success factors, limits of autonomy, etc.)?	🟩		🟥
1.2.2	Are there mechanisms in place to allow the Infra DLoD and other delivery units to feedback to the 'Defence Enterprise Organisational Management' body?	🟩		🟥
1.2.3	Is the 'Defence Enterprise Operational Management' body provided with appropriate inputs to support the formulation of effective 'Delivery Direction'?	🟩		🟥
1.2.4	Is the 'Defence Enterprise Operational Management' body provided with appropriate inputs to allow tracking and management of delivery, including against 'Defence Strategy' success factors?	🟩		🟥
1.3 Defence Enterprise Delivery Coherence		🟩		
1.3.1	Is there clarity over the purpose of Infra DLoD and other 'Defence Enterprise' delivery units?	🟩		🟥
1.3.2	Are interfaces between Infra DLoD and other delivery units clearly articulated and understood?	🟩		🟥
1.3.3	Are appropriate mechanisms (e.g. common processes, practices, standards and controls) in place to ensure coherence across 'Defence Enterprise' delivery units for all relevant facets of business (e.g. operational delivery, SHEF, quality, commercial practice, financial practice, HR practice, conflict resolution)?	🟩		🟥
1.3.4	Are these coherence mechanisms communicated effectively to the Infra DLOD and other 'Defence Enterprise' delivery units?	🟩		🟥

Organisational Element/Interface	Question	Yes	Do not Know	No
1.3.5	Are there clear, well understood and accessible routes for Infra DLoD and other 'Defence Enterprise' delivery units to feedback on the implementation of these coherence mechanisms?	🟩		🟥
1.3.6	Does the 'Defence Enterprise Delivery Coherence' body possess the people, skills, information, process, ways of working, infrastructure to operate effectively?	🟩		🟥
1.3.7	Is the 'Defence Enterprise Delivery Coherence' body appropriately incentivised to encourage positive behaviours and drive efficiencies?	🟩		🟥
1.4 Defence Enterprise Audit and Assurance				
1.4.1	Are mechanisms in place to ensure the compliance of the 'Infra DLoD and other 'Defence Enterprise' delivery units with process, practice, standards, controls and delegated authorities?	🟩		🟥
1.4.2	Are these compliance mechanisms communicated effectively to Infra DLoD and other 'Defence Enterprise' delivery units?	🟩		🟥
1.4.3	Are there clear, well understood and accessible routes for Infra DLOD and other 'Defence Enterprise' delivery units to feedback on the implementation of these compliance mechanisms?	🟩		🟥
1.4.4	Are assurance and audit activities prioritised against their contribution to strategic benefits, 'Defence Strategy' and 'Defence Delivery' success factors and against 'Defence Enterprise' risk?	🟩		🟥
1.4.5	Are other healthchecks in place across 'Defence Enterprise' delivery units (e.g. to assess employee engagement, safety culture, quality culture)?	🟩		🟥
1.4.6	Does the 'Defence Enterprise Audit and Assurance' body possess the people, skills, information, process, ways of working, infrastructure to operate effectively?	🟩		🟥
1.4.7	Is the 'Defence Enterprise Audit & Assurance' body appropriately incentivised to encourage positive behaviours and drive efficiencies?	🟩		🟥
Function 2 - Strategic Leadership				
2.1 Infra DLoD Strategic Leadership				
2.1.1	Does the 'Infra DLoD Strategic Leadership' set a clear scope, vision, purpose for the Infra DLoD system and clearly articulate strategic benefits?	🟩		🟥
2.1.2	Does the 'Infra DLoD Strategic Leadership' communicate scope, vision, purpose and strategic benefits effectively?	🟩		🟥
2.1.3	Is the 'Infra DLoD Strategic Leadership' provided with appropriate support (MI etc.) to allow tracking of the achievement of strategic benefits?	🟩		🟥
2.1.4	Is 'Infra DLoD Strategic Leadership' decision making focused on achieving strategic benefit?	🟩		🟥
2.1.5	Is the 'Infra DLoD Strategic Leadership' provided with appropriate support (MI etc.) to support effective decision making?	🟩		🟥
2.1.6	Does the 'Infra DLoD Strategic Leadership' employ effective risk management practice, informed by appropriate MI from the Infra DLoD system?	🟩		🟥
2.1.7	Are there appropriate mechanisms in place to allow the Infra DLoD system to feedback to the 'Infra DLoD Strategic Leadership' body?	🟩		🟥
2.1.8	Does the 'Infra DLoD Strategic Leadership' possess the people, skills, information, process, ways of working, infrastructure to operate effectively?	🟩		🟥
2.1.9	Is the 'Infra DLoD Strategic Leadership' appropriately incentivised to encourage positive behaviours and drive efficiencies?	🟩		🟥
Function 3 - Strategy Formulation				
3.1 Linking Infra DLoD Strategy to Infra DLoD Customers				
3.1.1	Does the 'Infra DLoD Strategy' body possess a clear understanding of the external environment at a strategic level, including identification of key strategic stakeholders?	🟩		🟥
3.1.2	Does the 'Infra DLOD Strategy' body have clear and stable mechanisms in place to interface with and influence key strategic stakeholders?	🟩		🟥
3.1.3	Is there a clear mechanism for provision of strategic 'Customer' requirements into the 'Infra DLoD Strategy' body?	🟩		🟥

Organisational Element/Interface	Question	Yes	Do not Know	No
3.1.4	Are 'Customers' able to effectively articulate and prioritise those strategic requirements against which they wish the Infra DLoD system to deliver?	🟩		🟥
3.1.5	Do the 'Customers' possess the people, skills, information, ways of working, infrastructure to effectively articulate and prioritise infrastructure requirements?	🟩		🟥
3.1.6	Are the 'Customers' appropriately incentivised to encourage positive behaviours and drive efficiencies?	🟩		🟥
3.2 Infra DLoD Strategy Development				
3.2.1	Is strategy formulation comprehensive (addressing delivery, people, capability, enablers)?	🟩		🟥
3.2.2	Is strategy coherent with itself (long-term vs short term, delivery vs resource, national vs regional etc.)? What mechanisms are in place to ensure coherence?	🟩		🟥
3.2.3	Is strategy coherent with 'Infra DLoD Strategic Leadership'-set strategic benefits? What mechanisms are in place to ensure coherence?	🟩		🟥
3.2.4	Is strategy coherent with strategic Customer/User requirements? What mechanisms are in place to ensure coherence?	🟩		🟥
3.2.5	Are clear and measureable success factors identified that link to the 'Strategic Benefits' identified by the 'Infra DLoD Strategic Leadership'?	🟩		🟥
3.2.6	Does the 'Infra DLoD Strategy' body possess the people, skills, information, ways of working, infrastructure to operate effectively?	🟩		🟥
3.2.7	Is the 'Infra DLoD Strategy' body appropriately incentivised to encourage positive behaviours and drive efficiencies?	🟩		🟥
3.3 Linking Infra DLoD Strategy to Infra DLoD Operational Management				
3.3.1	Does the 'Infra DLoD Strategy' body communicate effectively with the 'Infra DLoD Operational Management' body?	🟩		🟥
3.3.2	Are there mechanisms in place to allow the 'Infra DLoD Operational Management' body to feedback to the 'Infra DLoD Strategy' body?	🟩		🟥
3.3.3	Is the 'Infra DLoD Strategy' body provided with appropriate support (MI etc.) to support effective strategy formulation?	🟩		🟥
3.3.4	Is 'Infra DLoD Strategy' body provided with appropriate support (MI etc.) to allow tracking of the implementation of strategy, including against success factors?	🟩		🟥
Function 4 - Operational Management				
4.1 Infra DLoD Operational Management				
4.1.1	Does robust process exist to translate 'Strategy' into 'Programme' (e.g. programming to deliver against customer and internal requirements)?	🟩		🟥
4.1.2	Are 'Programme' plans coherent with external strategic requirements? What mechanisms are in place to ensure coherence?	🟩		🟥
4.1.3	Are 'Programme' plans coherent with internal strategy requirements? What mechanisms are in place to ensure coherence?	🟩		🟥
4.1.4	Are 'Programme' plans coherent with themselves (e.g. customer delivery programmes vs internal change programmes)? What mechanisms are in place to ensure coherence?	🟩		🟥
4.1.5	Do clear and measureable 'Programme' success factors exist that are clearly linked to 'Infra DLoD Strategy' success factors?	🟩		🟥
4.1.6	Are appropriate delegations / limits of autonomy set for each 'Project' delivery unit?	🟩		🟥
4.1.7	Is autonomy optimised? Are limits of autonomy set to ensure that a single 'Project' delivery unit cannot threaten the survival of the Infra DLoD system as a whole?	🟩		🟥
4.1.8	Are appropriate mechanisms in place for decision making by the 'DIO Operational Management' body?	🟩		🟥
4.1.9	Are appropriate mechanisms in place to allocate resources to each 'Project' delivery unit?	🟩		🟥

Organisational Element/Interface	Question	Yes	Do not Know	No
4.1.10	Are appropriate mechanisms in place to manage risk across the 'Programme'? Are these mechanisms informed by appropriate MI from 'Project' delivery units?	🟩		🟥
4.1.11	Does the 'Infra DLoD Operational Management' body possess the people, skills, information, process, ways of working, infrastructure to operate effectively?	🟩		🟥
4.1.12	Is the 'Infra DLoD Operational Management' body appropriately incentivised to encourage positive behaviours and drive efficiencies?	🟩		🟥
4.2 Linking Infra DLoD Operational Management to Infra DLoD Project Delivery				
4.2.1	Does the 'Infra DLoD Operational Management' body communicate effectively with each 'Project' delivery unit ('Programme' plans, success factors, limits of autonomy, etc.)?	🟩		🟥
4.2.2	Are there mechanisms in place to allow 'Project' delivery units to feedback to the 'Infra DLoD Organisational Management' body?	🟩		🟥
4.2.3	Is the 'Infra DLoD Operational Management' body provided with appropriate inputs (MI etc.) to support effective 'Programme' formulation (delivery/internal change)?	🟩		🟥
4.2.4	Is the 'Infra DLoD Operational Management' body provided with appropriate inputs (MI etc.) to allow tracking and management of 'Programme' delivery, including against 'Programme' success factors?	🟩		🟥
4.3 Infra DLoD Delivery Coherence				
4.3.1	Is there clarity over the purpose of each 'Project' delivery unit?	🟩		🟥
4.3.2	Are interfaces between each 'Project' delivery' unit clearly articulated and understood?	🟩		🟥
4.3.3	Are appropriate mechanisms (e.g. common processes, practices, standards and controls) in place to ensure coherence across 'Project' delivery units for all relevant facets of business (e.g. operational delivery, SHEF, quality, commercial practice, financial practice, HR practice, conflict resolution)?	🟩		🟥
4.3.4	Are these coherence mechanisms communicated effectively to all 'Project' delivery units?	🟩		🟥
4.3.5	Are there clear, well understood and accessible routes for the 'Project' delivery units to feedback on the implementation of these coherence mechanisms?	🟩		🟥
4.3.6	Does the 'Infra DLoD Delivery Coherence' body possess the people, skills, information, process, ways of working, infrastructure to operate effectively?	🟩		🟥
4.3.7	Is the 'Infra DLoD Delivery Coherence' body appropriately incentivised to encourage positive behaviours and drive efficiencies?	🟩		🟥
4.4 Infra DLoD Delivery Audit and Assurance				
4.4.1	Are mechanisms in place to ensure the compliance of the 'Project' delivery units with process, practice, standards, controls and delegated authorities?	🟩		🟥
4.4.2	Are these compliance mechanisms communicated effectively to 'Project' delivery units?	🟩		🟥
4.4.3	Are there clear, well understood and accessible routes for 'Project' delivery units to feedback on the implementation of these compliance mechanisms?	🟩		🟥
4.4.4	Are assurance and audit activities prioritised against their contribution to strategic benefits, 'Strategy' and 'Programme' success factors, and against 'Infra DLoD' risk?	🟩		🟥
4.4.5	Are other healthchecks in place across 'Project' delivery units (e.g. to assess employee engagement, safety culture, quality culture)?	🟩		🟥
4.4.6	Does the 'Infra DLoD Audit and Assurance' body possess the people, skills, information, process, ways of working, infrastructure to operate effectively?	🟩		🟥
4.4.7	Is the 'Infra DLoD Audit & Assurance' body appropriately incentivised to encourage positive behaviours and drive efficiencies?	🟩		🟥
Function 5 - Project Delivery				
5.1 Infra DLoD Project Delivery				

Organisational Element/Interface	Question	Yes	Do not Know	No
5.1.1	Is each 'Project' delivery unit able to capture the MI necessary for effective local and 'Infra DLoD Operational Management' decision making, and to demonstrate compliance with mandated requirements?	🟩		🟥
5.1.2	Does each 'Project' delivery unit possess the people, skills, information, process, ways of working, infrastructure to operate effectively?	🟩		🟥
5.1.3	Is each 'Project; delivery unit appropriately incentivised to encourage positive behaviours and drive efficiencies?	🟩		🟥
5.2 Linking Infra DLoD Project Delivery with Infra DLoD Users and Infra DLoD Suppliers				
5.2.1	Does each 'Project' delivery unit understand the external environment at a delivery level, including understanding of all primary users and suppliers?	🟩		🟥
5.2.2	Are there appropriate mechanisms in place to build, interface and engage with all primary users and suppliers?	🟩		🟥
5.2.3	Does each 'Project' delivery unit have clear and stable relationships in place to manage all primary user and supplier relationships?	🟩		🟥
5.2.4	Is there a clear mechanism for each 'Project' delivery unit to deliver against 'User' requirements?	🟩		🟥
5.2.5	Is there a clear mechanism for 'Users' to provide feedback to 'Project' delivery units?	🟩		🟥

Appendix 4–2: Open questions for assessing Defence Infrastructure System (Jun 2014)

E3: Defence Enterprise Operational Management
E3.1.1 Setting Management Direction
How is management direction set?
Is management direction for Infrastructure compliant with internal and external strategic direction?
Is management direction for Infrastructure coherent with management direction for other elements of Defence Delivery Enterprise?
How is management direction communicated and received?
Are clear and measurable success factors set? Are they linked to 'Defence Strategy' success factors?
E3.1.2 Allocating resources
How are resources allocated to the Infrastructure Delivery System?
How are resources balanced across Defence Enterprise?
How are these allocations communicated and received?
E3.1.3 Setting incentives
How are incentives set?
How are these incentives communicated, received and embedded?
Do they encourage positive behaviours and cultures?
Do they drive efficiencies?
Are the incentives set for the Infrastructure Delivery System consistent with those set for other elements of Defence Enterprise?
E3.2 Managing Performance & Risk
How is performance tracked and managed? For the Infrastructure Delivery System? For the Defence Enterprise Delivery System as a whole?
How is risk assessed and managed? Does this include against 'Defence Strategy' success factors?
Is autonomy optimised for the Infrastructure Delivery System?
What mechanisms exist for decision-making outwith delegations?
E3.3 Assuring delivery coherence
What mechanisms exist to ensure coherent operations across the Defence Enterprise Delivery System?
Is there clarity of purpose for all elements of the Defence Enterprise Delivery System?

Are the interfaces between Infrastructure Delivery System and other elements of Defence Enterprise clearly articulated and understood?
E3.4 Assuring and auditing performance
What mechanisms exist to assure and audit the performance of the Infrastructure Delivery System? Are these mechanisms comprehensive? Are they effective?
Are these mechanisms compatible with what is in place for the other elements of the Defence Enterprise Delivery System?
Are audit and assurance activities prioritised against strategic benefit/risk?
S1: Infrastructure Strategic Leadership
S1.1 Setting Strategic Direction
How is Strategic Leadership for the Infrastructure Delivery System undertaken?
Is Strategic Leadership direction focused on achieving strategic benefit?
How are strategic benefits and risks identified?
Is a clear scope, vision and purpose set for the Infrastructure Delivery System?
How is strategic direction communicated?
S1.2 Setting Strategic Incentives
How are incentives set on the Infrastructure Delivery System?
What mechanisms are used?
Do they encourage positive behaviours and drive efficiencies?
Is incentivisation effective?
S1.3 Managing Strategic Performance and Risk
How are strategic benefits and risks tracked?
How are strategic benefits and risks managed?
How is it linked to strategic decision making?
Does the Infrastructure Strategic Leadership own or have access to appropriate levers to enable necessary action?
S2: Infrastructure Strategy Formulation
S2.1 Capturing Requirements
How does the Infrastructure Delivery System develop an understanding of the external environment at a strategic level, including identification of key strategic stakeholders?
Are there clear and stable mechanisms in place to interface with and influence key strategic stakeholders?

Is there a clear mechanism for strategic 'Customer' requirements to be communicated into the Infrastructure Delivery System?
S2.2 Prioritising Requirements
How do 'Customers' articulate and prioritise those strategic requirements against which they wish the Infrastructure Delivery System to deliver?
How does the Infrastructure Delivery System prioritise across all strategic customer requirements within constraints?
S2.3 Setting Strategy
How is Infrastructure Strategy set?
Are clear and measurable success factors set? Are they linked to Infrastructure strategic benefits?
Is strategy coherent with Infrastructure strategic benefits and risks? What coherence mechanisms are in place?
Is strategy coherent with itself? With strategic Customer requirements? Long-term vs short-term? National vs regional? Coherence mechanisms?
Is strategy comprehensive? Does it address delivery, people, capability, enablers?
S2.4 Monitoring Strategy Implementation
How is the implementation of Infrastructure Delivery System strategy tracked? Against Infrastructure and Defence strategic success factors?
S3: Infrastructure Operational Management
S3.1 Setting Management Direction
How is management direction set?
Is management direction compliant with local and wider strategic direction? Is it coherent across the Infrastructure Delivery System?
Are clear and measurable success factors set? Are they linked to 'Defence Strategy', MOD Centre and Infrastructure success factors?
How are resources balanced across and allocated to Infrastructure Op Delivery?
How does Infrastructure Operational Management incentivise Infrastructure Op Delivery to drive positive behaviours and efficiency?
S3.2 Managing Performance and Risk
How is Infrastructure Operational Delivery performance tracked and managed?
How is risk assessed and managed? Does this include against strategic Infrastructure and 'Defence Strategy' success factors?
Is autonomy optimised for Infrastructure Operational Delivery?
What mechanisms exist for decision-making outwith delegations?
S3.3 Assuring Delivery Coherence
What mechanisms exist to ensure coherent delivery across the Infrastructure Operational Delivery?

Is there clarity of purpose for all elements of Infrastructure Operational Delivery?
Are the interfaces between each element of Infrastructure Operational Delivery clearly articulated and understood?
S3.4 Assuring and Auditing Performance
What mechanisms exist to assure and audit the performance of Infrastructure Operational Delivery elements? Are these mechanisms comprehensive? Are they effective?
Are audit and assurance activities prioritised against Infrastructure and Defence strategic benefit/risk?
S4: Infrastructure Operational Delivery
S4.1 Understanding User Requirements
Does each delivery element (Programme, Project, Service) understand the external environment at a delivery level, including identification of all primary Users?
How does each delivery element manage User relationships? What mechanisms are used to build relationships, and interface and engage with Users? How do delivery elements incentivise and influence Users? What mechanisms are used to capture and respond to User requirements? Are clear and stable relationships in place for each primary User?
S4.2 Understanding Supplier Capabilities
Does each delivery element (Programme, Project, Service) understand the external environment at a delivery level, including identification and understanding of current and potential suppliers?
How does each delivery element manage supplier relationships? What mechanisms are used to build relationships, and interface and engage with current and potential suppliers? How do delivery elements incentivise and influence suppliers? Are clear and stable relationships in place for each primary supplier?
S4.3 Delivering Projects and Services
Are there clear mechanisms in place for each delivery element (Programme, Project, Service) to deliver against 'User' requirements?
How is delivery communicated to 'Users'?
What mechanisms are in place for 'Users' to provide feedback on delivery?
S4.4 Managing Delivery Performance and Risk
Are appropriate mechanisms in place to enable effective management and decision making within delivery elements (Programme, Project and Service)? Supported by levels of delegation and autonomy?
How do delivery elements demonstrate compliance with mandated requirements?

Appendix 4–3: Maturity model for Defence Infrastructure System Programme (Apr 2015)

Baseline assessment developed by Deloitte for tracking progress for the Defence Infrastructure System Programme - REDACTED
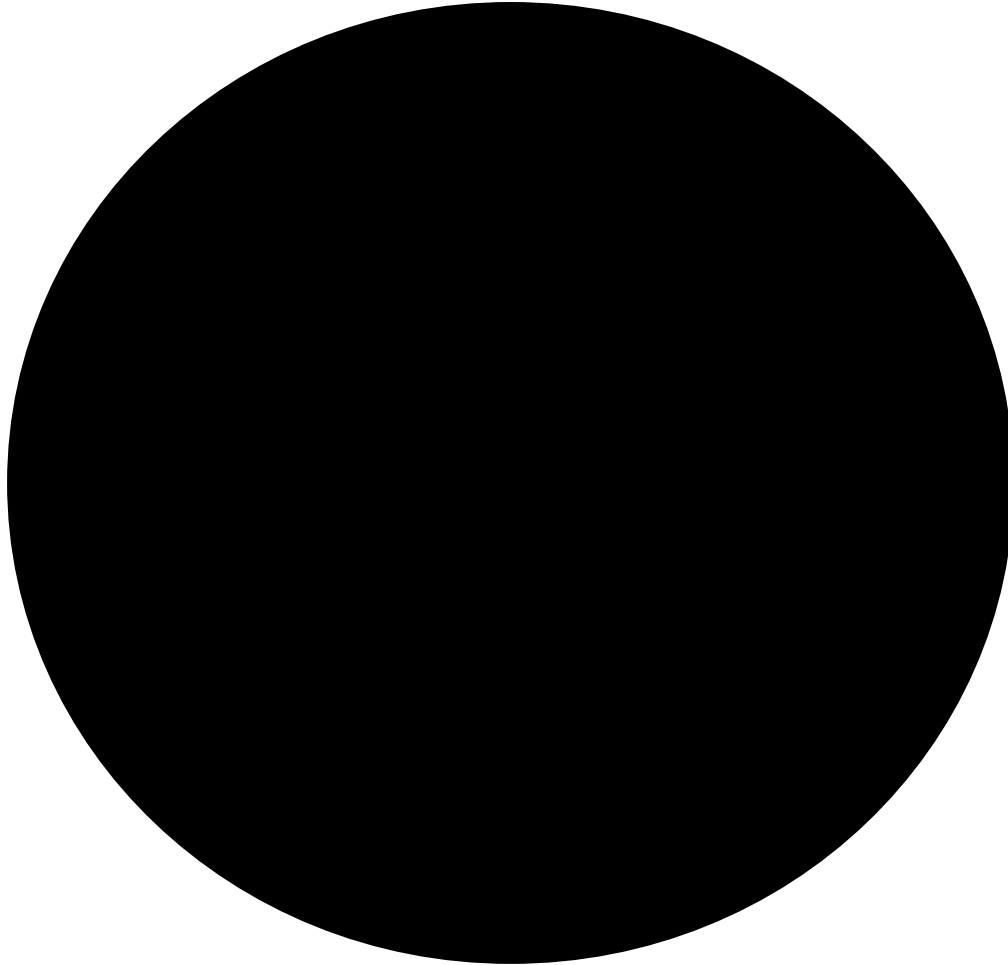
Maturity matrix developed by Deloitte for the Defence Infrastructure System model - REDACTED
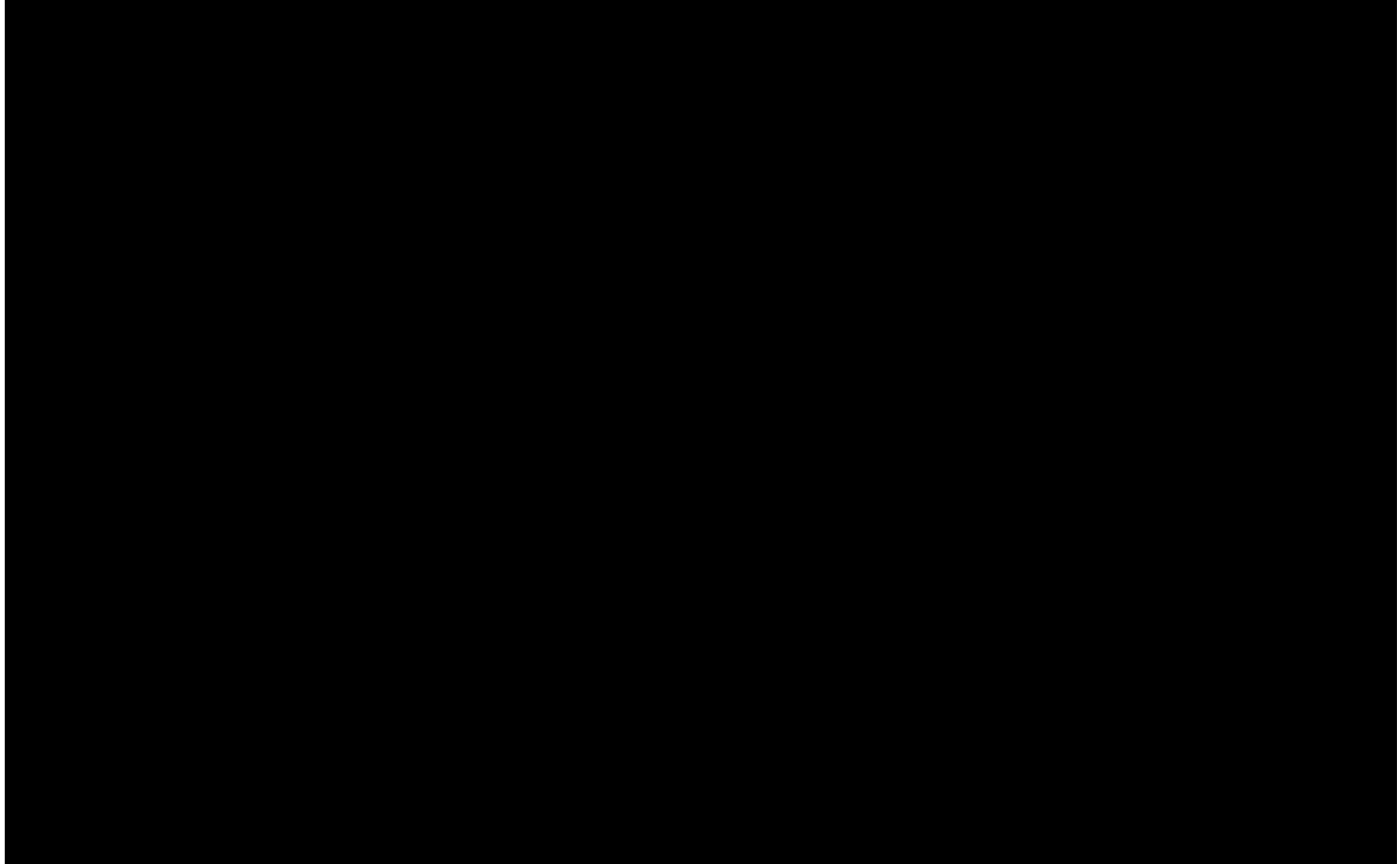
Appendix 5-1: Putative assessment framework for Acquisition System Health

Functional Requirement	Head Office	Command	Delivery Agent
1. Set strategic direction and allocate budgets: a. Is strategic direction clearly communicated by HO and understood by each TLB? b. Is strategic direction disseminated in time to inform TLB planning? c. Is the budget allocation appropriately balanced across TLBs? d. Is the budget allocation consistent with direction for each TLB? e. Does each TLB have an opportunity to feedback to HO on direction and budget? f. Do TLBs have appropriate delegations and budgetary control? [Key artefact: Defence Plan]	X	X	X
2. Ensure coherence of activities across Defence: a. Does HO understand the links and dependencies between TLBs? b. Are these links and dependencies managed by HO? c. Are there mechanisms for resolving conflict between TLBs? d. Is there a single cross defence view of acquisition activities? e. Are acquisition business cases scrutinised for coherence? [Key artefacts: Command Plans, DE&S Corporate Plan, ISS Corporate Plan]	X		
3. Hold to account[35] Commands for delivery against Command objectives: a. How frequently does holding to account occur and at what level? b. Is there an appropriate and agreed basis against which to holding to account? c. Do the Commands provide the information necessary against this basis? d. Does holding to account instil the right behaviours? e. Is there a clear consequence to poor performance? [Key artefacts: Command Plan, KPIs]	X	X	
4. Hold to account[7] DE&S for delivery against corporate objectives: a. How frequently does holding to account occur and at what level? b. Is there an appropriate and agreed basis against which to holding to account? c. Does the process include customer satisfaction measures? d. Does DE&S provide the information necessary against this basis? e. Does holding to account instil the right behaviours? f. Is there a clear consequence to poor performance? [Key artefacts: DE&S Corporate Plan, KPIs]	X		X
5. Develop and agree Command objectives with Head Office: a. Do the objectives clearly link to strategic direction issued from HO?	X	X	

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[35] Where holding to account includes performance management

Functional Requirement	Head Office	Command	Delivery Agent
b. Do the objectives clearly link to capability management strategies/plans issued by the Command? c. Do the objectives set clear direction for the Command? d. Are the objectives measurable? e. Are the objectives disseminated in time to inform capability management planning? [Key artefact: Command Plan]			
6. Develop and disseminate capability management strategies and plans: a. Do these strategies and plans comprehensively cover the full capability portfolio? b. Do they provide a firm basis for acquisition activity? c. Are they informed by information provided by operational units and Delivery Agents? d. Are they coherent with each other? [Key artefacts: Command Management Strategies, Command Management Plans]		X	
7. Formulate delivery strategy and assign pan-DLOD requirements: a. Do Command activities link to capability management strategies and plans? b. Do Command activities address full range of DLODs? c. Is there a mechanism for balancing and prioritising these activities? [Key artefacts: Programme mandates]		X	
8. Place and manage ESLS requirements with Delivery Agents (and other Commands): a. Are these requirements specified appropriately with metrics set wherever possible? b. Is there a golden thread establishing provenance up to strategic direction? c. Are they informed by information provided by operational units and Delivery Agents? d. Are they scrutinised and assured in a timely fashion? e. Are they clearly communicated to (and received by) Delivery Agents and/or other Commands) f. Is there a mechanism to manage (incl. change) these requirements over time? [Key artefacts: Command Acquisition Support Plan, Information Support Plan]		X	X
9. Ensure coherence of Command activities: a. Is there a mechanism to ensure coherence within Commands (e.g. across DLODs)? b. Is there a mechanism to ensure coherence across Commands (i.e. manage dependencies & priorities)?		X	
10. Hold to account[7] Delivery Agents (and Commands) for delivery against ESLS requirements: a. a. Is the frequency, timing and participation appropriate for holding to account ? b. Is there an appropriate and agreed basis against which to holding to account? c. Do the Delivery Agents and/or other Commands provide the necessary information? d. Does holding to account instil the right behaviours? e. Is there a clear consequence to poor performance? [Key artefacts: Command Acquisition Support Plan, Information Support Plan]		X	X

Functional Requirement	Head Office	Command	Delivery Agent
11. Hold to account[7] ISS for delivery against corporate objectives (JFC only): a. How frequently does holding to account occur and at what level? b. Is there an appropriate and agreed basis against which to holding to account? c. Does the process include customer satisfaction measures? d. Does ISS provide the information necessary against this basis? e. Does holding to account instil the right behaviours? f. Is there a clear consequence to poor performance? [Key artefacts: ISS as part of JFC Command Plan, KPIs]		X	X
12. Accept ESLS products and services from Delivery Agents: a. Are the specifications for acceptance clear and agreed? b. Is there a clear consequence for non or poor delivery? [Key artefact: Command Acquisition Support Plan]		X	X
13. Develop and agree corporate objectives with Owner (HO for DE&S, JFC for ISS): a. Do the objectives clearly link to strategic direction issued from HO? b. Do the objectives set clear direction for the Delivery Agent? c. Are the objectives measurable [Key artefact: DE&S Corporate Plan, ISS as part of JFC Command Plan]	X		X
14. Develop, agree and manage programme of work with Commands: a. Is the programme of work comprehensive? b. Do the specifications link clearly to ESLS requirements? c. Is there a balance between value for money and risk? c. Is it informed by information provided by industry?		X	X
15. Formulate delivery strategy and assign work to Delivery Teams (and other Delivery Agents): a. Do Delivery Agent activities clearly link to ESLS requirements? b. Do Delivery Agent activities address full range of ESLS requirements? c. Is there a mechanism for balancing and prioritising these activities?			X
16. Place and manage contracts with industry: a. Are contracts specified appropriately? b. Is there a golden thread establishing provenance to capability management strategies & plans? c. Are contracts informed by information provided by industry? d. Are contracts clearly communicated to (and received by) industry? e. Are the contracts actively managed (incl. change) through life? [Key artefacts: Command Acquisition Support Plan, Information Support Plan]			X
17. Ensure coherence of Delivery Agent activities: a. Is there a mechanism to ensure coherence within Delivery Agents (e.g. across the programme)? b. Is there a mechanism to ensure coherence across Delivery Agents (i.e. manage dependencies)?			X

Functional Requirement	Head Office	Command	Delivery Agent
18. Hold to account[7] industry for delivery against contracts: a. How frequently does holding to account occur and at what level? b. Is there an appropriate and agreed basis against which to holding to account? c. Does industry provide the necessary information? d. Does holding to account instil the right behaviours? e. Is there a clear consequence to poor performance? [Key artefacts: Contracts]			X
19. Hold to account[7] other Delivery Agents for delivery against ESLS requirements: a. How frequently does holding to account occur and at what level? b. Is there an appropriate and agreed basis against which to holding to account? c. Do the Delivery Agents and/or other Commands provide the necessary information? d. Does holding to account instil the right behaviours? e. Is there a clear consequence to poor performance? [Key artefacts: Command Acquisition Support Plan, Information Support Plan]			X
20. Hold to account[7] Commands for obligations to Delivery Agents: a. How frequently does holding to account occur and at what level? b. Is there an appropriate and agreed basis against which to holding to account? c. Do the Commands provide the necessary information? d. Does holding to account instil the right behaviours? e. Is there a clear consequence to poor performance? [Key artefacts: Command Acquisition Support Plan, Information Support Plan]		X	X

Appendix 7–1: Clustering key success factors for initiating action with PSMs

C - Context Clusterings / M - Method Clusterings		Factor contributing to successful outcomes	Context (C) / Method (M)	a. Ackermann et al.	b. Huxham	c. Midgley et al.	d. Gregory & Mdgley	e. Franco – Omega	f. Franco – JORS	g. Franco – EJOR	h. Black & Anderson	i. Eden & Ackermann	j. Ackermann et al.
C1. Agreed Purpose	2	Conflicting goals	C	X									
	7	Agreement over the issue	C		X								
	9	Appropriate expectations	C		X								
	13	Working towards common goals	C			X							
C2. Agreed participants	4	Participants with multiple roles	C	X									
	8	Agreement over the participants	C		X								
C3 Lack of politics & power issues	3	Complex politics and power	C	X									
	5	Uncertainty over who the client is	C	X									
	14	Absence of constraints	C			X							
C4 Commitment to work together	1	Lack of history	C	X									
	6	Commitment to collaboration	C		X								
	11	Absence of marginalisation	C			X							
	15	Trust	C			X							
M1. Apply appropriate method	16	Methods appropriate to situation	M			X							

C - Context Clusterings M - Method Clusterings		Factor contributing to successful outcomes	Context (C) / Method (M)	a. Ackermann et al.	b. Huxham	c. Midgley et al.	d. Gregory & Mdgley	e. Franco – Omega	f. Franco – JORS	g. Franco – EJOR	h. Black & Anderson	i. Eden & Ackermann	j. Ackermann et al.
	17	Competence in methods	M			X							
M2. Facilitate participation	12	Effective participation	M			X							
	18	Put forward ideas for discussion	M			X							
	30	People worked well in a team	M			X							
	42	High participation	M						X				
	58	Include different stakeholders	M									X	
M3. Structure multiple perspectives	19	Recognise there are many different points of view	M			X							
	43	Sharing Perspectives	M						X				
	56	Structure multiple perspectives	M									X	
M4. Enable systemic thinking	10	Visualisation of whole picture (systemicity)	M			X							
	53	Visualisation portrays dependencies	M								X		
	67	See both whole picture and details	M										X
	70	Cluster messy information	M										X
M5. Enhance mutual understanding	23	Learn more about the surrounding issues	M			X							
	34	Enhance mutual understanding	M				X						
	40	Support process of learning	M					X	X				
	66	Enable active sensemaking	M										X

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C - Context Clusterings M - Method Clusterings		Factor contributing to successful outcomes	Context (C) / Method (M)	a. Ackermann et al.	b. Huxham	c. Midgley et al.	d. Gregory & Mdgley	e. Franco – Omega	f. Franco – JORS	g. Franco – EJOR	h. Black & Anderson	i. Eden & Ackermann	j. Ackermann et al.
M6. Manage process and content	27	The purpose of the activity was clear	M			X							
	28	What was expected from me was clear	M			X							
	31	Important issues that could not be discussed	M			X							
	32	I felt pressured to agree with the group	M			X							
	33	Significant issue(s) were missed in discussions	M					X					
	39	Facilitation of open discussions	M										X
	49	Managing process and content	M									X	
	51	Focus on products	M								X		
	57	Manage both process and content	M									X	
	61	Provide high levels of group productivity	M			X							
	63	Separate person from problem	M								X		
M7. Ensure procedural justice	29	My views were listened to	M			X							
	38	Transparent approach	M					X					
	50	Trust	M								X		
	60	Demonstrate procedural Justice	M									X	
	65	Enable participants express contentious views	M										X
M8. Create boundary object	44	Model tangibility	M							X			

C - Context Clusterings M - Method Clusterings		Factor contributing to successful outcomes	Context (C) / Method (M)	a. Ackermann et al.	b. Huxham	c. Midgley et al.	d. Gregory & Mdgley	e. Franco – Omega	f. Franco – JORS	g. Franco – EJOR	h. Black & Anderson	i. Eden & Ackermann	j. Ackermann et al.
	45	Model associability	M							X			
	46	Model mutability	M							X			
	47	Model traceability	M							X			
	48	Model analysability	M							X			
	52	Visualisation is a shared representation	M								X		
	62	Enable group to create representation of situation	M									X	
	64	Help participants to create a transitional object	M										X
	54	Visualisation is responsive to input	M								X		
	69	Conduct real time analysis	M										X
M9. Support thinking differently	21	Change your mind on what ought to be done	M			X							
	22	Think more creatively	M			X							
	24	Challenge your previous way of thinking	M			X							
M10. Strengthen inter-relationships	35	Build closer working relationships	M				X						
	59	Support social as well as effective analysis process	M									X	
M11. Agree the issue(s)	25	Focus on what was really important	M			X							
	68	Focus on 'nub of the issue'	M										X
M12. Achieve accommodations	36	Achieve accommodations for unified vision	M				X						

C - Context Clusterings M - Method Clusterings		Factor contributing to successful outcomes	Context (C) / Method (M)	a. Ackermann et al.	b. Huxham	c. Midgley et al.	d. Gregory & Mdgley	e. Franco – Omega	f. Franco – JORS	g. Franco – EJOR	h. Black & Anderson	i. Eden & Ackermann	j. Ackermann et al.
	41	Mutual accommodation	M					X					
	55	Facilitate Consensus	M									X	
M13. Identify actions	20	Gain a better idea of the possible options	M			X							
	26	Think more clearly about possible changes	M			X							
	37	Build confidence group can work though problems	M				X						

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