Performance Management in Defence Organisations

(Gestion des performances dans les organisations de défense)

This report comprises national survey results, a structured literature review, expert opinion and a proposed new defence performance management framework.
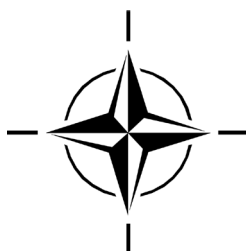
STO TECHNICAL REPORT   **TR-SAS-096-Part-I**

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The NATO Science and Technology Organization

Science & Technology (S&T) in the NATO context is defined as the selective and rigorous generation and application of state-of-the-art, validated knowledge for defence and security purposes. S&T activities embrace scientific research, technology development, transition, application and field-testing, experimentation and a range of related scientific activities that include systems engineering, operational research and analysis, synthesis, integration and validation of knowledge derived through the scientific method.

In NATO, S&T is addressed using different business models, namely a collaborative business model where NATO provides a forum where NATO Nations and partner Nations elect to use their national resources to define, conduct and promote cooperative research and information exchange, and secondly an in-house delivery business model where S&T activities are conducted in a NATO dedicated executive body, having its own personnel, capabilities and infrastructure.

The mission of the NATO Science & Technology Organization (STO) is to help position the Nations' and NATO's S&T investments as a strategic enabler of the knowledge and technology advantage for the defence and security posture of NATO Nations and partner Nations, by conducting and promoting S&T activities that augment and leverage the capabilities and programmes of the Alliance, of the NATO Nations and the partner Nations, in support of NATO's objectives, and contributing to NATO's ability to enable and influence security and defence related capability development and threat mitigation in NATO Nations and partner Nations, in accordance with NATO policies.

The total spectrum of this collaborative effort is addressed by six Technical Panels who manage a wide range of scientific research activities, a Group specialising in modelling and simulation, plus a Committee dedicated to supporting the information management needs of the organization.

- AVT   Applied Vehicle Technology Panel
- HFM   Human Factors and Medicine Panel
- IST   Information Systems Technology Panel
- NMSG   NATO Modelling and Simulation Group
- SAS   System Analysis and Studies Panel
- SCI   Systems Concepts and Integration Panel
- SET   Sensors and Electronics Technology Panel

These Panels and Group are the power-house of the collaborative model and are made up of national representatives as well as recognised world-class scientists, engineers and information specialists. In addition to providing critical technical oversight, they also provide a communication link to military users and other NATO bodies.

The scientific and technological work is carried out by Technical Teams, created under one or more of these eight bodies, for specific research activities which have a defined duration. These research activities can take a variety of forms, including Task Groups, Workshops, Symposia, Specialists' Meetings, Lecture Series and Technical Courses.

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List of Acronyms

ACT	Allied Command Transformation
BSC	Balanced Score Card
CHOD	Chief of Defence
CSO	Collaboration Support Office
DPMF	Defence Performance Management Framework
EDA	European Defence Agency
ERP	Enterprise Resource Planning
EU	European Union
IT-System	Information-Technology System
KPI	Key Performance Indicator
NATO	North Atlantic Treaty Organization
NEO	Non-combatant Evacuation Operation
OCCAR	Organisation for Joint Armament Cooperation
OSCE	Organization for Security and Co-operation in Europe
PM System	Performance Measurement System
RTG	Research Task Group
SAR	Search and Rescue
SAS	Studies and Analysis
SLR	Systematic Literature Review
UN	United Nations

Glossary

Performance Management	Use of performance information to effect positive change in organisational culture, systems and processes, by helping to set agreed-upon performance goals, allocating and prioritising resources, informing managers to either confirm or change current policy or programme directions to meet these goals, and sharing results of performance in pursuing those goals [1].
Performance Information	The relevant information that enables leaders and their stakeholders to understand the performance level of their organisation [2].
Performance Measure	A metric used to quantify the efficiency and/or effectiveness of action [3].
Performance Measurement System	A system that focuses on conveying financial and non-financial measures of performance that influence decision making and managerial action taken to maintain or alter patterns of activity in an organisation. The recording, analyses and distribution of performance information is often based on predetermined practices at pre-set times within the business cycle [4].

REFERENCES

[1] Adapted from: Amaratunga, D., and Baldry, D. (2002). Moving from performance measurement to performance management. *Facilities*, 20(5/6), pp. 217-223.

[2] Performance Management Questionnaire (Annex A).

[3] Adapted from: Neely, A., Gregory, M., and Platts, K. (1995). Performance measurement system design: A literature review and research agenda. *International journal of operations & production management*, 15(4), pp. 80-116.

[4] Adapted from: De Waal, A. (2002). *Quest for balance: The human element in performance management systems*. Wiley.

Preface

In recent years, performance measurement and management systems have been introduced in a variety of public organisations to support strategic-level decision making. These endeavours have met with mixed success.

The research documented here focuses on the performance measurement and management efforts of individual nations to guide strategic-level defence decision making. More particular guidance on measuring the performance of national capability-based planning processes can be found in the second report issued by this Research Task Group.

The Research Task Group responsible for this report was approved by the NATO Research & Technology Board in 2011 and had its first meeting in February 2012. The participating members have been Belgium, Canada, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Latvia, Norway, Sweden, the United Kingdom and ACT.

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Performance Management in Defence Organisations
(STO-TR-SAS-096-Part-I)

Executive Summary

Many public organisations, including defence organisations, have introduced performance measurement and management systems to support strategic-level decision making. These endeavours have met with mixed success. This report describes a study to investigate the extent to which, and how, strategic-level decision makers in twelve NATO and partner defence organisations make use of performance management and measurement systems to assess the organisations for which they are responsible. Data from this study is used to develop a new Defence Performance Management Framework.

Chapter 1 provides introductory material explaining the nature and scope of the research. The main objectives of the study were to:

- Analyse the use of performance measurement and management practices in NATO nations;
- Identify common practices and lessons learned in performance management and find performance measures and performance measurement systems that may benefit individual nations and address the needs of NATO; and
- Make recommendations on how to assess and improve existing approaches.

In pursuit of these objectives, a mixed methods approach was taken to the gathering and analysis of data.

Chapter 2 describes a survey of the current use of performance measurement systems in the defence organisations of several NATO Allies and partners. The survey identified a high level of diversity in the maturity of the performance measurement systems of the participating nations. The systems in two nations with relatively mature performance measurement systems could be viewed as benchmarks. Challenges in defence performance management and measurement uncovered by the survey include:

- How to define a balanced set of coherent strategic goals in the absence of a performance framework tailored to defence?
- How to align measures and initiatives with strategic objectives?
- How to measure performance in particular categories of interest to decision makers?
- Failing to implement performance measurement systems; and
- How to use performance measurement systems for decision making?

The survey was complemented by a systematic literature review of performance management in defence organisations (Chapter 3).

Chapter 4 synthesises the data from the survey and the literature review to propose a new Defence Performance Management Framework for strategic-level defence performance management. The DPMF comprises a depiction of characteristic high-level defence performance categories, their underlying relationships, and possible performance measures for the various categories. It provides the senior defence leadership with an instrument to assess how they define and measure strategic goals so that they can better orient their activities and outputs to their strategic goals and key performance indicators. It supports nations to evaluate their existing performance measurement schemes, or to build new ones.

Chapter 5 identifies propositions linked to the use of performance categories, sub-categories and metrics across defence organisations. This mapping illustrates how nations can use the DPMF to assess the design of their own performance measurement systems. Several insights from this exercise merit reflection, discussion and future research attention. For example, it was found that:

- More attention is generally paid in defence organisations to the measurement of means (i.e. resources) rather than ways and ends;

- Several nations lack clear objectives and measures related to national interests and credibility;

- A number of nations neglect important performance categories, including those related to science and technology and information and intelligence; and

- Relatively few metrics support the systematic evaluation of collaboration between nations.

Chapter 6 summarises insights on defence performance management provided by an expert panel. The overall conclusions and areas for future research are presented in Chapter 7.

Gestion des performances dans les organisations de défense
(STO-TR-SAS-096-Part-I)

Synthèse

Beaucoup d'organismes publics, parmi lesquels des organisations de défense, ont mis en place des systèmes de mesure et de gestion des performances pour faciliter la prise de décisions stratégiques. Ces efforts ont rencontré un succès mitigé. Le présent rapport décrit les conclusions d'une étude portant sur les systèmes de gestion et de mesure des performances, plus précisément sur leur utilisation par les stratèges de douze organisations de défense de l'OTAN et de ses pays partenaires pour évaluer leur organisation. Les données de cette étude servent à établir un nouveau cadre de gestion des performances de la défense.

Le chapitre 1 fournit des éléments introductifs expliquant la nature et le champ de la recherche. Les principaux objectifs de l'étude étaient d':

- Analyser l'utilisation des pratiques de mesure et de gestion des performances dans les pays de l'OTAN ;

- Identifier les pratiques communes de gestion des performances et leurs enseignements et trouver des systèmes de mesure et de gestion des performances susceptibles de bénéficier aux pays et de répondre aux besoins de l'OTAN ; et

- Emettre des recommandations sur la manière d'évaluer et d'améliorer les démarches existantes.

Un mélange de plusieurs méthodes a été appliqué pour réunir et analyser les données.

Le chapitre 2 décrit une enquête portant sur l'utilisation actuelle des systèmes de mesure des performances dans les organisations de défense de plusieurs Alliés et partenaires de l'OTAN. L'enquête a identifié une grande diversité de maturité des systèmes de mesure des performances parmi les pays participants. Les systèmes relativement matures de deux pays pourraient être considérés comme des références. L'enquête a révélé que la gestion et la mesure des performances soulevaient les questions suivantes :

- Comment définir un ensemble équilibré d'objectifs stratégiques cohérents en l'absence d'un cadre de performance adapté à la défense ?

- Comment aligner les mesures et les initiatives sur les objectifs stratégiques ?

- Comment mesurer les performances dans des catégories particulièrement intéressantes pour les décideurs sans système de mesure des performances ?

- Échec de la mise en œuvre des systèmes de mesure de performance ; et

- Comment utiliser les systèmes de mesure des performances pour la prise de décision ?

L'enquête a été complétée par une revue systématique de la littérature relative à la gestion des performances dans les organisations de défense (chapitre 3).

Le chapitre 4 synthétise les données de l'enquête et de la revue de littérature pour proposer un nouveau « cadre de gestion des performances de la défense » (DPMF) destiné à la gestion des performances de défense au niveau stratégique. Le DPMF décrit les catégories caractéristiques des performances de la

défense de haut niveau, leurs relations sous-jacentes et les mesures de performance possibles pour les diverses catégories. Ce cadre fournit aux hauts dirigeants de la défense un instrument qui leur permet d'évaluer leur définition et leur mesure des objectifs stratégiques, afin de mieux orienter leurs activités et résultats vers leurs objectifs stratégiques et leurs indicateurs clés de performance. Le DPMF aide les pays à évaluer leurs programmes existants de mesure des performances ou à en construire de nouveaux.

Le chapitre 5 émet des propositions quant à l'utilisation des catégories, sous-catégories et indicateurs de performance dans les différentes organisations de défense. Cette cartographie illustre la façon dont les pays peuvent utiliser le DPMF pour évaluer la conception de leur propre système de mesure des performances. Plusieurs enseignements de cet exercice méritent réflexion et discussion et pourraient faire l'objet de recherches à l'avenir. Il apparaît par exemple que :

- Les organisations de défense prêtent en général plus attention à la mesure des moyens (autrement dit, des ressources) qu'aux manières de faire et aux objectifs ;

- Plusieurs pays manquent d'objectifs clairs et de mesures en lien avec les intérêts nationaux et la crédibilité ;

- Un certain nombre de pays négligent des catégories de performance importantes, notamment celles liées à la science, la technologie, l'information et le renseignement ; et

- Il existe relativement peu d'indicateurs facilitant l'évaluation systématique de la collaboration entre pays.

Le chapitre 6 résume les avis d'une commission d'experts sur la gestion des performances de défense. Le chapitre 7 présente les conclusions générales et les domaines de recherche futurs.

Chapter 1 – INTRODUCTION

1.1 PERFORMANCE MEASUREMENT AND MANAGEMENT IN DEFENCE ORGANISATIONS

The past decade has presented NATO Allies and their partners with numerous challenges to defence management. These include the need to do more with fewer resources, the increasing expectations of stakeholders, a rapidly changing international environment, advances in technology, and the changing expectations placed upon our increasingly diverse armed forces.

In an austere financial environment, it has become increasingly important for senior defence decision makers to show that their decisions have demonstrable benefit, both to their own governments and to the public at large. This in turn provides an acute problem for the defence planner, who may need to rebalance defence capabilities within a tight financial envelope. Performance measurement systems have therefore grown in importance, not only because they provide transparency in the management of military means, ways and ends, but also because they may be used to drive continuous and breakthrough change within the turbulent context of the current defence environment. The use of performance metrics provides mechanisms to illustrate the impact of decisions to stakeholders and to assist in the generation of the best outcomes for defence as a whole.

Many defence organisations have thus introduced performance measurement systems to support strategic-level decision making. Unfortunately, while it is widely understood that effective performance measurement is central to aligning an organisation's operations with its strategic direction, many defence organisations have failed to implement effective systems to achieve this. Some of the frequently reported challenges include: the lack of a performance framework focused on defence needs; difficulties in measuring progress in key performance areas for armed forces (e.g., mission success, capability development); failures to implement and deploy planned measurement systems; and the limited use of performance measurement systems to support actual decision making. While several countries have created impressive systems that support the reporting of defence performance to external stakeholders, these efforts are not necessarily put to use in the context of strategic decision making.

1.2 OUTLINE AND FOCUS OF THE RESEARCH

The research documented in this report investigates the extent to which strategic-level decision makers in defence assess the performance of the organisations for which they are responsible, and how they do so. It analyses both the methodologies and measures currently in use and it proposes a new Defence Performance Management Framework (DPMF) tuned to the context of strategic-level defence decision making. This framework comprises a depiction of characteristic high-level defence performance categories and their underlying relationships, as well as possible performance measures and performance measurement best practices. It is intended to provide senior defence leadership with a powerful instrument to assess their current approach to the definition and measurement of strategic goals and to allow them to orient the activities and outputs of their organisations with strategic goals and key performance indicators.

The report compares current practices from various NATO Allies and partners. As such, it includes practices from nations with a higher level of maturity in their performance measurement systems that can serve as a source of inspiration for nations that are still in the early stages of developing, implementing and using such systems. The report also highlights aspects of implementing performance measurement systems that several nations have found challenging, i.e., it draws attention to common pitfalls in the development of systems and the need for future research to address common problems.

This research is focused on performance measurement systems at the national level of defence, i.e., the systems used by strategic-level decision makers in defence ministries, armed forces headquarters and governments. While there are likely to be benefits in using at least of parts of the performance management framework developed in this report at the operational level, further work will be needed to evaluate its usefulness in this context and to tailor it to meet the specific needs encountered here.

While the main effort of the research has been in documenting the existing performance measurement systems and the current use of specific performance measures in NATO and partner countries, it is important to note that an effective performance measurement system should be aligned with an organisation's overall strategy. As such this work aims to contribute both to improved performance measurement and to the definition of a coherent set of strategic objectives. The proposed DPMF should also be seen as an instrument to help characterize the overall strategy of a defence organisation and understand the connection between performance measures and national strategic objectives.

1.3   OBJECTIVES

The objectives of this study are to:

a)   Analyse the use of performance measurement and management practices in NATO and partner nations.

b)   Identify common practices and lessons learned in performance management and the use of performance measures and performance measurement systems that would benefit individual nations and address the needs of NATO.

c)   Make recommendations on how to assess and improve existing approaches.

1.4   RESEARCH QUESTIONS

The following research questions were identified at the start of the project to orient the activities of the Research Task Group (RTG):

a)   What is the critical information that provides a strategic-level view of the performance of the MoD and the armed forces?

b)   What are the critical perspectives, categories and subcategories of measures and objectives that provide an understanding of the overall performance of the defence organisation?

   i)   How can these be integrated in an overall performance management architecture that supports the development of effective performance measurement and information systems?

   ii)   What are the critical defence measures?

c)   How does management use this performance information?

d)   How do nations assure their measurement system is aligned with change?

e)   How do nations collect and analyse performance data and information (e.g., IT-system)?

During the course of this research, as specific data became available, a number of additional research questions were identified:

f)   Can the extent to which a nation uses performance measurement and management techniques be correlated with other national defence parameters, such as defence expenditure or type of armed forces?

g)   Can similar nations (clusters) be identified with respect to the use of performance measurement and management techniques?

1.5 APPROACH

As the research outline included both 'what' and 'how' questions, a mixed methods approach was taken to the gathering and analysis of data. The raw data was gathered from a survey of the current use of performance measurement systems in the defence organisations of NATO Allies and partners. This survey comprised:

- A questionnaire completed during semi-structured interviews with performance measurement experts at the strategic level of defence, which provided both qualitative data and data in the form of responses to questions on a six-point Likert scale; and

- A review of performance measurement and other strategic documents that nations responding to the questionnaire were also willing to share.

This survey was complemented by a structured literature review of performance management in defence organisations.

The analysis is both quantitative and qualitative, allowing nations to understand their own situation in relation to others, and to gain specific ideas on how to move forward in areas in which they may be struggling. The analysis was conducted by the RTG with additional insights provided by a panel of recognised subject matter experts.

These efforts and their results are described in further detail in the chapters that follow.

1.6 STRUCTURE OF THIS REPORT

This report is divided into seven chapters. Chapter 1, this chapter, provides introductory material explaining the nature and scope of the research. Chapter 2 describes the survey conducted by the RTG of the current use of performance measurement systems in the defence organisations of several NATO Allies and partners. Chapter 3 describes the structured literature review of performance management in defence organisations carried out in support of the study by researchers at Virginia Tech.

Chapter 4 synthesises the data from the survey and literature review to propose a new framework for strategic-level defence performance management. The survey data in summary form is mapped onto the new framework in Chapter 5, while Chapter 6 summarises the insights on defence performance management provided to the RTG by an expert panel assembled for this purpose. The overall conclusions of this study are presented in Chapter 7.

A second report prepared by this RTG provides a more detailed discussion of the performance of capability-based planning processes amongst NATO Allies.

Chapter 2 – THE PERFORMANCE MANAGEMENT SURVEY

2.1 AIM AND CONTENT OF THE SURVEY

In order to meet the objectives of the study and to answer the research questions identified by the RTG, it was decided to conduct, by means of a survey, an assessment of the current use of performance measurement systems in the defence organisations of NATO Allies and partners. The survey comprised a questionnaire completed by members of the RTG during semi-structured interviews with performance measurement experts at the strategic level of defence, and a review of performance measurement and other strategic documents from the nations responding to the questionnaire.

2.2 DEVELOPMENT OF THE QUESTIONNAIRE

The questionnaire was developed iteratively. An initial set of observations by the nations participating in the RTG on the challenges of defence performance management was used to identify the research questions for the study (see Chapter 1). A validated questionnaire on performance measurement use [1] was also adapted by the RTG to reflect practices within the context of defence organisations – notably the term "performance measures" in the original questionnaire was replaced by "performance information" on the grounds that while specific performance metrics may be lacking in defence performance measurement systems, performance information in key areas such as lessons learned and insights from various types of intelligence systems would be present in such systems and useful to support strategic decision making.

These inputs were used to generate an initial draft questionnaire that was pilot tested in four nations, allowing the RTG to evaluate both the questionnaire and the data collection process. Refinements in the final version included the addition of a number of definitions in the introduction, minor changes to open-ended questions to further orient the responses in support of the research questions, and the addition of a request for specific illustrations and supporting documents. The final questionnaire can be found in Annex A.

2.3 DATA COLLECTION

The members of the RTG used the final questionnaire in interviews with experts from nations that were willing to participate. Interviews took between 60 and 120 minutes, not including efforts to provide additional documentation such as lists of performance measures, performance reports, and defence guidance documents. For some nations, several participants were interviewed, based on their specific expertise or role with regard to performance measurement – some experts, for example, were very knowledgeable about the design and characteristics of the performance measurement system, but were unable to testify its actual use by strategic-level decision makers. In some cases, additional discussion within the nation was necessary to come to a consensus response to certain questions.

2.4 THE SAMPLE

The analysis in this report is based upon responses from 12 NATO Allies and partners, who, in order to ensure as candid responses as possible, were guaranteed anonymity and are identified in this report only by means of a two-letter code. The sample includes nations of various size and strategic ambition, and as such should be of sufficient breadth to provide insights that may be relevant to all NATO Allies and partners.

However, several Allies declined to participate, many citing a lack of maturity in their performance measurement efforts as the reason for doing so. While the overall sample does include examples of nations at

various stages of maturity with regard to performance measurement, nations that are still at the early stages may be under-sampled and this report's characterisation of the overall state of performance measurement amongst Allies and partners may thus be inflated.

2.5   REVIEW OF STRATEGIC DOCUMENTS

In addition to the responses to the questionnaire, data was also provided to the RTG in the form of official documents relevant to the research. These included top-level defence policy documents, white papers, and descriptions of national performance measurement systems.

2.6   SUMMARY OF QUESTIONNAIRE RESPONSES AND ANALYSIS

The data from the questionnaire responses was analysed and employed in the development of the proposed DPMF. As much of the data is not directly relevant to the narrative presented in this report, it is summarised only briefly below. However, a detailed overview of the responses and an analysis is presented in Annex B.

2.6.1   Summary of Likert Scale Responses

Thirty-eight of the questionnaire's questions related to the use by nations of performance information and required answers on a 6-point Likert scale (strongly disagree, disagree, tend to disagree, tend to agree, agree, strongly agree). The questions which on average received the most positive (agree) responses, and the most negative (disagree) responses are collected in Table 2-1 and Table 2-2.

Table 2-1: The Questions with the Most Positive Responses.

The Questions with the Highest Median Responses	
Q2a1	We conceptualise critical information within an overarching structure.
Q4a5	We use performance information to monitor restructuring efforts.
Q4a7	We use performance information to produce reports for senior leadership or other stakeholders.
Q4b1	Senior leadership or other stakeholders receive results on key performance measures on a regular basis.
Q4b2	Performance portrayals and or reports are updated in a timely manner.
Q4b3	Performance data are collected in a timely manner.
Q4d1	We compare our current performance levels to historical performance to identify trends over time.
Q4d2	We seek to identify causes to explain current performance levels.
Q4e1	We make decisions to manage or improve performance when it is clear that action is needed.

Table 2-2: The Questions with the Most Negative Responses.

The Questions with the Lowest Median Responses	
Q4a2	We use performance information to redistribute personnel.
Q4c2	We verify the proposed causal relationships between different performance measures.

The Questions with the Lowest Median Responses	
Q4c3	We use visual representations such as a strategy map or a causal map to portray proposed causal relationships.
Q4c4	We use analysis methods and tools to test hypothesised causal relationships.
Q4f5	We hypothesise how planned improvement actions will impact key performance measures.
Q4f6	We verify the impact of improvement actions on results for key performance measures.

Reporting to senior leadership and monitoring restructuring efforts are the most prevalent uses of performance information, while the use of performance information for the redistribution of personnel is least common. The importance of reporting also features in different guises in other questions that received a mostly positive response (Q4b1, Q4b2, and Q4b3). Other themes that feature on this list are the identification of performance trends over time, the identification of causes to explain current performance levels, and the taking of decisions to manage or improve performance.

Questions with mostly negative responses concern causal relationships between performance measures, and supposition and follow-up regarding the impact of improvement actions on performance measures.

2.6.2   Cluster Analysis

A cluster analysis was performed on the responses to the Likert scale questions of the 12 nations participating in the survey. The result is shown in Figure 2-1, in the form of a cluster dendrogram.
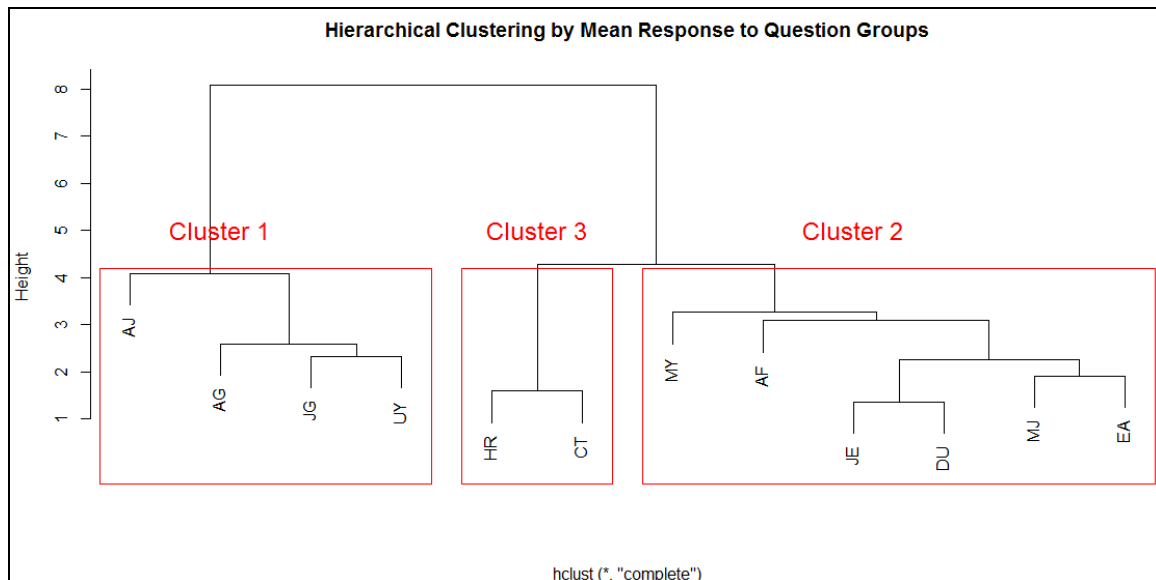
Figure 2-1: Hierarchical Clustering of Nations by Likert Scale Responses.

The responses to the questionnaire are clearly different for each of the three groups identified by the cluster analysis (see Annex B). The confident user cluster (cluster 3), has the highest scoring responses, followed by the learning cluster (cluster 2), and finally the minimal experience cluster (cluster 1). In general, though, there is no individual question, or group of questions, the response to which acts as a clear discriminator between the clusters – there is instead a general trend towards more positive responses to all questions as one moves from cluster 1 through to cluster 3.

2.6.3 Explanatory Factor Analysis

The analysis of the questionnaire results also investigated whether nations' responses to the Likert-scale questions could be connected to factors such as defence expenditure or type of armed forces; in other words, could the extent to which a nation uses performance measurement and management techniques be correlated with other national defence parameters. Eight 'candidate explanatory factors' were identified by the RTG and are described in Table 2-3.

Table 2-3: Candidate Explanatory Factors.

Defence Expenditure	Def.Exp	US$bn, 2011. Source: Ref [2].
Defence Expenditure as % GDP	Def.GDP	Source: Ref. [2].
Size of Active Armed Forces	Act.AF	Thousands. Source: Ref. [2].
Size of Active Armed Force cf. population	AF.Pop	Armed forces per thousand population. Source: Ref. [2].
Type of Armed Force	AF.Type	This measure categorises armed forces by type on a six-point scale: Territorial Defence, Peace Force, Limited Expeditionary Force, Selective Expeditionary Force, Broad Expeditionary Force, Full Spectrum Force. Source: Ref [3].
Deployment	Dep	ISAF Troop Contribution, March 2011. Directly comparable figures for national military deployment are not available for all nations that responded to the questionnaire. Afghanistan, however, was a NATO/European priority in 2011; this would seem to be a reasonable proxy measure for the international operational commitments of responding nations. Source: Ref [4].
Government Effectiveness	WGIGE	Percentile Rank. This is intended as a proxy measure for the degree to which national governments, and hence their ministries of defence, have adopted the type of governance practices associated with the New Public Management. The World Bank states that this indicator "captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies." Source: Ref. [5].
"Years in NATO"	Yrs.NATO	This is intended as a measure of the time to which nations have been exposed to the defence reform agendas of key international defence organisations. It is calculated as the sum of the years since 1991 that a nation has been a NATO member (i.e., the number of years that a nation has participated in NATO's post-Cold War agenda) and the years that a nation has participated in ESDP.

In most cases, there are positive correlations between the degree of use of performance measurement/management and the candidate explanatory factors. The candidate explanatory factor best correlated with the use of performance measurement/management is AF. Type, which categorises a nation's armed forces on a six-point scale according to level of ambition. It can thus be proposed that the more ambitious a nation is in the use of its armed forces, and thus the more complex the management task placed

on defence ministries and/or armed forces headquarters, the greater the likelihood that the nation makes use of performance measurement/management techniques; specifically, the greater the likelihood that it will use an overarching structure for performance management (Question 2a), and that it will use performance information for monitoring (Question 4b), to validate causal relationships (Question 4c) and to validate improvement actions (Question 4f). In other words, nations with higher levels of military ambition do not use their performance measurement systems for reporting only, but also use the information that comes from these systems for proactive performance management.

Similar patterns of correlation are also evident, although the effect is smaller, between the degree of use of performance measurement/management and defence spending (Def.Exp and Def.GDP) and deployment (Dep). This is unsurprising, given the high levels of correlation between these candidate explanatory factors themselves.

There does not appear to be any consistent correlation between the use of performance measurement/management and the candidate explanatory factors AF.Pop, WGIGE, and Yrs.NATO.

However, further work would be required to confirm these propositions, as only a small number of nations was surveyed, and possible causal mechanisms are not immediately obvious.

2.7   REFERENCES

[1]   Chearskul, P. (2010). *An empirical investigation of performance measurement system use and organizational performance* (Doctoral dissertation, Virginia Tech).

[2]   The International Institute for Strategic Studies (2013). *The Military Balance 2013*. London: Routledge.

[3]   Clingendael Centre for Strategic Studies (2006). *Air Force: Luxury or necessity? First of a series of nine essays on the future of the Air Force*. The Hague: Clingendael Centre for Strategic Studies.

[4]   International Security Assistance Force (2011). *Key facts and figures*, 4 March 2011. http://www.nato.int/isaf/placemats_archive/2011-03-04-ISAF-Placemat.pdf.

[5]   Kraay, A., The World Bank (2012). *Worldwide governance indicators*. http://info.worldbank.org/governance/wgi/#home.

Chapter 3 – A SYSTEMATIC LITERATURE REVIEW OF PERFORMANCE MANAGEMENT IN DEFENCE ORGANISATIONS

3.1 RATIONALE

The analysis of the survey data collected from the 12 participating Allies and partners provides a strong empirical foundation for the proposed DPMF (see Chapter 4). However, the RTG also wanted to evaluate the extent to which the framework could be further validated by evidence from the literature.

To this end, the RTG was able to draw on the support of a research team from Virginia Tech, who performed a Systematic Literature Review (SLR) of performance measurement practices in the defence sector. This exercise applied the SLR methodology to conduct a comprehensive, but targeted search of the literature in order to identify relevant sources and to provide a framework for an in-depth analysis of the characteristics of the literature. The categories, and performance metrics presented in the identified publications were used to validate the proposed DPMF.

3.2 APPROACH

The approach for the SLR used in this research was adapted from Tranfield *et al.* [1] and the Cochrane Collaboration handbook [2]. It consisted of six phases which are summarised in Figure 3-1.
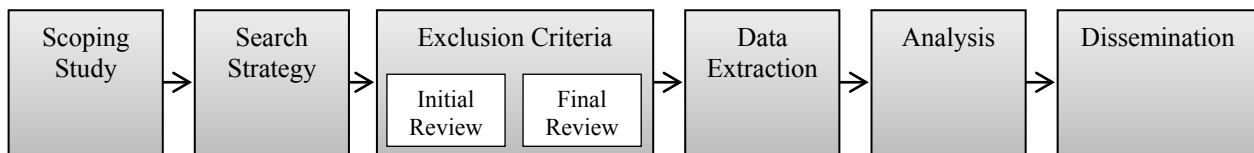
Figure 3-1: Phases of the Systematic Literature Review.

Details of the SLR approach and the subsequent analysis are included in the final report of the Virginia Tech research team, which is included at Annex C. The report identifies dominant authors in the field, and defence performance management themes and categories. It also compares the findings from the broader literature with the new framework proposed by the RTG. The SLR identified performance categories and metrics used at various levels of defence through a detailed analysis of 54 selected papers with a focus on defence performance frameworks, categories or metrics. A list of the paper set obtained through the SLR is in Appendix C-1.

3.3 KEY FINDINGS

3.3.1 Dominant Frameworks

Thematic analysis of the various performance categories identified within the literature demonstrates that the Balanced ScoreCard (BSC) and the Logic Model (Input, Process, Output) are the dominant performance frameworks used within defence. However, significant customisations are often needed to adapt these generic frameworks to the defence context. Figure 3-2 Provides an Overview of the Most Common Categories Identified in the Literature.
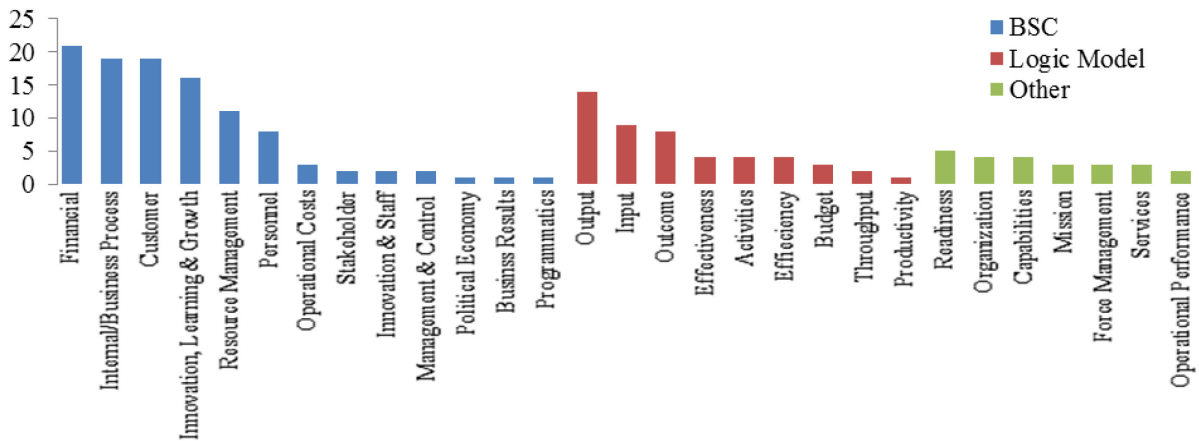
Figure 3-2: Most Common Performance Categories.

3.3.2 Differences Between Armed Services

The Systematic Literature Review was not limited to the use of performance measurement systems at the strategic level. It also includes findings with regard to differences between the different armed services and discusses performance categories and metrics used at various levels of the military.

Different branches within the military typically use different performance categories to assess their performance. This is clearly illustrated by Figure 3-3, which uses social network analysis to investigate the co-occurrence of categories, i.e., instances of two categories being included in the same PM system design.
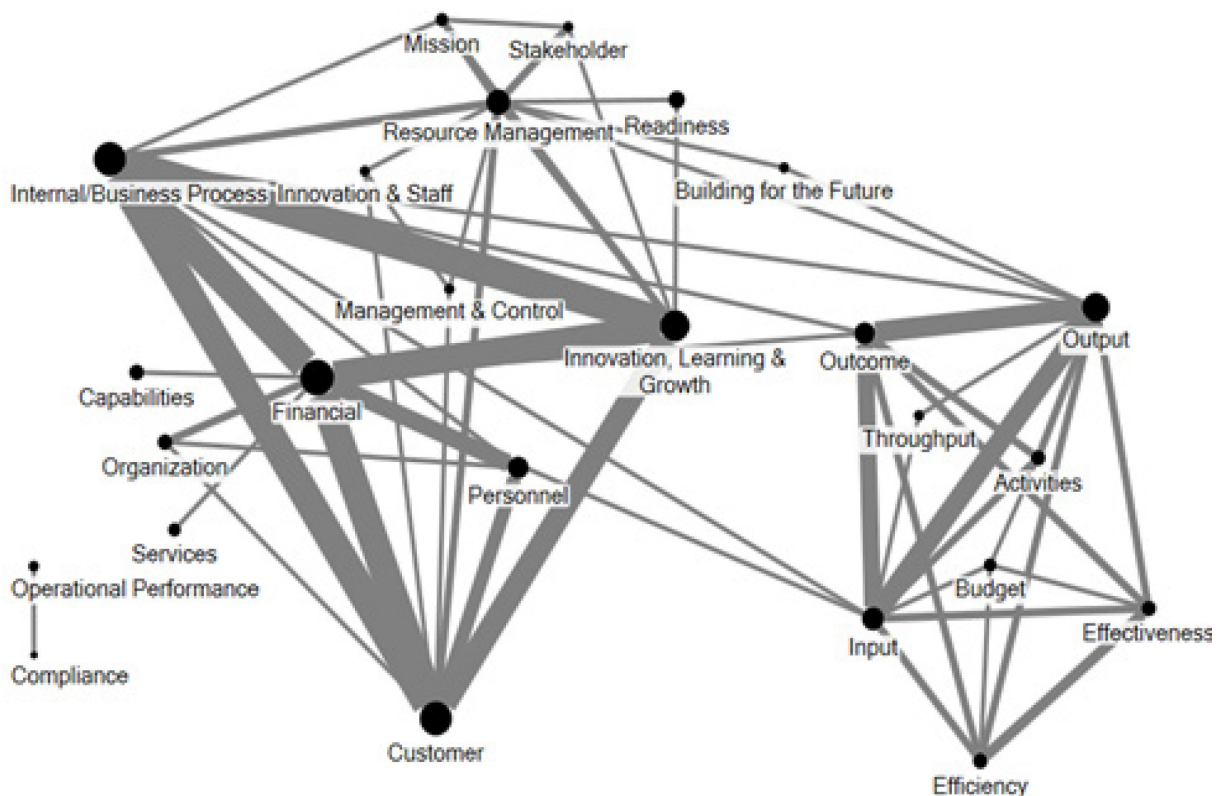
Figure 3-3: Co-Occurrence of Performance Measurement Categories.

The nodes in Figure 3-3 each represent a single category and the size of the node is proportional to the number of PM systems that included it. The edges in this figure indicate that the two categories were used in the same PM system and the thickness of the edge represents the number of times the categories co-occurred. To improve the readability of the network, co-occurrences that happen only once are omitted from the figure.

The network illustrates the limited co-occurrence of performance measurement categories, but also shows two distinct clusters with one consisting primarily of categories associated with the BSC and the other with categories associated with the Logic Model. In addition, use of the public sector version of the BSC, which typically includes categories such as Resource Management and Stakeholders, is also evident. The results show that, while many systems are still based on existing frameworks, there is some evidence of customized systems that blend the existing frameworks and incorporate military-specific categories.

A more detailed analysis of categories used across branches (Figure 3-4), demonstrates that whereas the BSC and its categories seem to be popular within the Air Force, the Logic Model seems to be more popular within the Army.
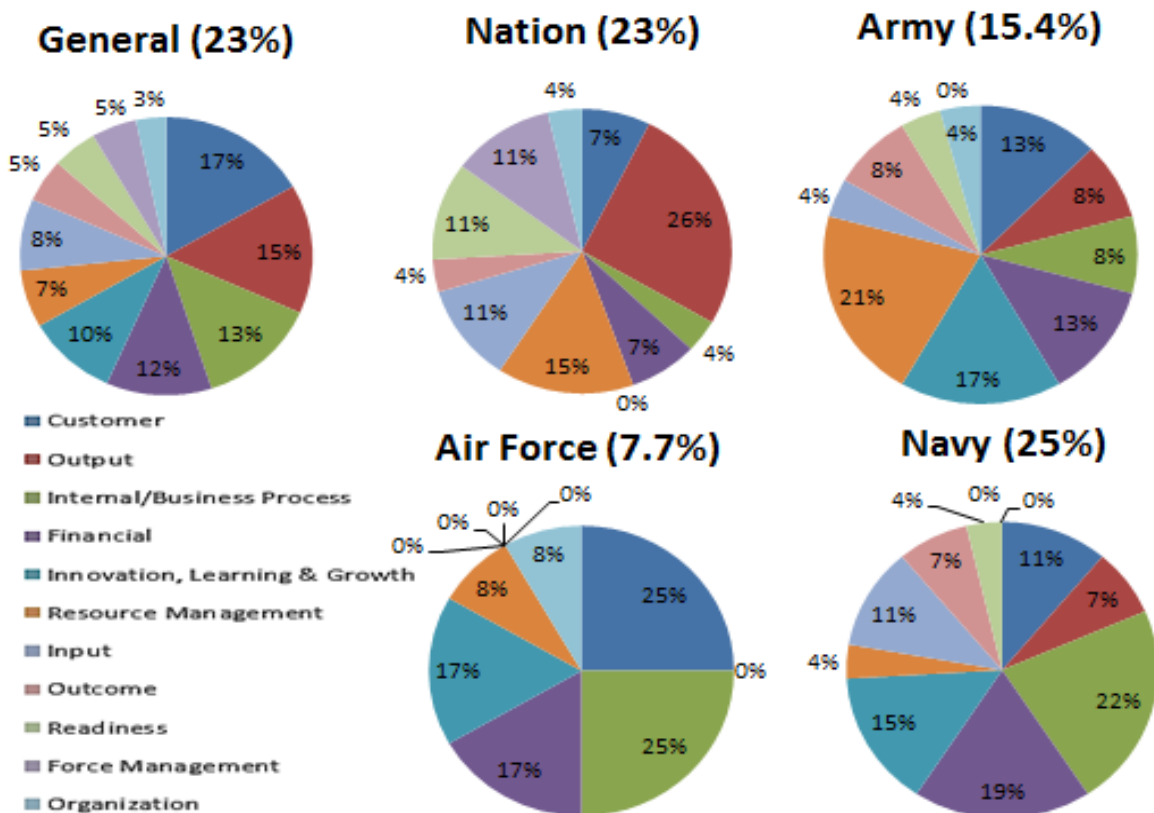
Figure 3-4: Differences in Performance Category Prevalence by Branch.

This suggests that various branches use different mental models to optimise their performance. This can become a barrier for the implementation of performance measurement systems in an overall defence context. First, it can create misalignment between strategic-level leaders who use different languages to discuss performance. Second, the use of different models and categories at different levels and branches makes it more difficult to deploy performance measurement systems across the entire defence organisation.

3.3.3 Further Work

The SLR also identified 270 publications from the defence sector, which did not include the frameworks, categories, or metrics that were its focus. These publications could be used in future research to investigate performance measurement practices in defence more broadly and to provide further context for interpreting the results of this study. In addition, these publications include relevant material – for example related to identifying areas that are hard to measure, lessons learned, best practices, and the implementation and use of measurement systems – that was not used to support this study. Additional analysis of this larger paper set may reveal insights beyond those captured here.

3.4 REFERENCES

[1] Tranfield, D., Denyer, D., and Smart, P. (2003). Towards a methodology for developing evidence-informed management knowledge by means of systematic review. *British journal of management*, 14(3), pp. 207-222.

[2] Higgins, J.P.T., Green. S. (Eds.), *Cochrane handbook for systematic reviews of interventions, Version 5.1.0 [updated March 2011]*. The Cochrane Collaboration, (2011). Available at: http://handbook.cochrane.org/.

Chapter 4 – A NEW FRAMEWORK FOR STRATEGIC-LEVEL DEFENCE PERFORMANCE MANAGEMENT

4.1   AIM AND RATIONALE

This chapter proposes a new performance management framework tuned to the context of strategic-level defence decision making – the DPMF. The DPMF comprises a depiction of characteristic high-level defence performance categories, their underlying relationships, and possible performance measures for the various categories. It is intended to provide the senior defence leadership with a powerful instrument to assess their current approach to the definition and measurement of strategic goals, and to allow them to orient the activities and outputs of their organisations to strategic goals and key performance indicators. The framework may be used as a starting point for nations that wish to evaluate their existing performance measurement schemes, or by nations that wish to build new ones.

4.2   CHAPTER OUTLINE

The remainder of this chapter comprises four substantive sections. The first provides a short overview of the methodology used to develop the DPMF. The second outlines the concepts and constructs behind the framework – the ends-ways-means paradigm and generic strategy maps. The third provides an overview of the DPMF itself, while the final section offers some guidance on using the framework to assess and/or build defence performance measurement systems.

4.3   METHODOLOGY OVERVIEW

The framework was derived from a qualitative data corpus obtained from a variety of sources. These included the responses to the open-ended questions of the RTG's questionnaire, additional documents provided by the participating nations and discussions within the RTG. This qualitative data corpus was analysed using the thematic analysis methodology described by Braun and Clarke [1], who define thematic analysis as a method for identifying, analysing, and reporting patterns within qualitative sources of data. The six-phases of the methodology are summarised in Table 4-1. Phase one corresponds to the objective of identification, phases two to phase five to the objective of analysis, and phase six to the objective of reporting.

Table 4-1: Methodology for Defining the DPMF.

Phase	Process	Data Set(s)	Data Extract / Result
1.	Familiarisation with the data.	Responses to open-ended questionnaire questions.	Initial list of metrics and objectives (see Appendix E–1).
2.	Generation of initial codes.	Additional documents provided by participating nations.	Concept maps for pilot nations (see Annex D for an illustration).
3.	Searching for categories among codes – preliminary analysis for eight nations.		Initial definition of performance categories.

Phase	Process	Data Set(s)	Data Extract / Result
4.	Reviewing categories.	Detailed documents and responses of leading nations.	Strategy maps for two leading nations (see Annex D for an illustration).
5.	Defining and naming of categories.	Meetings of the RTG.	Definitions of the categories and elaboration of underlying sub-categories (see Annex E).
6.	Final analysis and reporting.		Defence Performance Management Framework for strategic-level defence decision making (this chapter).

Phases 1, 2 and 3 were conducted separately by two independent researchers. Results from each researcher were compared and in case of discrepancy or conflict, discussions were held with a third researcher to refine and correct the generated findings. The results from phase 3 were then reviewed by members of the RTG.

In phase 4, a detailed analysis of the documents of two leading nations was conducted based on the initial definition of the performance categories identified in Phase 3. The results from phase 4 were again reviewed by the RTG. In phase 5, names and corresponding general descriptions for what are termed 'high-level performance categories' were defined by the RTG. The group also determined the basic relationships between these performance categories and identified subordinate performance related sub-categories under each one. Together, these performance categories, their relationships and their subordinate sub-categories constitute the proposed generic DPMF. This framework is outlined in the remainder of this chapter and in supporting annexes.

4.4   CONCEPTS UNDERLYING THE DPMF

4.4.1   Organising Concept: Ends-Ways-Means

The high-level performance categories found in the qualitative data corpus were mapped with reference to a classification based on the ends-ways-means paradigm frequently used within NATO strategic and operations planning [2]. The ends-ways-means paradigm is well known within the military, fairly straightforward and a convenient starting point for deconstructing the defence strategy of a nation, making it a natural choice for this study. Further, performance management should not exist in isolation, but should be linked to ongoing efforts to monitor, measure, assess risks and make course corrections during the execution of strategy; hence it is useful to situate performance categories within a paradigm designed to support strategic decision making.

In the classification adopted by the RTG, ends, ways and means thus provide 'performance perspectives' under which the high-level performance categories can be arranged. An overview of the resulting framework of performance categories colour-coded according to performance perspectives is presented in Figure 4-1.

The 'ends' perspective refers to a set of ultimate objectives, i.e., it answers the question: what is to be accomplished? The high-level performance categories found in the qualitative data corpus and selected to be included in the ends perspective were:

*   National interests and defence and security needs;

*   International credibility;

*   National credibility;

- Mission outputs and effects; and

- Ready force elements.
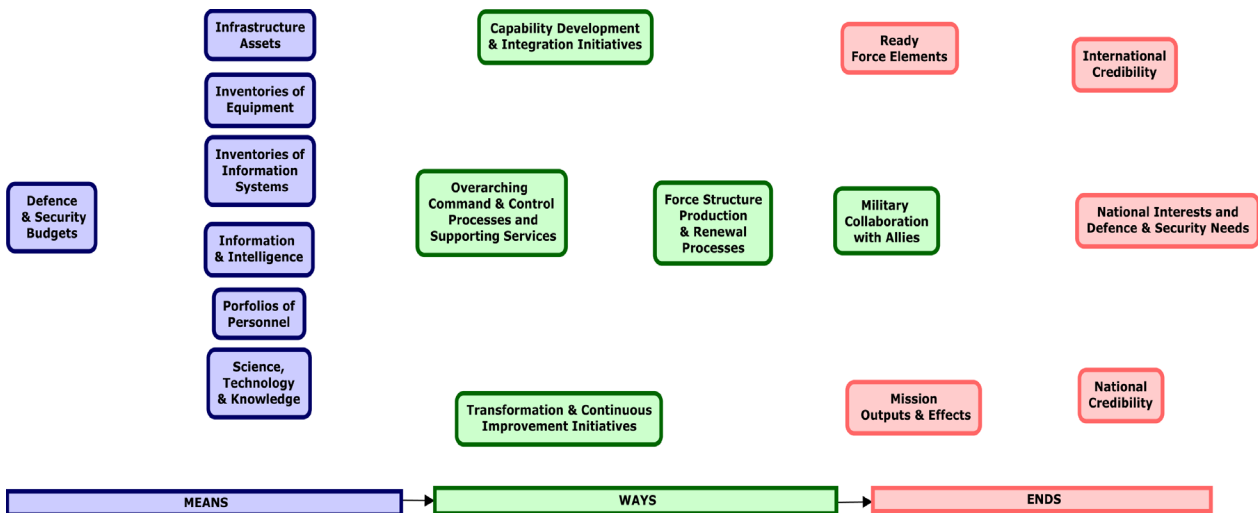
Figure 4-1: Performance Perspectives and Categories of the DPMF.

The 'ways' perspective refers to the main mechanisms that underlie how the ultimate objectives are to be accomplished. The high-level performance categories found in the qualitative data corpus and selected to be included in the ways perspective were:

- Force structure production and renewal processes;

- Overarching command and control processes and supporting services;

- Capability development and integration initiatives;

- Transformation and continuous improvement initiatives; and

- Military collaboration and ensuring interoperability with allies.

The 'means' perspective refers to the various resources that are to be used to achieve the objectives. These resources can be tangible or intangible. The high-level performance categories found in the qualitative data corpus and selected to be included in the means perspective were:

- Infrastructure assets;

- Inventories of equipment;

- Inventories of information systems;

- Information and intelligence;

- Science technology and knowledge;

- Portfolios of personnel; and

- Defence and security budgets.

4.4.2   Strategy Maps

Explicit linkages between an enterprise's strategy and its performance are often developed, clarified and communicated through the use of diagrams. These diagrams illustrate an overall theory about how the

enterprise intends to survive, thrive and change over time. A strategy map is one such diagram. Strategy maps are typically composed of a series of graphical objects (e.g., rectangles or ovals), each of which is labelled in accordance with one or more of the enterprise's objectives. Arrows are drawn between the objectives to signify the existence of dependencies and/or general relationships [3].

As well as providing a convenient summary of the theory that underlies an enterprise's strategy, strategy maps can also provide a tool to contextualise and track performance and to assess the second and third order effects of that performance over time. In other words, by illustrating the logical relationships between objectives, and by tracking performance against those objectives over time, it can become easier for an enterprise to understand how its achievements against certain objectives are expected to enable achievements against other linked objectives.

To comprehend the strategic direction of nations in connection with the state of their performance management regime, strategy maps for some of the participating nations were developed. An example may be found at Annex D. During the course of these efforts it became evident that, aside from the validity of the semantic logic conveyed in a strategy map, at least three other factors are paramount when attempting to construct a useful strategy map: degree of fidelity, scope and completeness.

Degree of fidelity refers to the fact that strategies and the performance management regimes that are connected to them exist at different levels of granularity. The RTG research was focused on the level of strategy that is most applicable to the top echelons of leadership and the primary stakeholders of a defence enterprise, for example, joint chiefs of staff, service chiefs, and civilian leaders inside a defence ministry and at higher levels of government, all of whom are typically concerned with the overall direction and performance of the nation's defence and security enterprise.

In terms of scope, enterprise-wide strategies are often partitioned into strategic themes or 'thrusts'. In many cases strategic thrusts encapsulate a unique ensemble of strategic goals that transcend the entire organisation. Although laudable, characterising the strategic thrusts within each nation was not a primary focus of the RTG. Instead, greater attention was paid to the subject of completeness, i.e., the group's efforts were focused on the creation of a framework which robustly identified a set of performance categories and subordinate subcategories that can be used as a starting point when developing performance measurement systems that support decision making by the upper echelons of a military enterprise.

4.5   THE DEFENCE PERFORMANCE MANAGEMENT FRAMEWORK

4.5.1   The Framework as a Strategy Map

The DPFM proposed by the RTG may also usefully be visualised as a strategy map. A map of the framework was thus constructed from the responses to the performance management survey, building upon lessons learned while developing individual strategy maps for some of the participating nations. It is illustrated in Figure 4-2 and Figure 4-3.

The framework contains a set of 17 high-level performance categories and shows the basic semantic relationships between them within the context of the ends-ways-means paradigm. As the colour coding in Figure 4-2 illustrates, seven performance categories belong to the means part of the framework, five categories belong to the ways part of the framework, and another five categories belong to the ends part of the framework.

In Figure 4-3 the semantic relationships between the performance categories are reversed. Instead of reading the map in the direction from means through ways to ends, it can be read in the reverse direction. The message communicated by Figure 4-2 and Figure 4-3 is the same, but the use often depends on whether the

strategy is communicated top down (Figure 4-3) or bottom up (Figure 4-2). Whereas top down communication is useful to share the strategic story of the organisation (how are we going to achieve the ultimate objectives [ends] of the organisation), bottom up communication tends to be more interesting when announcing specific initiatives linked to an objective (why are we doing this initiative? How is this helping us to implement the strategy of our organisation?). Figure 4-4 tabulates both the forward and backward relationships between performance categories in one location. In this figure, forward relationships can be read from right-to-left while reverse relationships can be read from left-to-right.

4.5.2   A Narrative Overview of the Framework

This section provides a narrative overview of the DPMF from the means > ways > ends viewpoint illustrated in Figure 4-2.

Reading from left to right, the basic resources that provide for any military endeavour are the monetary budgets appropriated by a nation's government for the purpose of defence and security. Budgets are required in order to acquire, develop, integrate, operate, maintain and divest of other types of resources including:

- Infrastructure portfolios;

- Inventories of materiel and equipment;

- Portfolios of information systems;

- Portfolios of information and intelligence;

- Organisational arrangements and pools of different types of personnel; and

- Knowledge in different domains of science and technology.

Each of these different types of resources corresponds to its own high-level performance category in the means perspective of the performance framework. Within each of these high-level performance categories the performance assessments might focus on:

- The state of the resource portfolio itself and its expected utility toward meeting the demands of other performance categories;

- The effectiveness and efficiency of life-cycle processes used to produce, renew and generate each portfolio; and

- Specific initiatives or management practices.

The interrelationships between the high-level performance categories in the means perspective will vary according to circumstances and are not specified in the DPMF.

The first of the high-level performance categories classified under the ways part of the DPMF corresponds to the ongoing execution of overarching command and control and the delivery of support services that facilitate the effective operation of a defence enterprise. More specifically this performance category encapsulates efforts that focus on directing, coordinating, balancing, controlling and supporting such things as:

- The development of strategy;

- The allocation of resources;

- The management of performance;

- The execution of strategy; and

- The management of risk across other performance categories.

As such, performance aspects pertaining to the fulfilment of roles, responsibilities and tasks by the upper echelons of leadership within a military enterprise are included under this performance category.
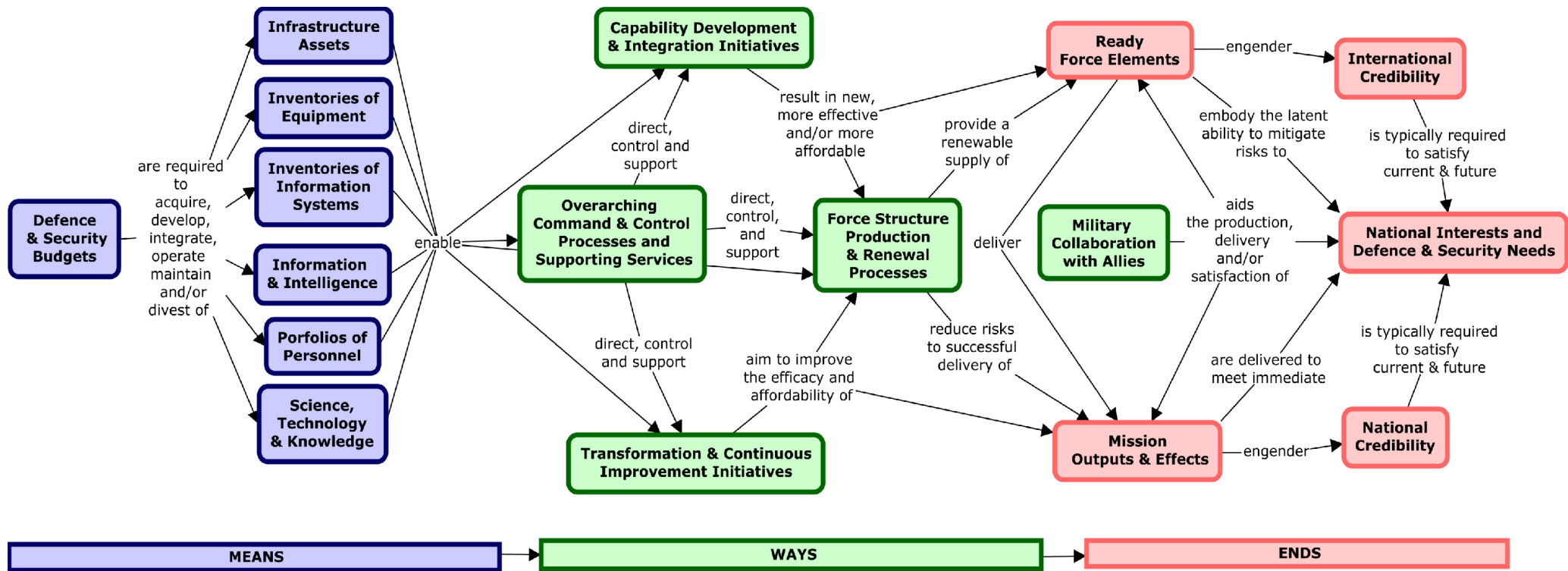
Figure 4-2: The Proposed Performance Framework – Means > Ways > Ends.
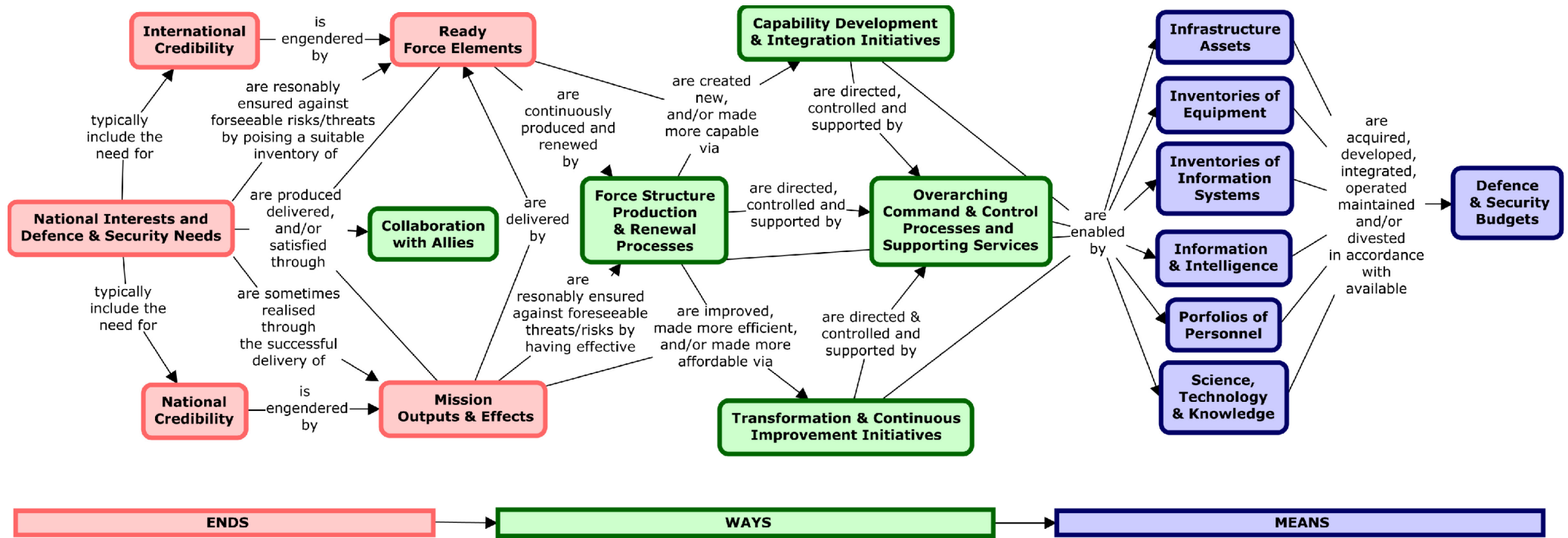
Figure 4-3: The Proposed Performance Framework – Ends > Ways > Means.

	Category(ies)	Forward relationship between categories (read left to right →)	Reverse relationship between categories (read right to left ←)	Category(ies)	
Means	- Defence & Security Budgets	are required to - acquire, - develop, - integrate - operate, - maintain and - divest of	are - acquired, - developed, - integrated, - operated, - maintained and/or - divested in accordance with available	- Infrastructure Assets - Inventories of Equipment - Inventories of Information Systems - Porfolios of Personnel - Concepts & Doctrine - Information & Intelligence - Porfolios of Personnel - Science, Technology & Knowledge	**Means**
	- Defence & Security Budgets - Infrastructure Assets - Inventories of Equipment - Inventories of Information Systems - Porfolios of Personnel - Concepts & Doctrine - Information & Intelligence - Porfolios of Personnel - Science, Technology & Knowledge	enable the delivery of	are enabled by	- Overarching Command & Control Processes and Supporting Services - Capability Development & Integration Initiatives - Transformation & Continuous Improvement Initiatives - Force Structure Production & Renewal Processes	**Ways**
Ways	- Overarching Command & Control Processes and Supporting Services	- direct, - control and - support	are - directed, - controlled and - supported by	- Capability Development & Integration Initiatives - Transformation & Continuous Improvement Initiatives - Force Structure Production & Renewal Processes	
	- Capability Development & Integration Initiatives	result in new, more effective and more affordable	are - created and - reinvented by	- Force Structure Production & Renewal Processes	
	- Transformation & Continuous Improvement Initiatives	aim to enhance the efficacy and affordability of	are made more efficient and affordable by	- Ready Force Elements - Mission Outputs & Effects	
	- Force Structure Production & Renewal Processes	provide a renewable supply of	are continuously produced and renewed by	- Ready Force Elements	
		reduce risks to successful delivery of	are reasonably ensured agained foreseeable threats and risks by having effective	- Mission Outputs & Effects	
	- Military Collaborations with Allies	aid the - production - sustainment, and - delivery of	are - produced - delivered, and - sustained through	- Ready Force Elements - Mission Outputs & Effects	
Ends	- Ready Force Elements	deliver	are delivered by	- Mission Outputs & Effects	**Ends**
		engender	is engendered by	- International Credibility	
		embody the latent ability to mitigate risks to	are reasonably ensured against foreseeable risks & threats by poising a suitable inventory of	- National Interests and Defence & Security Needs	
	- Mission Outputs & Effects	engender	are engendered by	- National Credibility - International Credibility	
		are delivered to meet immediate	are sometimes realised through the successful delivery of	- National Interests and Defence & Security Needs	
	- National Credibility - International Credibility	are typically required to satisfy current & future	are often partly satisfied by meeting requirements for		
	- National Interests and Defence & Security Needs	create a requirement for sufficient	are allocated in order to reduce risk in connection with the successful realisation of	- Defence & Security Budgets	**Means**

Figure 4-4: Forward and Reverse Relationships Between the Performance Categories.

The 'force structure production and renewal processes' category encompasses performance aspects related to producing and regenerating the overall structure and the component parts of a nation's fighting force. The

term 'force structure' refers to the aggregate collection of all force elements that belong to a nation's military. Within the force structure, individual force elements are the main vehicles through which capabilities are applied during any military operation. In other words, force elements and the formations in which they reside, are the organisational units of military force that actually execute tasks in order to achieve desired effects during military missions or in theatres of war.

A fundamental premise of the ends-ways-means paradigm is that means enable ways. As such, each of the high-level performance categories of the means perspective can drive the performance of the categories that belong to the ways perspective; however the degree of influence between the various categories can differ according to the specific strategy of the nation. The specific nature of these interrelationships is therefore not specified in the DPMF.

When defence personnel are afforded sufficient training, and the acquisition and preparation of equipment, infrastructure, information and intelligence is adequate, force elements can heighten the level of readiness. In many nations the term readiness is used to implicitly refer to the degree of risk associated with sending a formation of force elements on certain types of missions. As such, force elements are deemed to have attained a particular level of readiness when they have reached a predetermined level of competency and proficiency, and they are poised for successful participation in military operations (and international exercises) in accordance with a nation's appetite for risk.

The performance of the methods used to produce and renew forces is encapsulated in the high-level performance category 'force structure production and renewal processes'. However, performance as it pertains to the continuous existence of an adequate portfolio of ready force elements and the successful delivery of military outputs at the theatre and campaign levels is represented under two separate performance categories belonging to the ends perspective: 'ready force elements'; and 'mission outputs and effects'.

By following the semantic relationships that are drawn between the performance categories in Figure 4-2, it is evident that ready force elements embody the latent ability to mitigate risks to a nation's interests and its defence and security needs. On the other hand, when these force elements are actually employed on a mission or in a theatre of war, they produce the outputs and effects that are intended to mitigate impending risks, counter threats and thereby immediately satisfy national interests and defence and security needs. In either case, whether force elements are poised ready or whether they are executing a military mission, the ultimate focus is the satisfaction of national interests and needs. The high-level performance category 'national interests and defence and security needs' is thus included in the DPMF in order to act as a sink for all other performance categories belonging to the ends perspective.

Survival, the protection of sovereignty, economic wellbeing, and promotion of national values are just a few examples of national interests and needs. Developing an ability to assess the performance of the defence enterprise in terms of how it facilitates the fulfilment of these and other national needs and interests is an ultimate goal for defence performance measurement. In reality however, achieving this goal is very difficult. As such, two other performance categories sometimes act as a surrogate. These two categories are entitled: 'national credibility' and 'international credibility'.

National credibility often refers to the credibility and/or perceived degree of relevance that a military organisation has among its main stakeholders. These stakeholders include the nation's government, other government organisations and departments, and the nation's population. On the other hand, international credibility often refers to the credibility of one nation's military with the militaries and governments of foreign nations. It also refers to the ability of one nation's defence enterprise to facilitate the pursuit of national agendas (that may or may not be military agendas) with foreign nations and within international coalitions.

The credibility of a defence organisation to both national and international stakeholders is often enhanced when there is a perception that it accomplishes its missions successfully, ready forces are continuously

produced and renewed, and there is continued development and maintenance of new and existing military capabilities. Often, with greater credibility, defence organisations are in a better position to obtain the budgets and other necessary means that they need from their national governments in order to sustain themselves and their nation's interests over the longer term.

Returning to the ways perspective, three other high-level performance categories directly influence the production and renewal of ready forces:

- Military collaboration with allies;

- Capability development and integration initiatives; and

- Transformation and continuous improvement initiatives.

As the semantic relationships illustrate, military collaboration with allied nations can aid in the production of ready force elements and the delivery of desirable outputs during military missions or theatres of war. In addition, when combined with other instruments of national power (e.g., economic, political/diplomatic), collaborating with allied nations can also have a direct influence on a nation's ability to satisfy its national interests and its defence and security needs.

The performance category 'capability development and integration initiatives' puts focus on the efforts within a defence enterprise that add or modify individual capabilities within the portfolio of military capabilities. In this context, the term capability does not necessarily refer to a particular type of equipment, rather the term capability is more holistic. A capability is a latent ability to deliver effects during the course of mission, or during the delivery of a service, by executing tasks according to understood concepts, standards and doctrines over a range of preconceived contexts.

The alteration of a capability typically requires the execution of an initiative that aims to simultaneously alter several of its component parts, which include:

- Personnel components;

- The training and education components;

- The equipment, infrastructure and information systems components; and

- Aspects related to information and intelligence, concepts, doctrine, science and technology.

Once a capability has been developed, it is then integrated into the force structure. As its name suggests, aspects related to managing the development and integration of individual capabilities, as well as the overarching management of a nation's capability portfolio in order to meet the needs of future threats, are of primary concern to the performance category 'capability development and integration initiatives'.

Whereas capability development and integration initiatives often result in stepwise but localised changes to a nation's portfolio of military capabilities, defence organisations also engage in initiatives that either evolve over longer periods of time and/or involve making transformational changes to large swathes of the defence organisation (e.g., in terms of what is does, how it functions, or the resources that it employs). Often these initiatives are strategic in nature and aim to improve the overall efficiency and affordability of the defence enterprise as a whole. In other cases, these initiatives are smaller in scope. Regardless of the details however, aspects pertaining to management and performance of these kind of initiatives falls within the purview of the performance category entitled 'transformation and continuous improvement initiatives'.

4.5.3   Underlying Strategies in Participating Nations

When assessed against the DPMF, two main strategies driving the defence departments of most participating nations became evident.

4.5.3.1   The 'Prepare for the Future' Strategy

The first main strategy is an 'innovation' strategy, which puts a high degree of emphasis on the development of new or upgraded military capabilities. An innovation strategy typically requires capital investments, contributions to and from the science and technology industry and, ultimately, competent and trained personnel to operate new and/or modernised equipment and infrastructure. Nations may choose to develop these new capabilities themselves or collaborate within an international context (e.g., EU EDA, NATO, OCCAR).

The credibility of a defence organisation to both national and international stakeholders is enhanced when there is continued development and maintenance of new and existing capabilities, and there is steady production and renewal of ready forces. With greater credibility, defence organisations may be more likely able to obtain the budgets and other necessary means from its national government in order to sustain itself and its nation's interests over the longer term.

4.5.3.2   The 'Doing More with Less' Strategy

The second main strategy is a thrust towards enhanced efficiency. With this strategy, the need to downsize or 'do more with less' is often instilled by the national government. Very often, efficiency initiatives that affect the whole defence organisation are put in place. However, transformation initiatives can also be applied to individual segments of the organisation.

A 'do more with less' strategy usually brings pressure to reduce personnel and operating budgets, leading to changes in the organisation's programmes, practices, processes, products and services. Often there are also efforts to reduce and/or redistribute the employment of personnel, materiel, and infrastructure. Information systems including Enterprise Resource Planning tools (ERPs), business intelligence tools, and managerial costing systems are sometimes introduced or enhanced to support the implementation of new transformation and organisational efficiency initiatives that enable continuous improvement over time.

Ultimately the logic behind this strategy is that a high performing efficient organisation is not only more affordable, but also has an improved chance of mission success because it has learned to be agile. An agile organisation can effectively channel more of its resources to the front lines as they are required. More resources to the front lines help facilitate success in operations, and this is directly linked to the fulfilment of national defence and security objectives.

Greater success in operations is an important way to enhance the credibility of an organisation, whether at a national or an international level. However, there are limits to the degree that efficiency initiatives can achieve reductions without affecting the attainment of outcomes in accordance with a nation's appetite for risk. Beyond these limits, further reductions in budget or other resources will create the need for a nation to reassess whether it can realistically fulfil its currently espoused needs and interests for defence and security.

4.5.4   High-Level Performance Categories, Sub-Categories, Strategic Statements and Performance Metrics

The high-level performance categories identified under each of the ends-ways-means perspectives are not necessarily exhaustive, as the RTG primarily sought to identify the categories that occur most frequently. Further, the descriptive terms used by different nations often had slightly different meanings. As a result, in order to develop a clear and commonly understood framework, it was necessary to elaborate the content of each category by identifying sub-categories that provide more granularity. A detailed elaboration of the categories into subcategories may be found at Annex E.

In addition, Appendix E-1 provides for each sub-category a compilation of strategic statements and performance metrics derived from the survey of NATO Allies and partners. This is intended to provide an

overview of the aspects for which nations have defined goals, and of the metrics they apply in order to measure progress against these goals.

It is important to note that while the categories and sub-categories of the DPMF have been defined to be mutually exclusive, this is not necessarily the case for strategic statements and performance metrics. Nations use a limited number of strategic statements to drive performance in different categories and sub-categories, and in some cases even different perspectives. For example, the strategic statement 'Implement NATO capability goals' has been used by some nations as an objective to support the establishment of priorities and scenario based planning (a sub-category from the ways perspective), while other nations have seen this statement as a way to monitor Alliance specific readiness obligations and commitments (a sub-category from the ends perspective).

Similarly, nations use a limited number of metrics to assess progress against various strategic objectives. For example, the metric 'number of personnel in defence in absolute numbers' has been used to monitor performance related to:

- International credibility (ends);
- National transformation initiatives (ways); and
- The evaluation of manning and personnel readiness (means).

This implies that nations may use different operational definitions depending on the scope and objective of the metric.

In general, there are considerable differences between the metrics used by nations to monitor progress for an identical objective. Whereas the nations with more mature performance management systems may identify quantitative metrics that are frequently assessed, others may use only subjective measures that are used to stimulate discussion between experts and strategic decision makers.

Finally, it should be noted that for some sub-categories, no metrics have been identified. A more detailed discussion of these areas that seem to be hard to measure can be found in Chapter 5.

4.5.5 Validation of the DPMF

The results of the Systematic Literature Review (Chapter 3) were used to validate the proposed DPMF based on evidence from the literature. Mapping the categories identified in the SLR to the framework proposed by the RTG provided support for many of the categories used in the framework as well as providing some additions to be considered. Further, many publications identified in the SLR support the causal mapping of categories in the proposed framework. These findings suggest that the DPMF reflects the trends and practices in the literature.

4.6 USING THE DPMF

The framework illustrated in Figure 4-2 and Figure 4-3 can be used as a template to analyse a national strategy. Existing strategies, sets of strategic objectives, strategic thrusts, and/or performance measurement systems can be deconstructed and mapped onto this framework for the purposes of comparison, analysis, and/or assessing completeness. It is important to note, however, that it is not necessary for every strategy or strategic thrust to include each category or sub-category. The categories (and sub-categories that lie beneath them) should only be considered as a reference guide that helps to determine if a strategy or performance measurement system includes the components that are commonly used by their Allies or partners. The next chapter will provide an illustration of the results that can emerge from such an exercise.

Last but not least, the DPMF provides a strong foundation for nations that wish to renew their strategies, or that want to build new performance measurement systems. Instead of referring to performance frameworks that have been derived from industry (such as the BSC), the DPMF provides an instrument that uses a logic and a terminology that makes sense to military leaders. It will help them to focus on the common performance categories and sub-categories used by nations with a higher performance management maturity. Further, the various goals and metrics will serve as a source of inspiration, providing new nations also many alternatives when they decide on the implementation of specific goals and metrics.

4.7   REFERENCES

[1]   Braun, V., and Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative research in psychology*, 3(2), pp. 77-101.

[2]   Lykke, A.F. Jr. (February 2001). *Towards an understanding of military strategy. Guide to strategy.* U.S. Army War College, Carlisle, PA.

[3]   Kaplan, R.S., and Norton, D.P. (2004). *Strategy Maps: Converting intangible assets into tangible outcomes.* Boston: Harvard Business School Publishing Corporation.

Chapter 5 – NATIONAL INFORMATION MAPPED AGAINST THE DEFENCE PERFORMANCE MANAGEMENT FRAMEWORK

5.1 RATIONALE

In this chapter, the data from the survey responses is mapped against the DPMF. This first allows the identification of a number of propositions linked to the use of performance categories, sub-categories and metrics across defence organisations. Although the limited number of participating nations and the variety in the quality and quantity of additional data provided by these nations do not allow the drawing of rigorous conclusions, there are certainly a number of insights that, while speculative in nature, merit reflection, discussion and future research attention. Second, the assessments used within this chapter provide illustrations of how nations can use the DPMF to assess the design of their own performance measurement systems. This provides nations the opportunity to identify potential gaps in objectives and performance metrics. Using the DPMF as a benchmarking instrument will also allow nations to use the practices of other nations as a source of inspiration.

5.2 ASSESSING PERFORMANCE MANAGEMENT WITHIN AND ACROSS NATIONS

5.2.1 Identifying Blind Spots and Assessing Balance Within a Nation

The DPMF can be used to assess the overall structure of a nation's performance objectives. This may be achieved by projecting the strategic objectives of a nation onto the various categories of the DPMF. Figure 5-1 provides an overview of the result of such a projection for all the nations that participated in this research, based on their response to the survey and the additional data (white papers, guidance documents, etc.) shared with the RTG.

Defence Performance Measurement Framework Categories	#Crit	AJ	AG	JG	UY	HR	CT	MJ	AF	JE	DU	MY	EA	TOTAL		TOTAL	% of Crit
International Credibility	3	3	3	2	2	3	3	2	1	0	0	3	1	23		23	64%
National Credibility	4	1	2	0	1	4	4	4	1	0	1	4	2	24		23	48%
National Interests and Defence & Security Needs	10	3	0	0	1	6	5	2	1	0	1	5	0	24		24	20%
Mission Outputs & Effects	3	2	2	2	0	3	2	2	2	1	1	3	1	21		21	58%
Ready Force Elements (Operationality)	4	2	1	1	1	3	1	2	1	0	2	2	1	17		16	33%
Force Structure Production & Renewal Processes (Structure)	3	2	2	2	2	3	2	3	2	1	1	2	2	24		24	67%
Capability Development & Integration Initiatives	6	1	3	3	3	2	1	5	1	0	0	6	3	28		27	38%
Transformation & Continuous Improvement Initiatives (Efficiency)	4	2	1	2	2	2	3	3	2	3	3	2	2	27		27	56%
Military Collaboration and Ensuring Interoperability with Allies (Cooperation)	4	2	3	2	1	2	1	1	2	0	0	1	3	18		18	38%
Overarching Command & Control Processes and Supporting Services (Management)	5	1	2	3	0	3	3	3	2	2	3	4	1	27		24	40%
Inventories of Equipment	5	1	0	0	1	5	3	3	3	0	2	3	0	21		20	33%
Infrastructure Assets	5	1	2	0	0	2	1	3	0	0	1	5	0	15		14	23%
Inventories of Information	3	0	0	0	0	1	1	2	2	1	1	3	2	13		13	36%
Defence & Security Budgets	6	4	3	4	3	4	4	3	3	1	2	2	2	35		35	49%
Intelligence & Information	2	1	1	0	0	2	0	0	1	0	0	1	0	7		6	25%
Personnel, Organisation and Culture	8	5	3	1	4	8	6	6	7	1	1	6	5	53		53	55%
Science, Technology & Knowledge	2	0	0	0	0	2	0	2	0	0	0	1	0	5		5	21%
TOTAL	77	31	28	22	21	55	40	46	31	10	19	53	25	381			
		30	28	22	21	53	40	44	31	10	18	51	25				

Figure 5-1: Frequency Count of the Proposed Framework's Sub-Categories Within the Performance Management Systems of the Participating Nations.

The first column lists the high-level performance categories of the DPMF's ends, ways and means perspectives. The second column, in blue, lists the number of sub-categories that have been identified by the RTG for each performance category. These are set out in Annex E. For the category 'International Credibility', for example, three sub-categories have been defined (national credibility and reputation pertaining to NATO and EU; general international credibility and reputation that is not specific to NATO and EU; multi-lateral diplomacy, treaties and other engagements with foreign military organisations). The columns AJ to EA represent the 12 participating nations by their two-letter codes. The numbers in the column are the number of sub-categories that could be identified for each high-level performance category within the strategic objectives of each nation. For example, within the strategic objectives of nation AJ, all three sub-categories that make up the performance category 'International Credibility' could be identified, whereas for nation DU, no strategic objectives related to this performance category could be found.

The colour coding within Figure 5-1 provides an idea of the coverage of the strategic objectives of a nation for the various categories: green cells indicate good coverage, while red cells indicate low coverage. The totals found at the bottom of each column indicate the overall alignment of the strategic objectives of a nation with the DPMF; the four nations colour coded green are those with the best fit to the DPMF and could therefore be considered benchmark nations.

Two of these four nations, HR and CT, form the 'confident user' cluster identified in the cluster analysis in Chapter 2 (Figure 2-1), while the other two, MJ and MY, are members of the 'learning cluster'. Qualitative analysis of the data provided by the nations revealed that these nations could also be considered higher performing nations with regard to the implementation and use of their performance management systems. If it can be assumed that a higher coverage of the various categories of the DPMF reflects a better design of the overall performance measurement system, this finding aligns with an important hypothesis presented in the performance measurement literature [1], which proposes that the design of the performance measurement system is a critical factor in increasing the success rate of performance measurement implementation and use.

Nations that are struggling with their performance management efforts should therefore make use of the DPMF to strengthen the design of their performance management system and thus to increase the success rates of their measurement and management efforts. This can be achieved in two ways. First, nations can look for weaknesses in specific performance categories. Nation CT, for example, has blind spots with regard to Science and Technology and Intelligence and Information and might consider improving its strategic reflections on these topics. Second, an assessment could reveal potential problems with the focus of a nation's strategic objectives, i.e. the lack of balance between objectives in the ends, ways and means perspectives. Nation EA, for example, has a fair number of objectives related to the means perspective, but lacks objectives related to the ends and ways perspectives. This kind of balance check may also indicate a lack of understanding of the causal linkages between various objectives. This aligns with the findings of the RTG survey that demonstrated that many nations do not use their performance measurement system to investigate links between strategic objectives, metrics and initiatives (i.e., as an important source of information for proactive performance management), but rather use it solely as a reporting system.

5.2.2   Blind Spots, Specific and Common Categories Across Nations

To assess strengths and weaknesses more generally across nations, the data from Figure 5-1 was used to create the two-by-two matrix presented in Figure 5-2. The y-axis of this figure indicates the number of sub-categories that are found within the performance categories of the DPMF, while the x-axis indicates how well the sub-categories where shared across nations (coverage of a sub-category). For example, for the performance category 'Science, Technology and Knowledge' only two subcategories were identified from the performance management survey meaning a low score on the y-axis. And across all nations, only five objective statements could be linked to these sub-categories from a potential total maximum of 24 (two times twelve in the case that every nation formulated one objective for each sub-category). This leads to a total coverage of 21% meaning a low score on the x-axis also.

	High	Nation Specifics			Common Containers		
		National Interests and Defence & Security Needs	20		Personnel, Organisation and Culture		55
		Capability Development & Integration Initiatives	38		Defence & Security Budgets		49
		Overarching Command & Control Processes and Supporting Services (Management)	40				
		Inventories of Equipment	33				
Number		Infrastructure Assets	23				
of							
Sub-categories							
		Blind Spots			Shared Specifics		
		Ready Force Elements (Operationality)	33		International Credibility		64
		Military Collaboration and Ensuring Interoperability with Allies (Cooperation)	38		National Credibility		48
		Inventories of Information	36		Mission Outputs & Effects		58
		Intelligence & Information	25		Force Structure Production & Renewal Processes (Structure)		67
	Low	Science, Technology & Knowledge	21		Transformation & Continuous Improvement Initiatives (Efficiency)		56
		Low					High
				Coverage of Subcategories			

Figure 5-2: Performance Categories Quadrant.

The right-hand quadrants of this matrix represent the performance categories that are generally well covered by all nations. For these categories, several nations have formulated objectives, which together provide good coverage across the nations for these categories. The top right quadrant represents 'common containers': these are performance categories for which several sub-categories have been identified that in general are well covered in the strategic objectives of nations. It is noteworthy that the categories in this quadrant are all input oriented, relating to performance with regard to budgets and staff. The lower right quadrant represents the 'shared specifics'. These performance categories include a smaller number of sub-categories and seem to represent shared concerns of military performance. The qualitative analysis revealed that many nations tend to define similar objectives for these categories. They include the most common ends perspective categories (international and national credibility, mission outputs and effectiveness) and ways perspective categories (force structure production, transformation and continuous improvement).

The left-hand quadrants represent categories that are associated with objective statements that are largely different from one nation to another. The top left-hand categories represent 'nation specific' objectives. The categories in this quadrant are composed of several sub-categories, but the coverage for these categories is rather low. The qualitative data of the study demonstrates significant differences between the objectives of nations in these categories. They refer to ends, ways and means that are largely specific to the nation's ambition and way of working. The lower left-hand quadrant represents categories that have few sub-categories and that at the same time are poorly covered by nations. They represent 'blind spots' for the majority of nations and therefore require more attention in future research.

Both 'science, technology and knowledge' and 'intelligence and information' are located in this quadrant, suggesting that these areas are under-represented or poorly supported with data in the strategic-level discussions of the participating countries. Another blind spot is 'inventories of information' (which largely refers to strategic objectives related to information systems), which might indicate that several nations are currently underestimating the need to innovate their organisation to be ready for the digital century. Finally, 'collaboration and interoperability with allies' and 'operational readiness' might require more attention on the strategic agenda of several nations as well.

5.3   COMMONLY VERSUS POORLY MEASURED SUB-CATEGORIES

5.3.1   Commonly Measured Sub-Categories

Figure 5-3 provides an overview of the number of performance metrics used by nations to measure performance for each of the sub-categories of the DPMF. For the sub-category 'national credibility and reputation pertaining to NATO and EU', for example, 11 instances of the use of metrics were identified from the survey of participating nations. These are recorded as "strategic statements" in the tables of Annex E.

Note, however, that some of these instances make use of the same metric: for this particular sub-category, only 7 distinct metrics were identified, but some of these were used by more than one nation. For the sub-category 'Protect against terrorism (foreign and domestic)' no metrics were identified in the survey data.

International Credibility — Total 17
11	National credibility & reputation pertaining to NATO & EU
4	General international credibility & reputation that is not specific to NATO and EU
2	Multi-lateral diplomacy, treaties & and other engagments with foreign military organisations

Ready Force Elements — Total 11
5	General and mission-specific readiness
2	Contribution of reserve forces (may include temporary conscripts)
4	Alliance specific readiness obligations and committements
0	Pre-positioning

National Interests and Defence & Security Needs — Total 3
2	Protect national sovereignty, territorial integrety and national way-of-life
1	Contribute to the achievement of overarching national interests & level of ambition
0	Provide continental defence, international stabilisation & support to allies
0	Protect against terrorism (foreign & domestic)
0	Provide security via anti-proliferation and disarmament
0	Provide security by ensuring human safety & emergency response
0	Facilitate the attainment of particular political Interests
0	Provide social relevance to the citizens of the nation
0	Facilitate the enforcement of national and international laws
0	Facilitate the attainment of particular economic Interests

National Credibility — Total 6
4	Public support for Defense
1	Social & Evironmental Responsibility
0	Strategic communication and reporting to parliament, politicians and public
1	Alignment of defence with national government leadership

Mission Outputs & Effects — Total 23
17	Military operations and standing military tasks
0	Defence services & military collaborations with other government organisations
6	Ongoing command, control and coordination of military tasks

Capability Development & Integration Initiatives — Total 15
4	Specific areas of focus for developing national capabilities
1	Establishment of priorities and scenario based planning
4	Capabilities design, capability management and integrating the fundamental elements of capability
2	Operational experiences & lessons learned
1	Capability sufficiency analysis and integrated capability planning
3	Concepts, Doctrine and Experimentation

Military Collaboration and Ensuring Interoperability with Allies — Total 2
1	Interoperability improvements
1	Common Weapon Programs
0	Integration within multinational coalitions
0	Multinational Training

Force Structure Production & Renewal Processes — Total 11
6	Adequacy and balance in the force structure & force posture
4	Production and renewal of the force
1	Readiness-related training

Overarching C&C Processes and Supporting Services — Total 10
2	Performance management & reporting
1	Risk & consequence management
7	Strategic management practice
0	Internal Auditing
0	Support Services

Transformation & Continuous Improvement Initiatives — Total 10
4	National transformation initiaties
3	Overarching efficiency, cost reduction and mandate rationalization initiatives
3	Focused Improvement Initiatives
0	Alliance Transformation

Inventories of Equipment — Total 18
5	Material availability, readiness and contingency for operations
3	The overarching management of equipment programs / portfolios
10	The execution of materiel acquisition & procurement
0	The execution of ongoing materiel maintenance, testing, upgrade and divestment
0	Equipment-specific policy & strategy

Personnel, Organisation and Culture — Total 73
17	The management of manning, organisational structure and personnel readiness
13	Care, support & morale of defence personnel
4	Recruitment & selection
18	Job attractiveness
8	Career planning, individual education and professional development
9	Management of retention, transition, attrition and departure
2	Working Conditions
2	Management of the reserve force

Infrastructure Assets — Total 17
3	Availability of infrastructure and infrastructure expertise in accordance with operational requirements
4	Infrastructure acquisition, construction and betterment
6	Infrastructure & real estate portfolio management
2	Infrastructure divestment & disposal
2	Environment

Science, Technology & Knowledge — Total 7
6	Identification and development of defense science and technologies
1	Collaboration with industry with regard to science and technology

Inventories of Information Systems — Total 13
6	Strategic information system initiatives
5	Management of information systems portfolios
2	Ongoing information systems acquisition, deployment, security, user support, and divestment

Defence & Security Budgets — Total 26
4	Budget allocation and expenditure control
4	Levels of fiscal appropriation from the national government for purposes of national defence
13	The relative balance in the alloction of fiscal resources across budget partitions
1	Funding provided to international alliances
2	Financial arrangements
2	The relative balance in the allocation of fiscal resources across defence programs

Information & Intelligence — Total 0
0	Knowledge, intelligence, foresight & anticipation
0	Intelligence preparation, organization, procedures & adaptation

Figure 5-3: The Use of Metrics by Performance Sub-Category.

The colour coding provides an idea of the sub-categories that are typically well measured, versus the sub-categories that lack metrics and therefore represent areas that are either difficult to measure, or areas that are that are insufficiently developed as strategic themes to have resulted in specific metrics.

Figure 5-4 provides an overview of the most frequently measured sub-categories: the metrics of these sub-categories represent 64% of all observed metrics. The colour coding of the '# of Metrics' column highlights the overall top measured sub-categories: the sub-categories with 10 or more observations represent 38% of all reported metrics.

Category	Subcategory	# of Metrics
Mission Outputs & Effects	Military operations and standing military tasks	17
International Credibility	National credibility & reputation pertaining to NATO & EU	11
Mission Outputs & Effects	Ongoing command, control and coordination of military tasks	6
Ready Force Elements	General and mission-specific readiness	5
Overarching C&C Processes and Supporting Services	Strategic management practice	7
Force Structure Production & Renewal Processes	Adequacy and balance in the force structure & force posture	6
Personnel, Organisation and Culture	Job attractiveness	18
Personnel, Organisation and Culture	The management of manning, organisational structure and personnel readiness	17
Personnel, Organisation and Culture	Care, support & morale of defence personnel	13
Defence & Security Budgets	The relative balance in the alloction of fiscal resources across budget partitions	13
Inventories of Equipment	The execution of materiel acquisition & procurement	10
Personnel, Organisation and Culture	Management of retention, transition, attrition and departure	9
Personnel, Organisation and Culture	Career planning, individual education and professional development	8
Inventories of Information Systems	Strategic information system initiatives	6
Infrastructure Assets	Infrastructure & real estate portfolio management	6
Science, Technology & Knowledge	Identification and development of defense science and technologies	6
Inventories of Equipment	Material availability, readiness and contingency for operations	5
Inventories of Information Systems	Management of information systems portfolios	5

Figure 5-4: Most Frequently Measured Performance Sub-Categories.

The colour coding of the column 'Subcategory' highlights the most frequently measured sub-categories. Personnel metrics clearly dominate the measurement systems of the participating nations, followed by metrics relating to mission outputs and effects, material (inventories of equipment), budgets and international credibility. It should be noted however that even if a sub-category seems to be well measured, the metrics used by different nations can still be very different. The metrics in the sub-category 'military operations and standing military tasks' are, for example, mostly different for each nation, while the metrics relating to international credibility are largely the same for all nations and relate to those used by NATO to evaluate the contributions of nations to the Alliance.

Figure 5-3 and Figure 5-4 together indicate that much attention is paid to those metrics relating to the means perspective. This implies that there is a strong emphasis by nations on the management of resources, with more attention paid to the inputs of the organisation than to its outputs (the ends perspective) or processes (the ways perspective). This may relate to the challenges that most defence organisations have experienced in recent years related to obtaining resources and funding, to the relative ease of measuring categories of the 'means' perspective, and to the use of 'means' metrics by both NATO and the EU in their reporting on the defence spending of their members.

5.3.2   Poorly Measured Sub-Categories

Figure 5-5 provides a summary of the sub-categories of the framework that are poorly measured (fewer than two metrics each). These sub-categories represent 55% of all sub-categories, but barely represent 12% of the

observed metrics. For 25% of the sub-categories (the lower part of Figure 5-5) no metrics were identified in the performance management survey at all – while nations do have specific strategic objectives related to these sub-categories, they have no metrics to track progress.

Category	Subcategory	# Metrics
International Credibility	Multi-lateral diplomacy, treaties & other engagments with foreign military organisations	2
National Interests and Defence & Security Needs	Protect national sovereignty, territorial integerty and national way-of-life	2
Ready Force Elements	Contribution of reserve forces (may include temporary conscripts)	2
Capability Development & Integration Initiatives	Operational experiences & lessons learned	2
Overarching C&C Processes and Supporting Services	Performance management & reporting	2
Infrastructure Assets	Infrastructure divestment & disposal	2
Infrastructure Assets	Environment	2
Inventories of Information Systems	Ongoing information systems acquisition, deployment, security, support, & divestment	2
Personnel, Organisation and Culture	Working Conditions	2
Personnel, Organisation and Culture	Management of the reserve force	2
Defence & Security Budgets	Financial arrangements	2
Defence & Security Budgets	The relative balance in the allocation of fiscal resources across defence programs	2
National Credibility	Social & Evironmental Responsibility	1
National Credibility	Alignment of defence with national government leadership	1
National Interests and Defence & Security Needs	Contribute to the achievement of overarching national interests & level of ambition	1
Military Collaboration and Ensuring Interoperability with Allies	Interoperability improvements	1
Military Collaboration and Ensuring Interoperability with Allies	Common Weapon Programs	1
Capability Development & Integration Initiatives	Establishment of priorities and scenario based planning	1
Capability Development & Integration Initiatives	Capability sufficiency analysis and integrated capability planning	1
Force Structure Production & Renewal Processes	Readiness-related training	1
Overarching C&C Processes and Supporting Services	Risk & consequence management	1
Science, Technology & Knowledge	Collaboration with industry with regard to science and technology	1
Defence & Security Budgets	Funding provided to international alliances	1
National Credibility	Strategic communication and reporting to parliament, politicians and public	0
National Interests and Defence & Security Needs	Provide continental defence, international stabilisation & support to allies	0
National Interests and Defence & Security Needs	Protect against terrorism (foreign & domestic)	0
National Interests and Defence & Security Needs	Provide security via anti-proliferation and disarmament	0
National Interests and Defence & Security Needs	Provide security by ensuring human safety & emergency response	0
National Interests and Defence & Security Needs	Facilitate the attainment of particular political Interests	0
National Interests and Defence & Security Needs	Provide social relevance to the citizens of the nation	0
National Interests and Defence & Security Needs	Facilitate the enforcement of national and international laws	0
National Interests and Defence & Security Needs	Facilitate the attainment of particular economic Interests	0
Ready Force Elements	Pre-positioning	0
Mission Outputs & Effects	Defence services & military collaborations with other government organisations	0
Military Collaboration and Ensuring Interoperability with Allies	Integration within multinational coalitions	0
Military Collaboration and Ensuring Interoperability with Allies	Multinational Training	0
Transformation & Continuous Improvement Initiatives	Alliance Transformation	0
Overarching C&C Processes and Supporting Services	Internal Auditing	0
Overarching C&C Processes and Supporting Services	Support Services	0
Inventories of Equipment	The execution of ongoing materiel maintenance, testing, upgrade and divestment	0
Inventories of Equipment	Equipment-specific policy & strategy	0
Information & Intelligence	Knowledge, intelligence, foresight & anticipation	0
Information & Intelligence	Intelligence preparation, organization, procedures & adaptation	0

Figure 5-5: Poorly Measured Performance Sub-Categories.

This testifies to the difficulty of measuring performance in some of these sub-categories. Each nation surveyed was able to specify areas that they find difficult to measure. Several nations could benefit from the experience of those that have reached a higher level of maturity with regard to performance measurement. It could therefore be valuable to develop and share more detailed case studies focusing on some of these sub-categories.

Notably, several of these poorly measured sub-categories relate to national interests and national credibility. It might be surmised that while most countries have a clear view on the importance of assuring the credibility of their organisation towards alliance partners, they might underestimate the importance of demonstrating performance and progress in categories that are important to assure national support.

5.4 REFERENCES

[1] Keathley, H. (2016). Empirical investigation of factors that affect the successful implementation of performance measurement systems (Doctoral dissertation, Virginia Tech and Royal Military Academy of Belgium).

Chapter 6 – INSIGHTS FROM EXPERTS

6.1 THE EXPERT PANEL DISCUSSION

The expert panel discussion took place during a one-day seminar in Brussels. The experts were sent a draft version of this report and were asked to provide detailed feedback and comments. In addition, they were asked to clarify the main findings of their own work in relation to the findings of the report. For this purpose, each expert prepared a short presentation and answered the questions of the RTG.

The Systematic Literature Review allowed the RTG to pinpoint the leading authors on performance measurement within the public sector in general, and within the military more specifically, and to identify the clusters of researchers who frequently collaborate. The RTG was thus able to assemble an expert panel representing different research clusters. Three experts formed the panel: Dr Robert Beeres (NLD), Dr Bernard Marr (GBR) and Dr Eileen Van Aken (USA). They are briefly introduced below, followed by a summary of their main recommendations.

6.2 THE PANEL

6.2.1 Robert Beeres (NLD)

Robert Beeres is an associate professor of defence accounting and control at the Netherlands Defence Academy and at the Nyenrode Business Universiteit. His research focuses on the development of accountability systems, burden sharing and measures of effectiveness in military organisations. On these subjects he has published a number of peer-reviewed international articles. He has recently co-edited volumes on managing military organisations and the Dutch military mission in Uruzgan.

6.2.2 Bernard Marr (GBR)

Bernard Marr is a best-selling business author, keynote speaker and consultant in strategic performance, analytics, KPIs and big data. His leading-edge work with major companies, organisations and governments across the globe makes him a globally acclaimed and award-winning researcher, consultant and teacher. Bernard is acknowledged by the CEO Journal as one of today's leading business brains and by LinkedIn as one of the World's top 100 Business Influencers. He has written a number of seminal books and over 200 high profile reports, including the international best-sellers 'Big Data', 'Key Performance Indicators: The 75 Measures Every Manager Needs To Know' and 'Doing More with Less'.

6.2.3 Eileen Van Aken (USA)

Eileen M. Van Aken is an Associate Professor and Associate Department Head in the Grado Department of Industrial and Systems Engineering at Virginia Tech. She is the Director of the Enterprise Engineering Research Lab, conducting research with organisations on Performance Measurement, organisational improvement methods, lean work systems, and team-based work systems. She is a senior member of the Institute of Industrial Engineers and the American Society for Quality and is a member of the American Society for Engineering Management and the American Society for Engineering Education. She is a Fellow of the World Academy of Productivity Science.

6.3 RECOMMENDATIONS OF THE EXPERT PANEL CONCERNING THE DESIGN OF A PERFORMANCE MEASUREMENT SYSTEM

6.3.1 Customising the Framework

The experts agreed that the new framework makes sense: it provides a clear connection between outcomes and enablers through an ends-ways-means paradigm. As most of the proposed categories and sub-categories are specific to defence, the framework has face validity, facilitating acceptance by defence leaders. It will remain vital, however, for nations to translate this generic strategy into practice: every national strategy will be different and further research to provide guidelines for tailoring might be valuable. This research could also build on this work to further differentiate between strategies that align with the ambitions of different clusters of nations. It might be valuable, for example, to develop specific strategic templates that better reflect the differences between following and leading nations.

6.3.2 Assuring Balance Across Perspectives

Most nations have many metrics that are input-oriented (i.e., resource metrics from the means perspective with a strong focus on personnel, equipment and budgets), but fewer output and outcome metrics. These are essential to assess the ultimate delivery of defence and to satisfy key stakeholders. A lack of these types of metrics makes it difficult to assess effectiveness and efficiency of defence. It can however be challenging to move from a budgeting approach to an approach that stimulates accountability. This is often a problem in public management in general and, as a result, a more detailed comparison of the findings of this report with the literature on public management could be valuable.

6.3.3 Involving Key Stakeholders to Shift from Reporting to Decision Making

The survey suggests that the defence performance measurement system of many countries still has a strong focus on reporting. Effective performance measurement systems, however, are not about collecting information and reporting, but rather about assisting decisions and providing actionable information. The following elements are essential to overcome this challenge:

- Avoiding the delegation of the design of the measurement system: key questions need to come from key leaders. This implies the engagement of senior management at the design stage, requiring time and commitment.

- Facilitating the development of an integrated perspective that includes the view of various stakeholders from different forces. There seem to be different value orientations, with significant differences between Navy, Army, and Air Force. Currently, this often translates into different frameworks for performance measurement and different mental models aimed at optimising the performance of the overall defence organisation. Future research is needed to study how the proposed framework aligns with the current models used by different forces, and to articulate how the framework should be deployed throughout the whole organisation.

6.3.4 Measuring What Counts

Customisation also implies that nations should ensure that they measure what counts before linking objectives with metrics and deliverables. The basis for the development of the performance measurement system has to be a strategy that matches the nation's context. For this purpose, it is important to start by asking questions to identify what constitutes 'key' performance. More (metrics) is not necessarily better.

Measuring what counts also implies developing better metrics for the two main production processes of defence organisations: 'prepare' and 'crisis response'. The current study highlights challenges related to both processes:

- Many countries experience difficulties in measuring 'crisis response'. This type of metric remains very subjective and narrow in scope.

- This translates to a large diversity of metrics across nations that focus on the contributions of the individual nation and the performance of their own troops.

- Metrics are often inwardly-focused (resources) and not focused on outputs. There is a general need to better understand the benefits of defence from a security, economic (e.g., jobs, technology, spin-offs) and non-economic perspective [1], [2].

6.3.5 Developing Measures that Stimulate Collaboration Across Nations

Whereas the participating nations clearly formulate multiple strategic objectives that relate to international collaboration, there are relatively few metrics that allow the clear articulation of the progress and the benefits of this collaboration. From a mission perspective this could imply developing common metrics of burden sharing (see Refs. [1], [2]), but equally importantly, it may be necessary to develop collaboration metrics related to the preparation process, including for specific training, interoperability, and joint capability development activities.

6.4 RECOMMENDATIONS OF THE EXPERT PANEL CONCERNING THE IMPLEMENTATION AND USE OF A PERFORMANCE MEASUREMENT SYSTEM

Goals can only be achieved through action. This implies that performance should be linked to action plans, milestones and meaningful progress indicators, and that the impact of initiatives and plans should be assessed. Besides improving the design of their performance measurement systems, military organisations also need to improve the implementation and use of these systems. The following recommendations should guide the design of improved performance reporting and review meetings.

6.4.1 The Interpretation of Performance

Nations need to ensure that review meetings move beyond reporting: the basics of performance communication relate to understanding performance. The appropriate design of reports (e.g., A3 reporting) needs to stimulate the interpretation of data (visualisation) and the understanding of context information.

6.4.2 Preview versus Review Meetings

Frequent but efficient and effective meetings are essential to keeping performance management efforts alive. Recommendations include spending more time on predicting the future (developing a forward-looking strategy) rather than discussing the statistics of the past, and moving from a review to a preview meeting by focusing on 5/6 topics per meeting.

6.4.3 Challenging the Strategy

The dominant military culture generally does not like 'red' performance metrics: there seems to be a fear of not being perfect and therefore an urge to turn red (chaos) into green (stability). To ensure that the organisation continues to drive performance, it is therefore essential to focus on measures pointing towards the future (i.e., hypothesising and testing cause and effect). The goal is to challenge the strategy and to focus on what to do differently.

6.4.4   Cultural Change – Stimulating Honest Feedback and Assessment

Successful performance measurement implies the collaboration of cross-functional teams and the joint assessment of common objectives. To assure cultural change in defence organisations, it is essential to encourage the development of a performance culture alongside the development of the performance management system. This implies leadership development and coaching of the overall change process behind the implementation of the strategy.

6.4.5   Political Influence

Defence is submitted to a context of various external stakeholders that can influence the definition and perception of performance. To manage political interference, it can be valuable to create separate performance reporting systems for internal and external purposes.

6.5   REFERENCES

[1]   Beeres, R., De Waard, E., and Bollen, M. (2010). Ambitions and opportunities for assessing military performance in crisis response operations. *Financial accountability & management,* 26(3), pp. 344-366.

[2]   Beeres, R., and Bogers, M. (2012). Ranking the performance of European armed forces. *Defence and peace economics*, 23(1), pp. 1-16.

Chapter 7 – CONCLUSIONS

The study reported here has investigated the extent to which, and how, strategic-level decision makers in twelve NATO and partner defence organisations make use of performance management and measurement systems to assess the performance of the organisations for which they are responsible. The data, collected through a questionnaire and from relevant national publications shared with the RTG, has identified a high level of diversity in the maturity of the performance measurement systems of the participating nations. While the systems of two nations with relatively mature performance measurement systems might be seen as benchmarks, the systems of the other nations can be characterised as having only moderate or low levels of maturity. Some nations even declined to participate in the RTG's survey due to the near or complete absence of a performance measurement system at the top of their defence organisations. These findings are further confirmed by the Systematic Literature Review on performance measurement in defence, conducted in support of this study, which also demonstrated the low state of maturity with regard to performance measurement in this particular context.

The research has illustrated the numerous challenges that many nations have experienced when trying to implement performance measurement systems for their strategic defence decision makers. Some of the challenges reported to the RTG by nations include: the difficulties of defining a balanced set of coherent strategic goals in the absence of a performance framework tailored to defence; the alignment of measures and initiatives with strategic objectives; the difficulties in measuring performance in certain categories of interest to decision makers; the failure to implement functioning performance measurement systems despite the intent of the senior leadership, and the limited use of performance measurement systems for decision making.

To address these and other issues, defence organisations will be greatly assisted by better designing, implementing and using performance measurement systems to support strategic decision makers. As a contribution to meeting this challenge and taking account of the recommendations of performance measurement experts consulted during the study, this report has developed a coherent Defence Performance Management Framework (DPMF) tuned to the context of strategic-level defence decision making. The DPMF comprises a depiction of characteristic high-level defence performance categories, their underlying relationships, and possible performance measures for the various categories. It is intended to provide the senior defence leadership with a powerful instrument to assess their current approach to the definition and measurement of strategic goals, and to allow them to orient the activities and outputs of their organisations with strategic goals and key performance indicators. The framework may be used as a starting point for nations that wish to evaluate their existing performance measurement schemes, or by nations that wish to build new ones.

National data gathered by the RTG has been mapped against the DPMF in order to identify a number of propositions linked to the use of performance categories, sub-categories and metrics across defence organisations. This exercise also illustrates how nations can use the DPMF to assess the design of their own performance measurement systems, including providing the opportunity to identify potential gaps in objectives and performance metrics. Although rigorous conclusions cannot be drawn from this exercise, several insights merit reflection, discussion and future research attention. These include the findings: that more attention is generally paid in defence organisations to the measurement of means (i.e. resources) rather than ways and ends; that several nations lack clear objectives and measures related to national interests and credibility, although all regard these as important defence objectives; that a number of nations neglect important performance categories, including those related to science and technology, information and intelligence; and that relatively few metrics support the systematic evaluation of collaboration between nations.

In addition to these findings, the RTG has identified two significant challenges in this area that would merit further research. First, despite management intent, the deployment of measurement systems within defence organisations appears to have been problematic for nations and challenges of implementation deserve closer scrutiny. Second, the relationship between cultural change within defence organisations and the use of performance measurement is ill-defined. Further research would assist future defence strategic leaders in using performance management to drive strategic change within their organisations.

Annex A – PERFORMANCE MEASUREMENT QUESTIONNAIRE

> **Performance Management Questionnaire: Introduction**

Thank you for helping with this research of the System Analysis and Studies Panel of NATO's Science and Technology Organisation. Better understandings of performance management practices within NATO nations will help us to identify common practices and make recommendations for all nations on how to improve their existing approach.

Our objective is to analyse the use of performance management practices in NATO nations and NATO with a view to establishing some common practices that would benefit individual nations and address the needs of NATO.

As a first step, we hope to gather as much information as possible about existing practice within NATO member states; hence this questionnaire. While the exact positions of the individuals most suited to answer this questionnaire will vary from nation to nation, we anticipate that this questionnaire will be best answered by staff at the strategic level, either in the MoD or the defence forces, who work with the overall management of defence or the defence programme, or their nation's performance management system.

As an expert on performance management we would like to gain insights from your experience through a telephone interview of about 60 – 90 minutes. We are sending you this questionnaire in advance to help with your preparation: please do not attempt to fill it in before you are contacted by an SAS-096 panel member. We hope that you will also be ready to supply us with any relevant supporting documentation. Your participation is extremely valuable to the success of this research.

We assure confidentiality and anonymity to all participants. Only your interviewer will know your answers to the questions, and only aggregated answers will be used to support the overall research aims – no individuals will be linked to specific responses.

As a token of our appreciation, we offer you the option of receiving a summary report of the survey results by providing us your e-mail address. We assure that your identity will be kept confidential at all times and that your contact details will only be used for sending you the results.

Thank you for your support!

Background Information

1. Your country.

2. Your name (this information will be converted into an anonymous code that will be used for further analysis of the survey results).

3. Your contact information.

4. The name of your organisational unit.

5. Your title and role/function in the organisation.

6. How long have you been working in this organisation? In your current role?

Survey Questions

SAS-096 Objective 1: Analyse the use of performance management practices in NATO nations and NATO with a view to establishing some common practices that would benefit individual nations and address the needs of NATO.

The questions in this Section ask general information about your nation's performance measurement system (or performance scorecard) and performance management practices.

Please review the following definitions BEFORE answering any questions in this Section.

Definitions of key terms:

Performance Management: use of performance information to effect positive change in organisational culture, systems and processes, by helping to set agreed-upon performance goals, allocating and prioritising resources, informing managers to either confirm or change current policy or programme directions to meet these goals, and sharing results of performance in pursuing those goals.[1]

Performance Information: the relevant information that enables leaders and their stakeholders to understand the performance level of their organisation.

Performance Measure: a metric used to quantify the efficiency and/or effectiveness of action.[2]

Performance Measurement System: A system that focuses on conveying financial and non-financial measures that influences decision making and managerial action taking to maintain or alter patterns in organisational activities. The recording, analysing, and distributing of this information is often based on predetermined practices and at present times in the business cycle.[3]

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[1] Adapted from: D. Amaratunga, D. Baldry, "Moving from performance measurement to performance management," *Facilities* 20, nos. 5/6 (2002): 217–223.

[2] Adapted from: A.D. Neely, J.F. Mills, M.J. Gregory, K.W. Platts, "Performance measurement system design – a literature review and research agenda," *International Journal of Operations and Production Management* 15, no. 4 (1995): pp. 80–116.

[3] Adapted from: A. A. de Waal, *Quest for balance: the human element in performance management systems.* New York: J. Wiley, 2002.

1. What is the critical information that provides a <u>strategic-level</u> view of the performance of the MoD and the armed forces?

2. Is this critical information conceptualised as an overarching structure such as a strategic map, balanced scorecard perspectives etc.? How is this structure used?

   a. Please indicate your level of agreement with the following statements *(check only one for each statement)*

	Strongly Disagree	Disagree	Tend to Disagree	Tend to Agree	Agree	Strongly Agree	Not known
1. We conceptualise critical information within an overarching structure.	1	2	3	4	5	6	
2. We prioritise objectives/tasks in the overarching structure.	1	2	3	4	5	6	
3. We align the budget to the overarching structure (the budget is assigned to the highest priority, most relevant activities).	1	2	3	4	5	6	
4. We cascade the overarching structure down to lower levels in the organisation.	1	2	3	4	5	6	
5. The performance measurement system and overarching structure are integrated so that measures are consistent with the objectives stated.	1	2	3	4	5	6	

   b. Please describe this overarching structure, if applicable.

3. Areas in which measures or other information are collected.

   a. Please indicate the categories in which you collect measures or other information related to the assessment of performance.

	Measures	Information	Examples
1. Financial			
2. Operational effectiveness, e.g. DOTMLFPI or similar			
3. National credibility/image			
4. International credibility/image			
5. Ongoing operations			
6. Transition/reform progress			
7. Armed forces personnel well-being			
8. Efficiency			
9. Capability development			
10. Initiatives			
11. Other*			

      i.   *Please describe any other categories in which you collect measures or other information related to the assessment of performance.

    b.   Please provide a complete list of the measures or other information related to the assessment of performance you collect.

    c.   What are the areas that are difficult to measure? Why?

4. How does management use this performance information in support of strategic decision making?

    a.   Please indicate your level of agreement with the following statements *(check only one for each statement.*

	Strongly Disagree	*Disagree*	*Tend to Disagree*	*Tend to Agree*	*Agree*	*Strongly Agree*	*Not known*
1. We use performance information to make resource allocation decisions.	1	2	3	4	5	6	
2. We use performance information to redistribute personnel.	1	2	3	4	5	6	
3. We use performance information as a basis for policy changes.	1	2	3	4	5	6	
4. We use performance information to make investment decisions.	1	2	3	4	5	6	
5. We use performance information to monitor restructuring efforts.	1	2	3	4	5	6	
6. We use performance information to adjust the objectives/tasks found in the overarching structure.	1	2	3	4	5	6	
7. We use performance information to produce reports for senior leadership or other stakeholders.	1	2	3	4	5	6	

i. Please provide any comments or elaboration.

b. Use of performance information:[4] monitoring. Please indicate your level of agreement with the following statements *(check only one for each statement)*.

	Strongly Disagree	Disagree	Tend to Disagree	Tend to Agree	Agree	Strongly Agree	Not known
1. Senior leadership or other stakeholders receive results on key performance measures on a regular basis.	1	2	3	4	5	6	
2. Performance portrayals and or reports are updated in a timely manner.	1	2	3	4	5	6	
3. Performance data are collected in a timely manner.	1	2	3	4	5	6	
4. Performance data collected are reliable and valid.	1	2	3	4	5	6	
5. Procedures for collecting performance data are well defined.	1	2	3	4	5	6	
6. Methods and tools used to collect performance data are effective.	1	2	3	4	5	6	

Notes:

c. Use of performance information: validating causal relationships. Please indicate your level of agreement with the following statements *(check only one for each statement)*.

	Strongly Disagree	Disagree	Tend to Disagree	Tend to Agree	Agree	Strongly Agree	Not known
1. We define proposed causal relationships between different performance measures.	1	2	3	4	5	6	
2. We verify the proposed causal relationships between different performance measures.	1	2	3	4	5	6	
3. We use visual representations such as a strategy map or a causal map to portray proposed causal relationships.	1	2	3	4	5	6	
4. We use analysis methods and tools to test hypothesised causal relationships.	1	2	3	4	5	6	

Notes:

d. Use of performance information: problem finding. Please indicate your level of agreement with the following statements *(check only one for each statement)*.

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[4] The use questions related to monitoring, validating causal relationships, problem finding, problem solving and validating improvement actions are all adapted from Chearskul, Pimsinee. "An Empirical Investigation of Performance Measurement System Use and Organizational Performance." PhD diss., Virginia Polytechnic Institute and State University, (2010).

	Strongly Disagree	Disagree	Tend to Disagree	Tend to Agree	Agree	Strongly Agree	Not known
1. We compare our current performance levels to historical performance to identify trends over time.	1	2	3	4	5	6	
2. We seek to identify causes to explain current performance levels.	1	2	3	4	5	6	

Notes:

e. Use of performance information: problem solving. Please indicate your level of agreement with the following statements *(check only one for each statement)*.

	Strongly Disagree	Disagree	Tend to Disagree	Tend to Agree	Agree	Strongly Agree	Not known
1. We make decisions to manage or improve performance when it is clear that action is needed.	1	2	3	4	5	6	
2. Once problems or opportunities are identified we define potential improvement actions.	1	2	3	4	5	6	
3. Based on our performance review we decide on the best course of action to address problem areas.	1	2	3	4	5	6	
4. Decisions we make are put into action.	1	2	3	4	5	6	
5. Decisions we make support proactive performance improvement.	1	2	3	4	5	6	
6. Once improvement actions are determined we define clear action plans with tasks priorities etc.	1	2	3	4	5	6	
7. We allocate sufficient attention and resources to implement improvement actions.	1	2	3	4	5	6	

Notes:

f. Use of performance information: validating causal relationships. Please indicate your level of agreement with the following statements *(check only one for each statement)*.

	Strongly Disagree	Disagree	Tend to Disagree	Tend to Agree	Agree	Strongly Agree	Not known
1. We use performance information to support decisions at operational levels.	1	2	3	4	5	6	
2. The performance review process enables us to focus our attention on the most critical areas.	1	2	3	4	5	6	
3. We use performance information and findings to verify our assumptions about the business.	1	2	3	4	5	6	
4. The performance information we review enables us to anticipate the future direction of the organisation.	1	2	3	4	5	6	
5. We hypothesise how planned improvement actions will impact key performance measures.	1	2	3	4	5	6	
6. We verify the impact of improvement actions on results for key performance measures.	1	2	3	4	5	6	

	Strongly Disagree	Disagree	Tend to Disagree	Tend to Agree	Agree	Strongly Agree	Not known
7. Based on our review of performance information we predict future performance on key measures.	1	2	3	4	5	6	

Notes:

 g. How do you establish quantifiable targets related to the achievement of the objectives/tasks that have been identified?

 h. Please describe any other purposes for which performance information is used.

 i. How do you align measures and analysis with action?

   i. How do you analyse your performance data?

   ii. Are initiatives aligned with performance gaps?

   iii. How are measures aligned with initiatives (e.g., to track progress)?

   iv. How do you manage accountability?

   v. How is the measurement system deployed to lower layers of the organisation (i.e., cascading down)?

5. How do you ensure that the performance measurement system itself kept up to date?

 a. What is the process for reviewing the performance measurement system, e.g. for adding or deleting measures? How often is this done?

 b. What types of changes are made to the measurement system?

6. How do you collect and analyse performance data and information (e.g. IT-system)?

   a. How do you assure integrity (accurate data input, timeliness, reliability, etc.) in the data being collected?

Any Other Comments:

Annex B – PERFORMANCE MEASUREMENT QUESTIONNAIRE RESULTS AND ANALYSIS

B.1 INTRODUCTION

This annex summarises the responses to the performance management questionnaire and provides an analysis of some of the questionnaire findings. The methodology of the analysis is presented in the first section, the raw results in the second section, and an analysis of the results in the third section of this annex.

B.2 QUESTIONNAIRE ANALYSIS: METHODOLOGY

B.2.1 Statistical Analysis of Likert Scale Questions

Thirty-eight questions in the questionnaire, arranged in 7 groups, required a response on a 6-point Likert scale. An analysis of the responses to these questions was carried out using the R statistical computing language [1]. The analysis consisted of three parts:

- A description and visualisation of the responses;
- A cluster analysis to identify groups of similar responding nations to investigate whether responses varied between them; and
- An attempt to identify factors that might explain the responses of nations.

The first part of the analysis was intended to contribute to the basic overview of the current use of performance management systems in defence organisations. The second and third parts of the analysis were conducted to answer the additional research questions identified during the study:

- Can the extent to which a nation uses performance measurement and management techniques be correlated with other national defence parameters, such as defence expenditure or type of armed forces?
- Can groups of similar nations (clusters) be identified with respect to the use of performance measurement and management techniques?

B.2.1.1 Description and Visualisation of Responses

The responses to the 38 Likert scale questions were summarised and visualised using diverging stacked bar charts and boxplots. An example of a diverging stacked bar chart summarising the results of question group 2a is shown in Figure B-1. The questions take the form of a statement to which respondents were asked to rate their level of agreement according to a 6-point Likert scale (Strongly Disagree, Disagree, Tend to Disagree, Tend to Agree, Agree, Strongly Agree). The chart shows the percentage of the responses that fall within each of these categories, centred at the neutral point. The three responses that disagree with the statements are shaded red, while the three responses that agree with the statements are shaded blue. The figures on the right-hand axis give the total number of responses (excluding "not applicable") that were received for each question.

Figure B-2 shows an example boxplot of the same data. Here the responses are treated as interval data with the values 1 (strongly disagree) to 6 (strongly agree). The ends of the boxes are located at the lower and upper quartiles while the thick black vertical line is the median value. The 'whiskers' indicate the minimum and maximum values, with outliers plotted as discrete points. The dashed red line represents a neutral response. While the diverging stacked bar charts are a better means of visualising the overall structure of data, the spread of the data may be more easily seen from a boxplot.
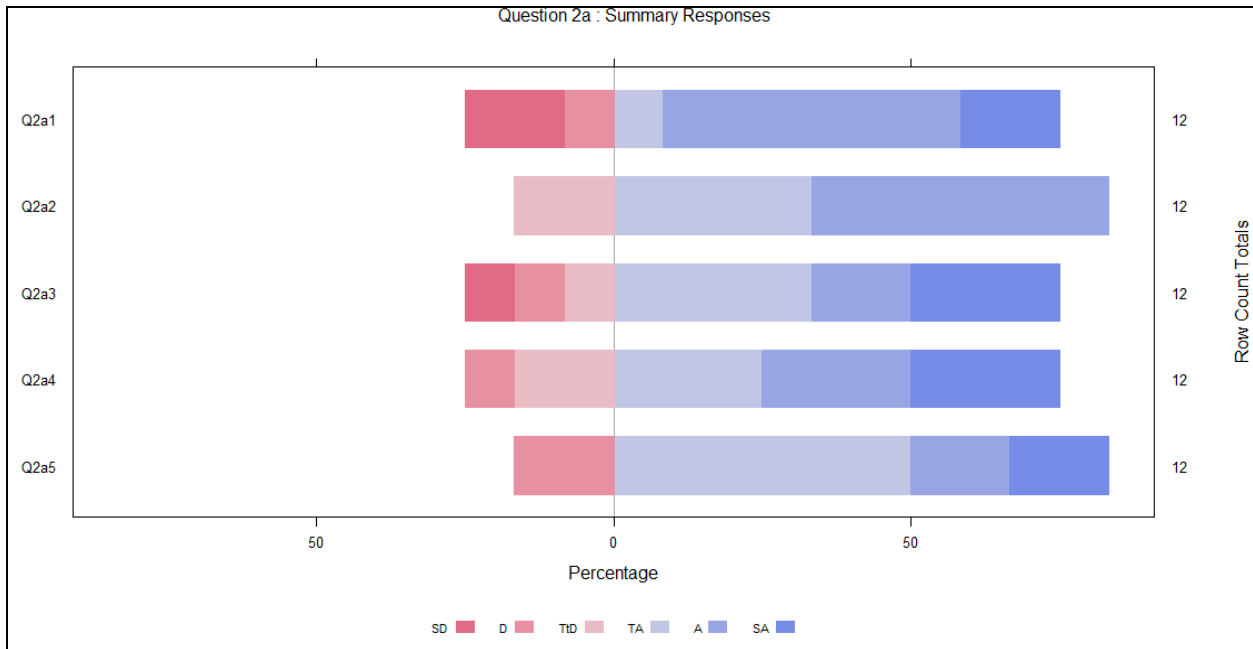
Figure B-1: Example Diverging Stacked Bar Chart.
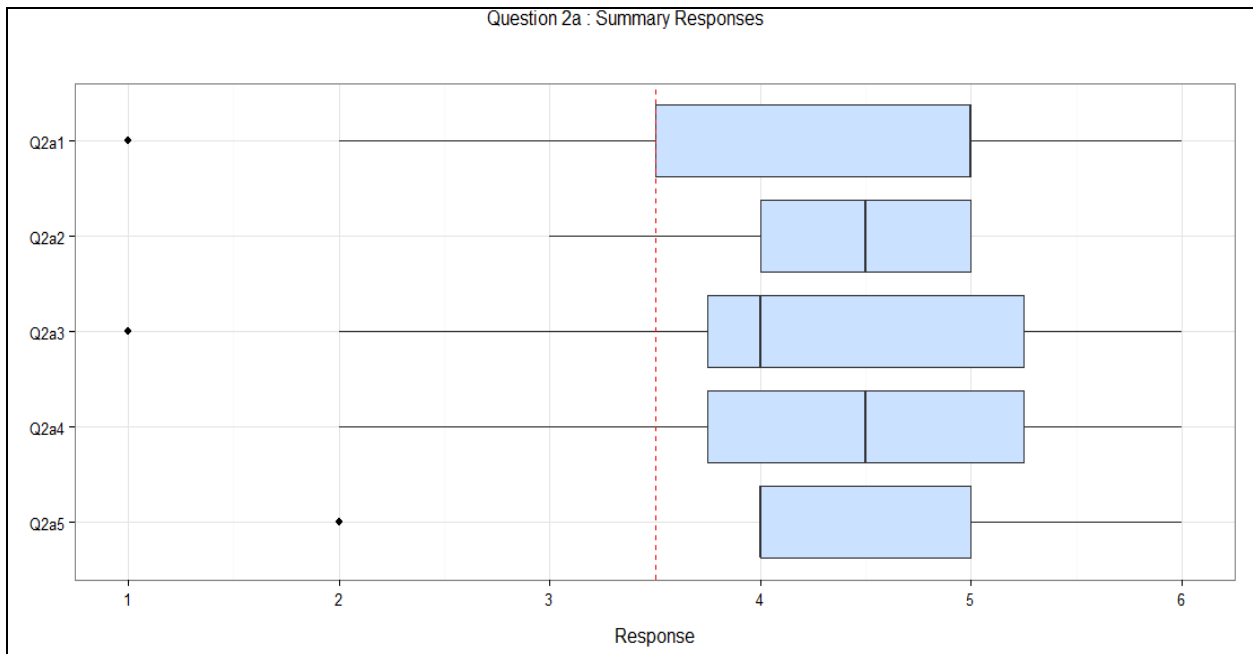
Figure B-2: Example Boxplot.

B.2.1.2   Cluster Analysis

A cluster analysis was carried out to identify groups of similar nations with respect to their responses to the Likert scale questions. Cluster analysis is a technique by which selected parameters of observed data are compared, and the data clustered (grouped) according to a measure of distance between these parameters; each cluster contains observations that are close to each other, but distant from observations in other clusters.

Many techniques are available. Here, hierarchical clustering was used with R's default methods (Euclidean measure of distance and clustering by 'complete linkage'). The input parameters were the mean responses of each nation to each of the seven question groups.

The responses of the nations in each cluster were then summarised and visualised by means of diverging stacked bar charts and boxplots in order to identify where the differences between the clusters lie.

B.2.1.3   Explanatory Factors

The third part of the statistical analysis investigated whether nations' responses to the Likert scale questions could be connected to factors such as defence expenditure or type of armed forces; in other words, could the extent to which a nation uses performance management techniques be correlated with other national defence parameters. Spearman's rank correlation coefficients were calculated between eight measures of the use of performance management and eight 'candidate explanatory factors' proposed by members of the RTG.

The eight measures of the use of performance management were the mean responses of each nation to each of the 7 question groups and the mean response of each nation to all 38 Likert scale questions. The eight 'candidate explanatory factors' are described in Table B-1.

Table B-1: Candidate Explanatory Factors.

Candidate Explanatory Factors		
Defence Expenditure	Def.Exp	US$bn, 2011. Source: Ref. [2].
Defence Expenditure as % GDP	Def.GDP	Source: Ref. [2].
Size of Active Armed Forces	Act.AF	Thousands. Source: Ref. [2].
Size of Active Armed Force cf., population	AF.Pop	Armed forces per thousand population. Source: Ref. [2].
Type of Armed Force	AF.Type	This measure categorises armed forces by type on a six-point scale: Territorial Defence, Peace Force, Limited Expeditionary Force, Selective Expeditionary Force, Broad Expeditionary Force, Full Spectrum Force. Source: Ref. [3].
Deployment	Dep	ISAF Troop Contribution, March 2011. Directly comparable figures for national military deployment are not available for all nations that responded to the questionnaire. Afghanistan, however, was a NATO/European priority in 2011; this would seem to be a reasonable proxy measure for the international operational commitments of responding nations. Source: Ref. [4].
Government Effectiveness	WGIGE	Percentile Rank. This is intended as a proxy measure for the degree to which national governments, and hence their ministries of defence, have adopted the type of governance practices associated with the New Public Management. The World Bank states that this indicator "captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies." Source: Ref. [5].
"Years in NATO"	Yrs.NATO	This is intended as a measure of the time to which nations have been exposed to the defence reform agendas of key international defence organisations. It is calculated as the sum of the years since 1991 that a nation has been a NATO member (i.e., the number of years that a nation has participated in NATO's post-Cold War agenda) and the years that a nation has participated in ESDP.

B.2.2   Qualitative Analysis

An overview of the responses to the open questions of the questionnaire was created to highlight common themes, issues and illustrations within each response. This overview includes the number of times each of these items appeared in a response (e.g., 3/12 refers to a theme, issue or illustration that was mentioned by three of the twelve responding nations).

B.3   QUESTIONNAIRE RESPONSES

The responses to the questionnaire are recorded below. The responses to the open questions are summarised by a narrative supported, where appropriate, by figures indicating the number of relevant responses. The responses to the Likert scale questions are summarised and visualised using diverging stacked bar charts and box plots. The text of the questions is provided as an aide-memoire at the start of each section.

B.3.1   Question 1

> **Question 1:   What is the critical information that provides a strategic-level view of the performance of the MoD and the armed forces?**

The responses to this question included a number of themes common to several nations. According to these themes, stakeholders at the strategic level are typically interested in:

- Performance in current operations, including standing peacetime tasks (personnel deployed, equipment status, mission success, public/media approval) (8/12).[1]
- People (numbers/manning levels, recruitment, turnover, gender balance, training) (6/12).
- Financial indicators (defence expenditure, expenditure in particular categories (personnel, investment etc.) (6/12).
- Readiness/deployability/sustainability to participate in future operations (4/12).
- Public/parliamentary opinion (4/12).
- Procurement of material and infrastructure (status of programmes) (3/12).
- Progress against plans for major change programmes (3/12).

Less frequent responses included:

- Risks (2/12).
- Suitability of capabilities to meet defence needs (2/12).
- Progress against short term development plans (e.g., annual plans) (1/12).
- Implementation of NATO capability targets (1/12).
- Efficiency measures (1/12).
- Intelligence outputs (1/12).
- Benchmarking against similar nations (1/12).
- Defence priorities (1/12).

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[1] (8/12): i.e., 8 nations' responses, from a total of 12 responses, included a reference to current operations. Note, however, that these figures should be treated as indicative only. Nations phrased their responses to the open Questions using their own terminology, which does not always allow for direct comparison or easy categorisation and summary. Also, nations responded at different levels of detail. For example, one nation indicated that its critical strategic-level information reflected progress against a major change programme – presumably this programme includes more detailed objectives of interest to strategic leaders, such as acquisition and recruitment targets, but these were not explicitly stated in its response.

Several nations (4/12) indicated that this critical information reflects the main requirements placed on defence in strategic-level documents, such as leadership vision statements, laws or defence agreements.

B.3.2   Question 2

Question 2:	Is critical information conceptualised as an overarching structure such as a strategic map, balanced scorecard perspectives etc.? How is this structure used?
Q2a1	We conceptualise critical information within an overarching structure.
Q2a2	We prioritise objectives/tasks in the overarching structure.
Q2a3	We align the budget to the overarching structure (the budget is assigned to the highest priority, most relevant activities).
Q2a4	We cascade the overarching structure down to lower levels in the organisation.
Q2a5	The performance measurement system and overarching structure are integrated so that measures are consistent with the objectives stated.
Q2b	Please describe this overarching structure, if applicable.

The responses to Question 2a are summarised in Figure B-3.

Question 2a: Question 2a concerns the overall approach that nations take to the management of performance information. It asks whether there is a coherent model (overarching structure) for the identification, collection and use of performance information, such as that proposed by Kaplan and Norton's balanced scorecard [6], and the ways in which this model is used in the organisation. The figure shows that the majority of nations do indeed consider that they have an overarching structure in place (Q2a1 – "We conceptualise critical information within an overarching structure") and that they make use of this in ways anticipated by the designers of such structures (Q2a2 – Q2a5). Note, however, that three nations disagree with Q2a1 – they have no formal structure in place, and their collection and use of performance information is *ad hoc*; they have an entirely different basis for responding to the remaining questions of the questionnaire.

Question 2b: While most nations agreed with the statement that they conceptualise information as an overarching structure, few provided descriptions, in response to Q2b, of such a structure in terms of a strategic map, balanced scorecard, or similar. The most common response (4/10) simply described the setting of objectives at the strategic level, and their cascading down the organisation. A small number of nations (2/10) indicated that their management information is categorised into a handful of strategic-level key performance areas (similar to a balanced scorecard), whilst other nations (2/10) indicated that they follow a performance management framework mandated by central government. One nation indicated that it had initially used a balanced scorecard but had modified and simplified this over time.
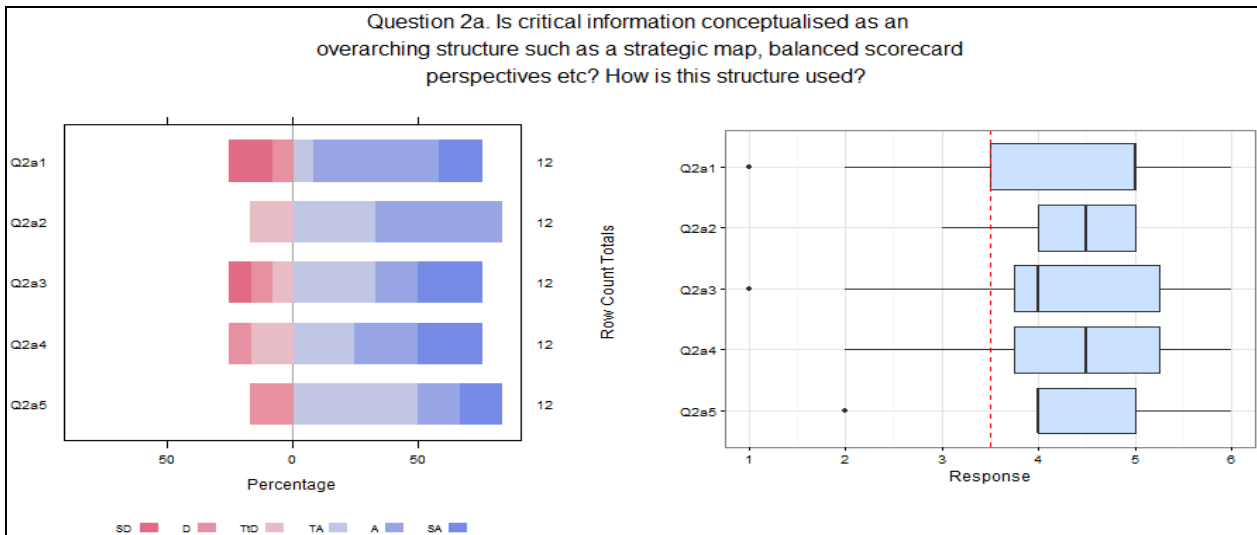
Figure B-3: Summary Responses to Question 2a.

B.3.3   Question 3

Question 3:	Areas in which measures or other information are collected
Q3a	Please indicate the categories in which you collect measures or other information related to the assessment of performance.
Q3ai	Please describe any other categories in which you collect measures or other information related to the assessment of performance.
Q3b	Please provide a complete list of the measures or other information related to the assessment of performance you collect.
Q3c	What are the areas that are difficult to measure? Why?

Question 3a, 3b: See Annex E for complete answers to these questions.

Question 3c: The most common responses were:

- Objectives that are difficult to quantify (e.g., personnel well-being, acceptance of the armed forces, mission success, success in public relations, success in international cooperation) (7/12); and

- Efficiency (4/12).

Other responses included finding common measurements across an organisation that does many different things, the overall effect of certain activities (e.g., research and development), capability development within units, readiness, and acquisition. One nation stated that all areas were difficult, as they are all subject to individual interpretation.

B.3.4   Question 4

Question 4a: How does management use [the performance information it collects] in support of strategic decision making?	
Q4a1	We use performance information to make resource allocation decisions.
Q4a2	We use performance information to redistribute personnel.
Q4a3	We use performance information as a basis for policy changes.
Q4a4	We use performance information to make investment decisions.
Q4a5	We use performance information to monitor restructuring efforts.
Q4a6	We use performance information to adjust the objectives/tasks found in the overarching structure.
Q4a7	We use performance information to produce reports for senior leadership or other stakeholders.

The responses to Question 4a are summarised in Figure B-4.

Figure B-4: Summary Responses to Question 4a.

Question 4a: Question 4a elicits an overview of the range of uses to which nations put performance information. The responses displayed in the figure show that the majority of nations agree with most of the statements proposed in this group of questions i.e., that on average, nations tend to use performance information for all of these purposes. The most positive response is to Q4a5 ("We use performance information to monitor restructuring efforts"). An exception to the general pattern is Q4a2 ("We use performance information to redistribute personnel"); a larger number of nations disagree with this statement, and the median response is lower than the neutral response.

Question 4b: Use of performance information: monitoring	
Q4b1	Senior leadership or other stakeholders receive results on key performance measures on a regular basis.
Q4b2	Performance portrayals and or reports are updated in a timely manner.
Q4b3	Performance data are collected in a timely manner.
Q4b4	Performance data collected are reliable and valid.
Q4b5	Procedures for collecting performance data are well defined.
Q4b6	Methods and tools used to collect performance data are effective.

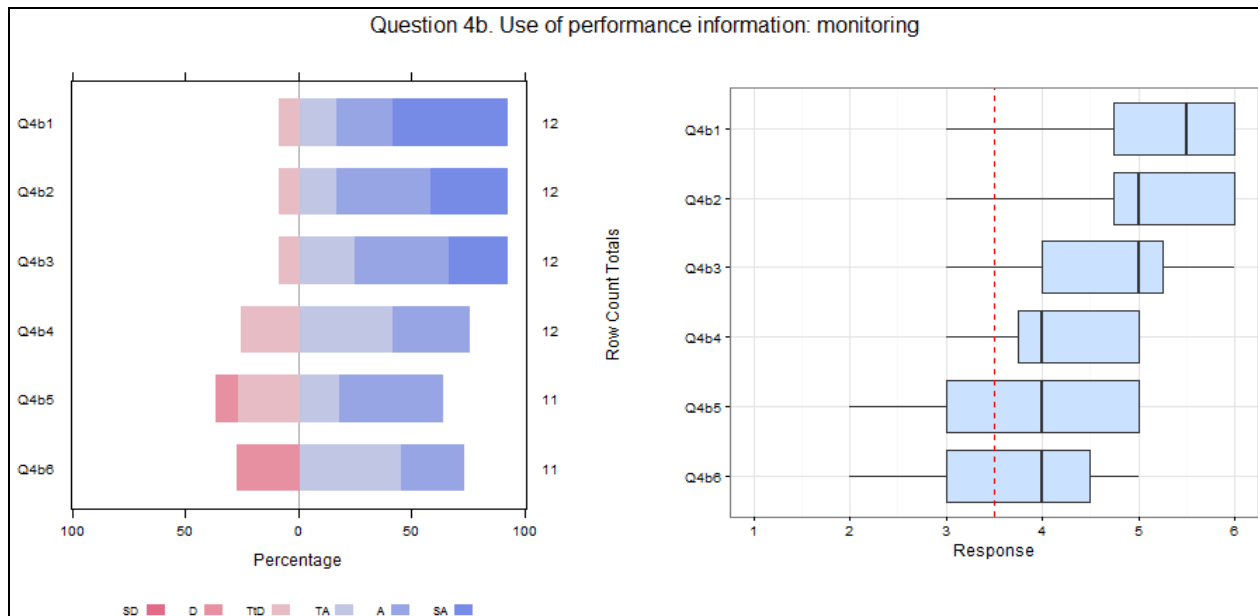The responses to Question 4b are summarised in Figure B-5.

Figure B-5: Summary Responses to Question 4b.

Question 4b: The remainder of Question 4 is intended to extract more detailed information on the uses to which nations put performance information. The responses to Question 4b, which is concerned with monitoring, are mostly positive. The majority of nations agree with all of the statements proposed in this group of questions, with Q4b1 ("Senior leadership or other stakeholders receive results on key performance measures on a regular basis") receiving the most positive response on average.

Question 4c: Use of performance information: validating causal relationships	
Q4c1	We define proposed causal relationships between different performance measures.
Q4c2	We verify the proposed causal relationships between different performance measures.
Q4c3	We use visual representations such as a strategy map or a causal map to portray proposed causal relationships.
Q4c4	We use analysis methods and tools to test hypothesised causal relationships.

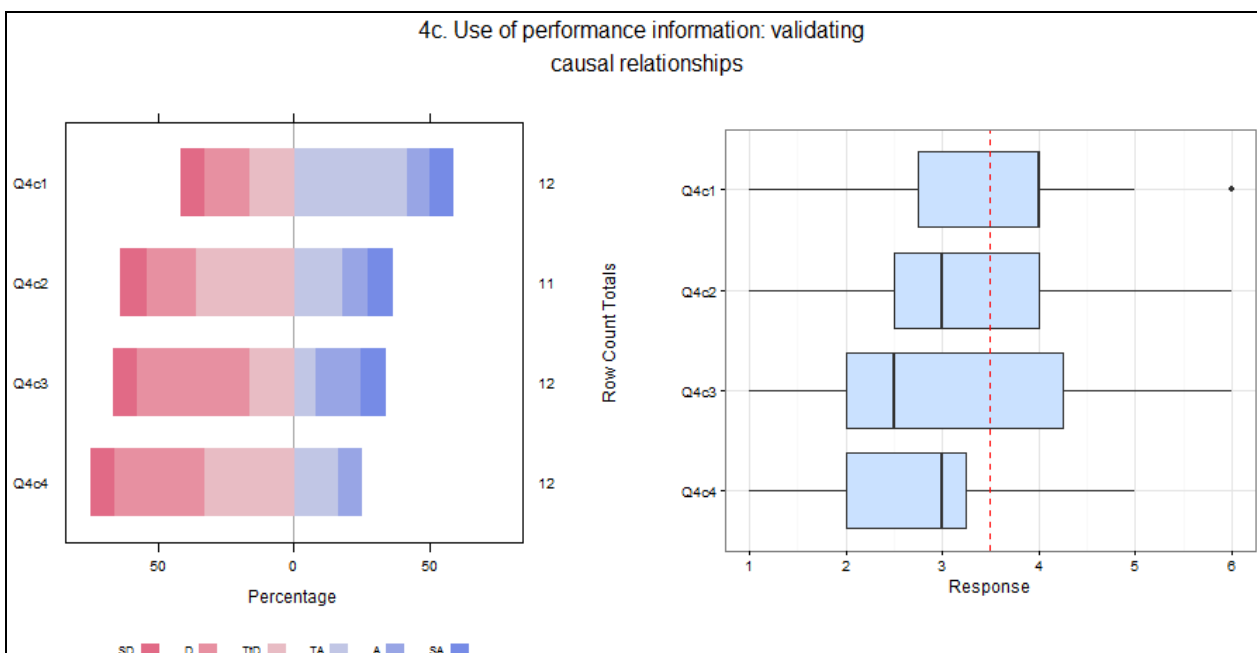The responses to Question 4c are summarised in Figure B-6.

Figure B-6: Summary Responses to Question 4c.

Question 4c: By contrast to the preceding questions, the responses to Question 4c, which is concerned with validating causal relationships, are mostly negative. A slight majority of nations agree with Q4c1 ("We define proposed causal relationships between different performance measures"), but the majority of responses to the remaining questions in this group are on the 'disagree' end of the scale, and the median response is lower than the neutral response.

Question 4d: Use of performance information: problem finding	
Q4d1	We compare our current performance levels to historical performance to identify trends over time.
Q4d2	We seek to identify causes to explain current performance levels.

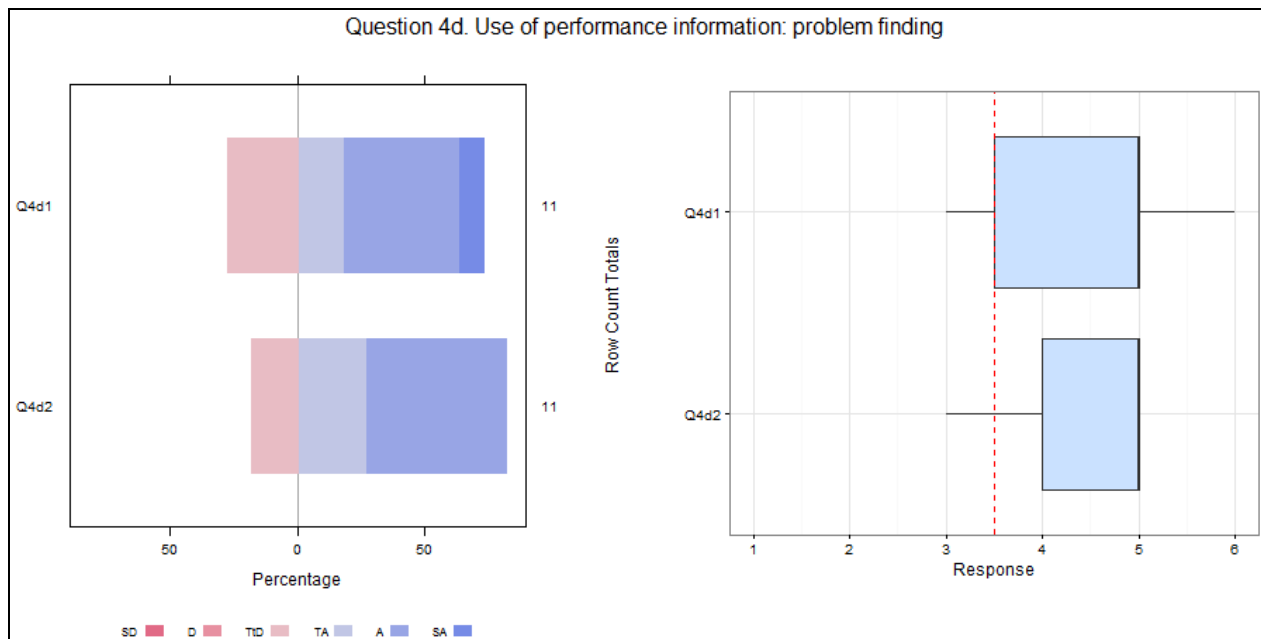The responses to Question 4d are summarised in Figure B-7.

Figure B-7: Summary Responses to Question 4d.

Question 4d: The responses to Question 4d, problem finding, are mostly positive. The majority of nations agree with both statements, and the median response is quite high.

Question 4e:	Use of performance information: problem solving
Q4e1	We make decisions to manage or improve performance when it is clear that action is needed.
Q4e2	Once problems or opportunities are identified we define potential improvement actions.
Q4e3	Based on our performance review we decide on the best course of action to address problem areas.
Q4e4	Decisions we make are put into action.
Q4e5	Decisions we make support proactive performance improvement.
Q4e6	Once improvement actions are determined we define clear action plans with tasks priorities, etc.
Q4e7	We allocate sufficient attention and resources to implement improvement actions.

The responses to Question 4e are summarised in Figure B-8.

Question 4e: The responses to Question 4e, which concerns the use of performance information in problem solving, are more varied. The responses to Q4e1 ("We make decisions to manage or improve performance when it is clear that action is needed") and Q4e2 ("Once problems or opportunities are identified we define potential improvement actions") are, on the whole, positive, but the responses to the remainder of the questions are positive, but close to neutral on average.
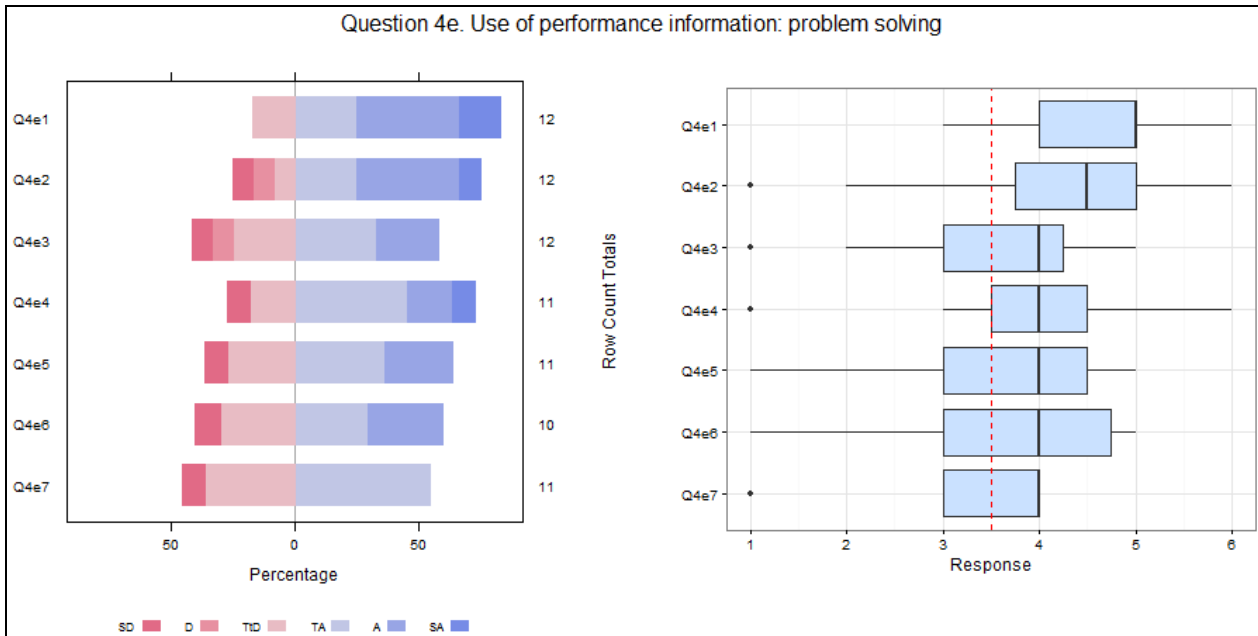
Figure B-8: Summary Responses to Question 4e.

Question 4f:	Use of performance information: validating improvement actions
Q4f1	We use performance information to support decisions at operational levels.
Q4f2	The performance review process enables us to focus our attention on the most critical areas.
Q4f3	We use performance information and findings to verify our assumptions about the business.
Q4f4	The performance information we review enables us to anticipate the future direction of the organisation.
Q4f5	We hypothesise how planned improvement actions will impact key performance measures.
Q4f6	We verify the impact of improvement actions on results for key performance measures.
Q4f7	Based on our review of performance information we predict future performance on key measures.

The responses to Question 4f are summarised in Figure B-9.

Question 4f: The responses to Question 4f, which concerns the use of performance information in validating improvement actions, are also varied. The responses to all of these questions are close to neutral on average.
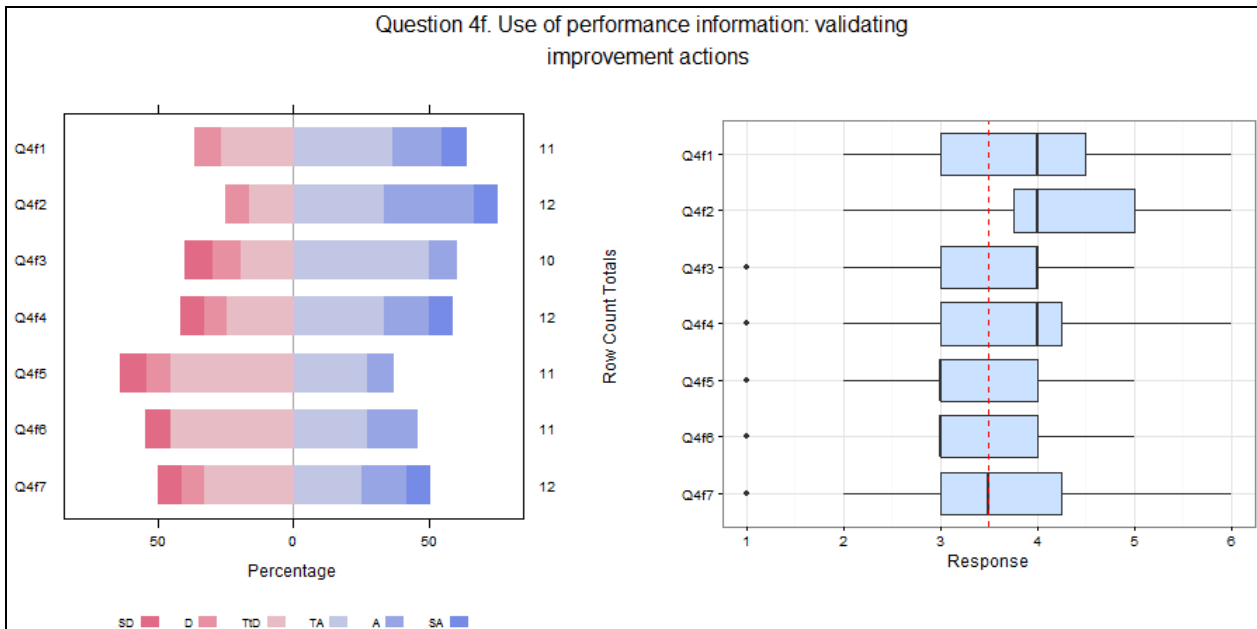
Figure B-9: Summary Responses to Question 4f.

Question 4:	How does management use [the performance information it collects] in support of strategic decision making?	
Q4g	How do you establish quantifiable targets related to the achievement of the objectives/tasks that have been identified?	
Q4h	Please describe any other purposes for which performance information is used.	
Q4i	How do you align measures and analysis with action?	
	i	How do you analyse your performance data?
	ii	Are initiatives aligned with performance gaps?
	iii	How are measures aligned with initiatives (e.g., to track progress)?
	iv	How do you manage accountability?
	v	How is the measurement system deployed to lower layers of the organisation (i.e., cascading down)?

Question 4g: The most common response (6/12) was that targets are established by an authority (e.g., Chief of Defence, subject matter expert, a strategic-level department, a NATO requirement) sometimes in dialogue with those who are required to deliver them. One third of the nations (4/12) responded that they establish targets primarily by means of a dialogue between the strategic level and the deliverers. A small number of nations (2/12) establish targets based on historical performance or by benchmarking. Some nations (2/12) also noted that once established, targets are subsequently used as the basis of a performance contract or similar document.

Question 4h: Nations reported that performance information is also used to:

- Inform central government, parliament, and the public (4/7);

- Evaluate programmes (2/7);

- Mitigate risks (2/7);

- Carry out divestment exercises (2/7);

- Local (i.e., non-corporate) management (1/7);

- Accountability (1/7);

- Evaluate progress on investments (1/7);

- Evaluate efficiency (1/7); and

- Participate in government initiatives (1/7).

Question 4i.i: Most nations (5/12) limited their responses to indicating that they have a regular reporting system in place complemented, in some cases, by a system to aggregate information at various levels of management.

A small number (2/12) of nations reported that they attempt to explain differences in performance against targets. In most cases, this is a task for the staff responsible for each measure, with staff at higher management levels reviewing and challenging the responsible staff's interpretation. Other nations (2/12) reported that their analysis seeks to examine the impact of differences between targets and observed performance. Two nations (2/12) reported only a limited analysis of performance data.

Question 4i.ii: The majority of nations (9/12) indicated that initiatives are aligned with performance gaps, while two nations (2/12) answered that this is not the case. Some nations (4/12) indicated that alignment is not automatic, and that performance shortfalls must be considered in the context of other considerations (e.g., budget, risk management, capability planning) before an initiative will be launched. One nation (1/12) also noted that initiatives may arise from processes independent of the performance management system (e.g., *ad hoc* initiatives from strategic leadership).

Question 4i.iii: Responses were varied and included:

- Deadlines/progress against plan (3/9);

- Tailored performance measures (2/9);

- Quality management (2/9); and

- Management attention/follow up (2/9).

Question 4i.iv: Most nations (8/12) have identified individuals who are held accountable for performance by senior management. These are typically budget holders, commanding officers, process owners or similar (in some cases, more than one individual may be held accountable). A few nations (3/12) indicated that there is no accountability for performance in their systems.

Question 4i.v: Most nations (7/12) indicated that the tasking and reporting system flows from the top through the whole organisation. However, lower levels will often only provide data, rather than participate in the development of targets and analysis of performance.

B.3.5   Question 5

Question 5:	How do you ensure that the performance measurement system itself kept up to date?
Q5a	What is the process for reviewing the performance measurement system, e.g., for adding or deleting measures? How often is this done?
Q5b	What types of changes are made to the measurement system?

Question 5a: Most nations (9/12) indicated that their performance management system is regularly reviewed and renewed, at which time measures may be added or deleted. Sometimes this is in response to a change in overall strategic direction (e.g., a new defence strategy or defence agreement), but in most nations, the content and effectiveness of the performance management system itself is reviewed through a formal process independently of major strategic change. This typically takes place annually.

Question 5b: Nations variously reported the addition or deletion of measures (5/10), changes to target values (2/10), the structure of the measurement system (1/10), and the presentation of results (1/10).

B.3.6   Question 6

Question 6:	How do you collect and analyse performance data and information (e.g., IT-system)?
Q6a	How do you assure integrity (accurate data input, timeliness, reliability, etc.) in the data being collected?

Question 6: Most nations (10/12) use software-based solutions. Many of these are proprietary products, SAP (3/12) and Excel (2/12) being the most frequently mentioned. Other nations use more bespoke solutions or combinations of IT tools which must be integrated either manually or automatically – or, most commonly, a combination of the two. A few nations (2/12) use primarily manual systems. One or two nations reported that they are in the process of improving their software systems.

Question 6a: To assure integrity, most nations (5/12) simply rely on those who provide and input data. In addition, some nations (3/12) reported that they conduct audits or other forms of control on a regular basis, or by exception when discrepancies are found. One nation (1/12) stressed the importance of standing instructions, while another (1/12) mentioned dialogue between personnel as means of ensuring integrity.

B.4   ANALYSIS OF QUESTIONNAIRE RESPONSES

B.4.1   Summary of Likert Scale Responses

The questions which received the highest (≥ 5) and lowest (≤ 3) median responses are collected in Table B-2 and Table B-3.

Table B-2: The Questions with the Highest Median Responses.

The Questions with the Highest Median Responses	
Q2a1	We conceptualise critical information within an overarching structure.
Q4a5	We use performance information to monitor restructuring efforts.

The Questions with the Highest Median Responses	
Q4a7	We use performance information to produce reports for senior leadership or other stakeholders.
Q4b1	Senior leadership or other stakeholders receive results on key performance measures on a regular basis.
Q4b2	Performance portrayals and or reports are updated in a timely manner.
Q4b3	Performance data are collected in a timely manner.
Q4d1	We compare our current performance levels to historical performance to identify trends over time.
Q4d2	We seek to identify causes to explain current performance levels.
Q4e1	We make decisions to manage or improve performance when it is clear that action is needed.

Table B-3: The Questions with the Lowest Median Responses.

The Questions with the Lowest Median Responses	
Q4a2	We use performance information to redistribute personnel.
Q4c2	We verify the proposed causal relationships between different performance measures.
Q4c3	We use visual representations such as a strategy map or a causal map to portray proposed causal relationships.
Q4c4	We use analysis methods and tools to test hypothesised causal relationships.
Q4f5	We hypothesise how planned improvement actions will impact key performance measures.
Q4f6	We verify the impact of improvement actions on results for key performance measures.

Reporting to senior leadership and monitoring restructuring efforts are the most prevalent uses of performance information, while the use of performance information for the redistribution of personnel is least common. The importance of reporting also features in different guises in other questions that received a high median response (Q4b1, Q4b2, and Q4b3). Other themes that feature on the high median list are the identification of performance trends over time, the identification of causes to explain current performance levels, and the taking of decisions to manage or improve performance.

Issues with low median response concern causal relationships between performance measures, and supposition and follow-up regarding the impact of improvement actions on performance measures.

B.4.2   Cluster Analysis

The result of the cluster analysis is shown in Figure B-10, in the form of a cluster dendrogram. In hierarchical clustering, the number of clusters is determined after the clustering has been performed by inspection of the dendrogram and by reference to the original problem context. The height differences in the dendrogram in Figure B-10 – the vertical distances between the horizontal branches – suggests that two or four clusters may be an appropriate choice; four clusters would, however, result in nation 'AJ' being a cluster on its own, which was considered undesirable, while two clusters would seem to be too few to differentiate between the responses. The problem context coupled with a qualitative assessment of the overall responses

of nations suggest that three clusters would be a good choice, since it might be expected that there is a group of nations with minimal experience in the use of performance management, a group of confident users, and a group of 'learning' nations. It was thus decided to base further work on the three clusters identified in Figure B-10: cluster 1, the minimal experience cluster, containing four nations; cluster 2, the 'learning' nations, containing six nations; and cluster 3, the confident users, containing the remaining two nations.
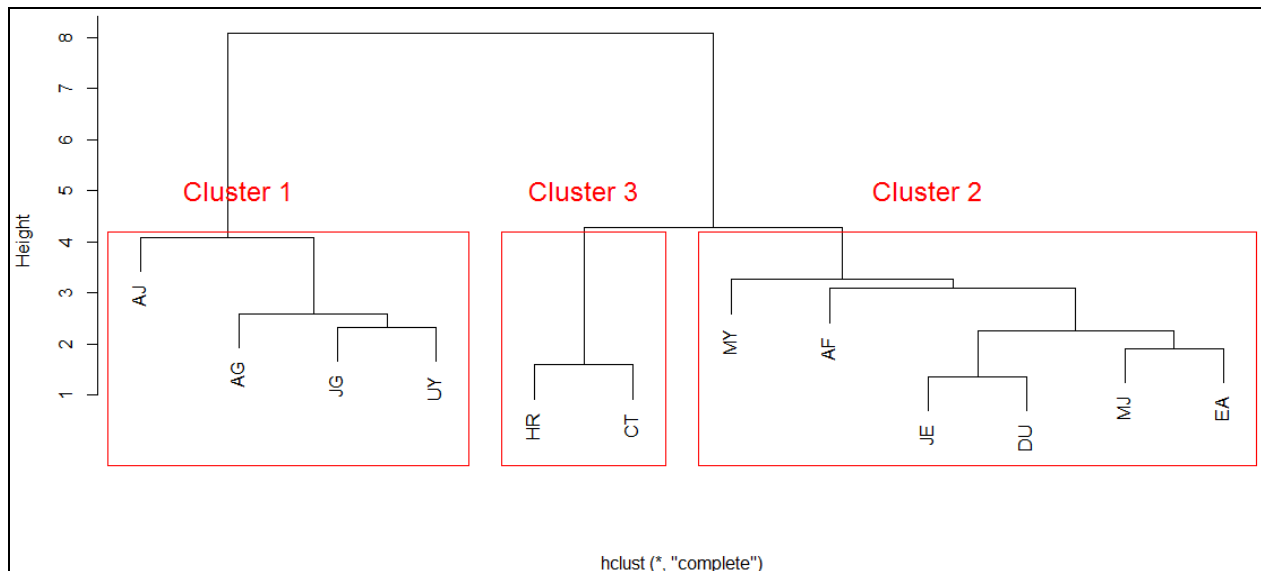

Figure B-10: Hierarchical Clustering by Mean Response to Question Groups.

The responses to the questionnaire are clearly different for each of the three groups identified by the cluster analysis. The confident user cluster (cluster 3), has the highest scoring responses, followed by the learning cluster (cluster 2), and finally the minimal experience cluster (cluster 1).

The confident user cluster may be differentiated by its overall positive responses to all questions except Q4c3 ("We use visual representations such as a strategy map or a causal map to portray proposed causal relationships"), Q4c4 ("We use analysis methods and tools to test hypothesised causal relationships"), and Q4e2 ("Once problems or opportunities are identified we define potential improvement actions"). In general, though, there is no individual question, or group of questions, the response to which acts as a clear discriminator between the clusters – there is instead a general trend towards more positive responses to all questions as one moves from cluster 1 through to cluster 3.

The responses to the 38 Likert scale questions are summarised and visualised by cluster in Appendix B-1.

B.4.3   Explanatory Factor Analysis

Table B-4 contains the values of Spearman's rank correlation coefficient between all proposed measures of the use of performance management, and all candidate explanatory factors. In most cases, there are positive correlations between the proposed measures of use of performance management and the candidate explanatory factors tested.

The candidate explanatory factor best correlated with the measures of use of performance management is *AF.Type*, which categorises armed forces by level of ambition on a six-point scale. More than half of these correlations (5 of 8 – see Table B-4 and Figure B-11) are significant at the 95% level or higher. It can thus be proposed that the more ambitious a nation is in its use of its defence forces, and thus the more complex the

management task placed on defence ministries and/or armed forces headquarters, the greater the likelihood that the nation make use of performance management; specifically, the greater the likelihood that it will use an overarching structure for performance management (Question 2a), and that it will use performance information for monitoring (Question 4b), to validate causal relationships (Question 4c), and to validate improvement actions (Question 4f).

**Table B-4: Spearman's Correlation Coefficients: Question
Group – Candidate Explanatory Factors.**

	Def.Exp	Def.GDP	Act.AF	AF.Pop	AF.Type	Dep	WGIGE	Yrs.NATO
Mean.Q2a	0.52 .	0.45	0.41	-0.15	0.77 **	0.63 *	0.36	0.31
Mean.Q4a	0.43	0.61 *	0.19	0.36	0.46	0.30	0.28	0.09
Mean.Q4b	0.67 *	0.29	0.39	-0.28	0.60 *	0.56 .	0.58 *	0.08
Mean.Q4c	0.68 *	0.54 .	0.57 .	-0.01	0.78 **	0.64 *	-0.07	0.59 *
Mean.Q4d	0.50 .	0.40	0.27	-0.08	0.39	0.28	0.04	0.17
Mean.Q4e	0.32	0.56 .	0.23	0.48	0.40	0.15	0.39	0.03
Mean.Q4f	0.66 *	0.54 .	0.45	-0.09	0.83 ***	0.70 *	0.34	0.33
Mean.AllQ	0.64 *	0.61 *	0.45	0.10	0.76 **	0.59 *	0.34	0.31

Significance Codes: 0 "*"   0.001 "**"   0.01 "*"   0.05 "."   0.1 " " 1**
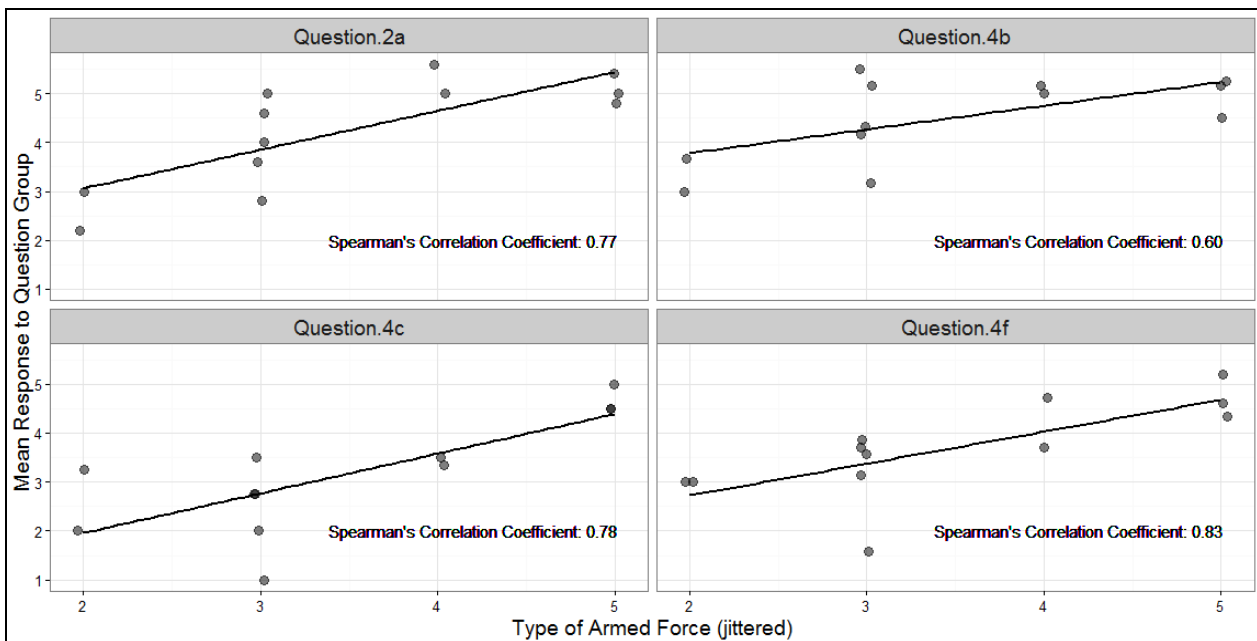

**Figure B-11: The Relationship Between Response to
Selected Question Groups and Type of Armed Force.**

Similar patterns of correlation are also evident, although the coefficients are smaller, between these measures of use of performance management and defence spending (*Def.Exp* and *Def.GDP*) and deployment (*Dep*). This is unsurprising, given the high levels of correlation between these candidate explanatory factors (see Table B-5). However, further work would be required to confirm the above proposition, as only a small number of nations was surveyed, and several questions are thrown up by this research. It is not immediately obvious, for example, why *AF.Type* should be well correlated with these particular uses of performance information and not with others. Nor is it apparent why the size of a nation's armed forces (*Act.AF*), which is also well correlated with *AF.Type*, is not well correlated with the measures of use of performance management.

**Table B-5: Spearman's Correlation Coefficients: Candidate
Explanatory Factors – Candidate Explanatory Factors.**

	Def.Exp	**Def.GDP**	**Act.AF**	**AF.Pop**	**AF.Type**	**Dep**	**WGIGE**	**Yrs.NATO**
Def.Exp	1	0.5	0.88 ***	-0.13	0.88 ***	0.88 ***	0.21	0.71 **
Def.GDP	–	1	0.40	0.49	0.43	0.32	0.05	0.27
Act.AF	–	–	1	-0.10	0.83 ***	0.82 **	0.00	0.80 **
AF.Pop	–	–	–	1	-0.23	-0.34	0.09	0.04
AF.Type	–	–	–	–	1	0.95 ***	0.17	0.73 **
Dep	–	–	–	–	–	1	0.11	0.78 **
WGIGE	–	–	–	–	–	–	1	-0.19
Yrs.NATO	–	–	–	–	–	–	–	1

Significance Codes: 0 "*"   0.001 "**"   0.01 "*"   0.05 "."   0.1 " " 1**

There does not appear to be any consistent correlation between the use of performance management and the candidate explanatory factors *AF.Pop*, *WGIGE*, and *Yrs.NATO* (the single occurrences of significant correlations with the latter two cannot be readily defended).

B.4.4   The Question Groups: Internal Correlations and Internal Consistency

In order to evaluate the robustness of the questionnaire as an analytical tool, the degree to which the responses to the groups of questions are correlated with each other and the degree to which the question groups are internally consistent were examined. Spearman's rank correlation coefficients between the mean responses to the 7 question groups and the mean response to all questions are reported in Table B-6. The table indicates that the mean responses to each question group are positively correlated with the mean responses to all other question groups; two-thirds (20 of 28) of these correlations are significant at the 95% confidence level or higher. It can be concluded that the mean responses to the groups of questions are broadly consistent with each other as proxy measures of the use of performance management.

**Table B-6: Spearman's Correlation Coefficients:
Question Group – Question Group.**

	Mean.Q2a	Mean.Q4a	Mean.Q4b	Mean.Q4c	Mean.Q4d	Mean.Q4e	Mean.Q4f	Mean.AllQ
Mean.Q2a	1	0.59 *	0.61 *	0.71 **	0.52 .	0.53 .	0.90 ***	0.86 ***
Mean.Q4a	–	1	0.59 *	0.59 *	0.51 .	0.84 ***	0.79 **	0.89 ***
Mean.Q4b	–	–	1	0.37	0.56 .	0.39	0.72 **	0.69 *
Mean.Q4c	–	–	–	1	0.69 *	0.53 .	0.78 **	0.80 **
Mean.Q4d	–	–	–	–	1	0.30	0.51 .	0.59 *
Mean.Q4e	–	–	–	–	–	1	0.67 *	0.80 **
Mean.Q4f	–	–	–	–	–	–	1	0.96 ***
Mean.AllQ	–	–	–	–	–	–	–	1

Significance Codes: 0 "*"   0.001 "**"   0.01 "*"   0.05 "."   0.1 " "   1** [2]

Table B-7 reports values of Cronbach's alpha for each of the question groups. Cronbach's alpha measures the degree to which a set of test items measure the same underlying concept. The values here are all high – the questions within each group are consistent and together reflect various underlying concepts related to the degree of use of performance management.

Table B-7: Cronbach's Alpha.

Question Group	Mean.Q2a	Mean.Q4a	Mean.Q4b	Mean.Q4c	Mean.Q4d	Mean.Q4e	Mean.Q4f	Mean.AllQ
Cronbach's alpha	0.86	0.92	0.93	0.86	0.85	0.96	0.90	0.97

B.5   REFERENCES

[1] R Core Team (2015). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL http://www.R-project.org/.

[2] The International Institute for Strategic Studies (2013). *The Military Balance*. London: Routledge.

[3] Clingendael Centre for Strategic Studies (2006). Air Force: Luxury or necessity? First of a series of nine essays on the future of the Air Force. The Hague: Clingendael Centre for Strategic Studies.

[4] International Security Assistance Force (2011). Key facts and figures, 4 March 2011. http://www.nato.int/isaf/placemats_archive/2011-03-04-ISAF-Placemat.pdf.

[5] The World Bank (2012). Worldwide governance indicators. http://info.worldbank.org/governance/wgi/#home.

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[2] Significance codes indicate the size of the p-value associated with the hypothesis test: H_0 correlation coefficient = 0, vs H_A correlation coefficient $\neq$ 0. At the 95% confidence level, the null hypothesis can be rejected for those correlation coefficients marked "*", "**", or "***".

[6]   Kaplan, R.S. and Norton, D.P. (1992). The balanced scorecard – measures that drive performance. Harvard Business Review, 83(7), 172.

Appendix B-1: CLUSTER ANALYSIS OF QUESTIONNAIRE RESPONSES

B1.1 INTRODUCTION

This appendix presents the responses to the questionnaire's 38 Likert scale questions, for each of the three groups identified by the cluster analysis. The figures show that the cluster 3 has the highest scoring responses, followed by cluster 2, and finally cluster 1. In general, though, there is no individual question, or group of questions, the response to which acts as a clear discriminator between the clusters – there is instead a general trend towards more positive responses to all questions as one moves from cluster 1 through to cluster 3.

B1.2 QUESTION 2A

The responses, by cluster, to Question 2a are summarised in Figure B1-1 and Figure B1-2.

B1.3 QUESTION 4A

The responses, by cluster, to Question 4a are summarised in Figure B1-3 and Figure B1-4.

B1.4 QUESTION 4B

The responses, by cluster, to Question 4b are summarised in Figure B1-5 and Figure B1-6.

B1.5 QUESTION 4C

The responses, by cluster, to Question 4c are summarised in Figure B1-7 and Figure B1-8.

B1.6 QUESTION 4D

The responses, by cluster, to Question 4d are summarised in Figure B1-9 and Figure B1-10.

B1.7 QUESTION 4E

The responses, by cluster, to Question 4e are summarised in Figure B1-11 and Figure B1-12.

B1.8 QUESTION 4F

The responses, by cluster, to Question 4f are summarised in Figure B1-13 and Figure B1-14.
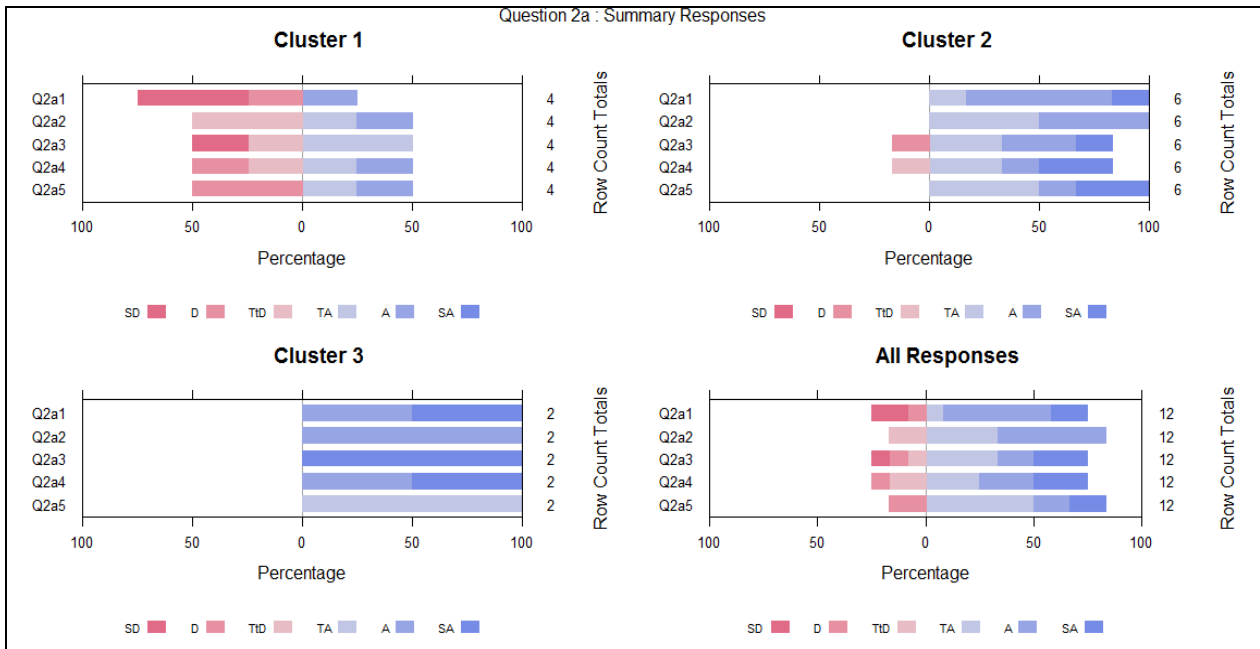
**Figure B1-1: Summary Response by Cluster to Question 2a. (Is critical information
conceptualised as an overarching structure such as a strategic map, balanced
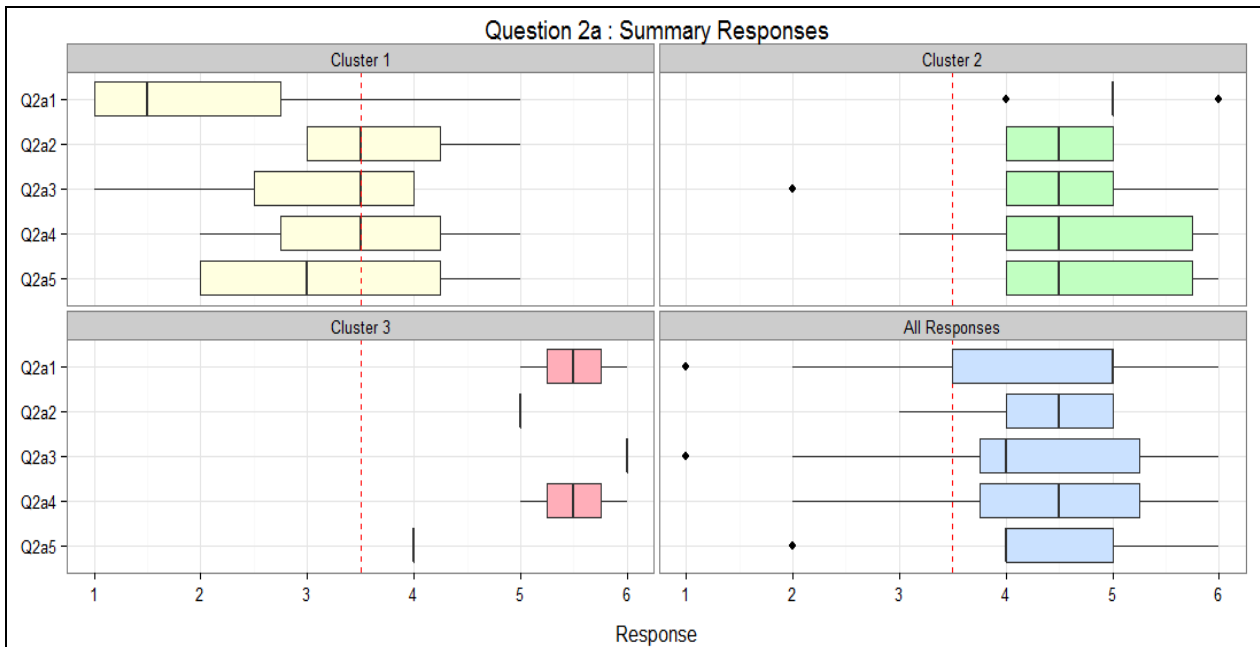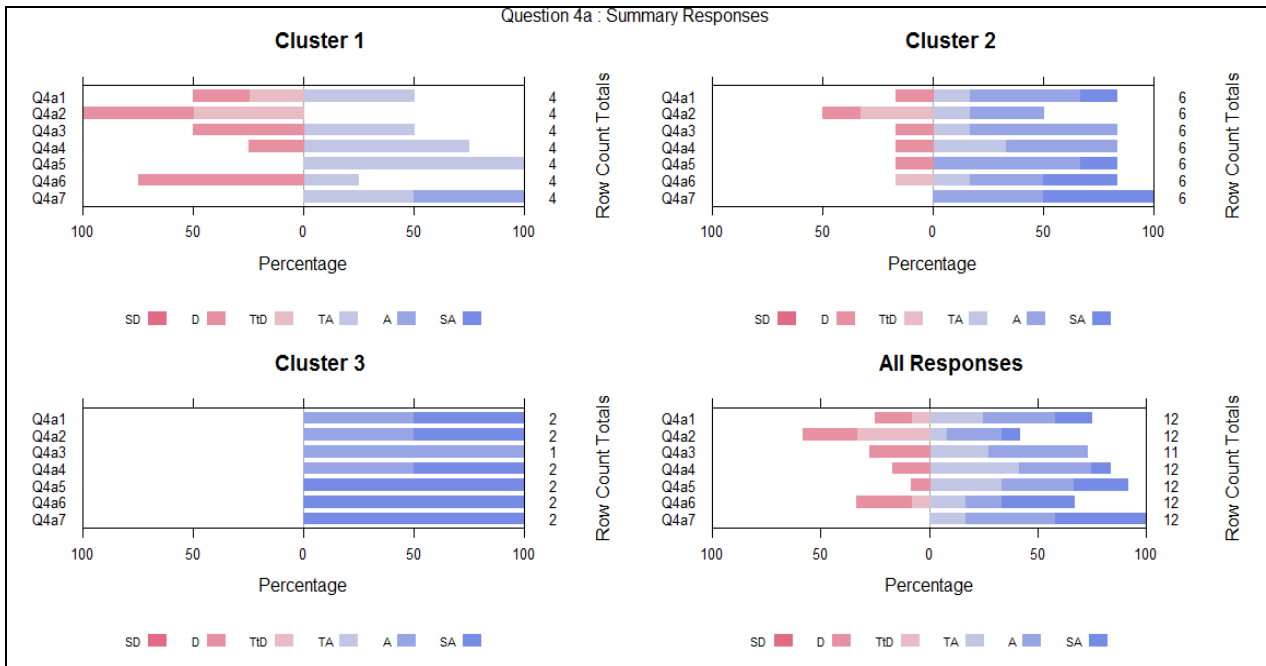scorecard perspectives etc.? How is this structure used?)**

**Figure B1-2: Boxplot Summary Response by Cluster to Question 2a. (Is critical information
conceptualised as an overarching structure such as a strategic map, balanced
scorecard perspectives etc.? How is this structure used?)**

**Figure B1-3: Summary Response by Cluster to Question 4a. (How does
management use [the performance information it collects]
in support of strategic decision making?)**

**Figure B1-4: Boxplot Summary Response by Cluster to Question 4a. (How does
management use [the performance information it collects]
in support of strategic decision making?)**
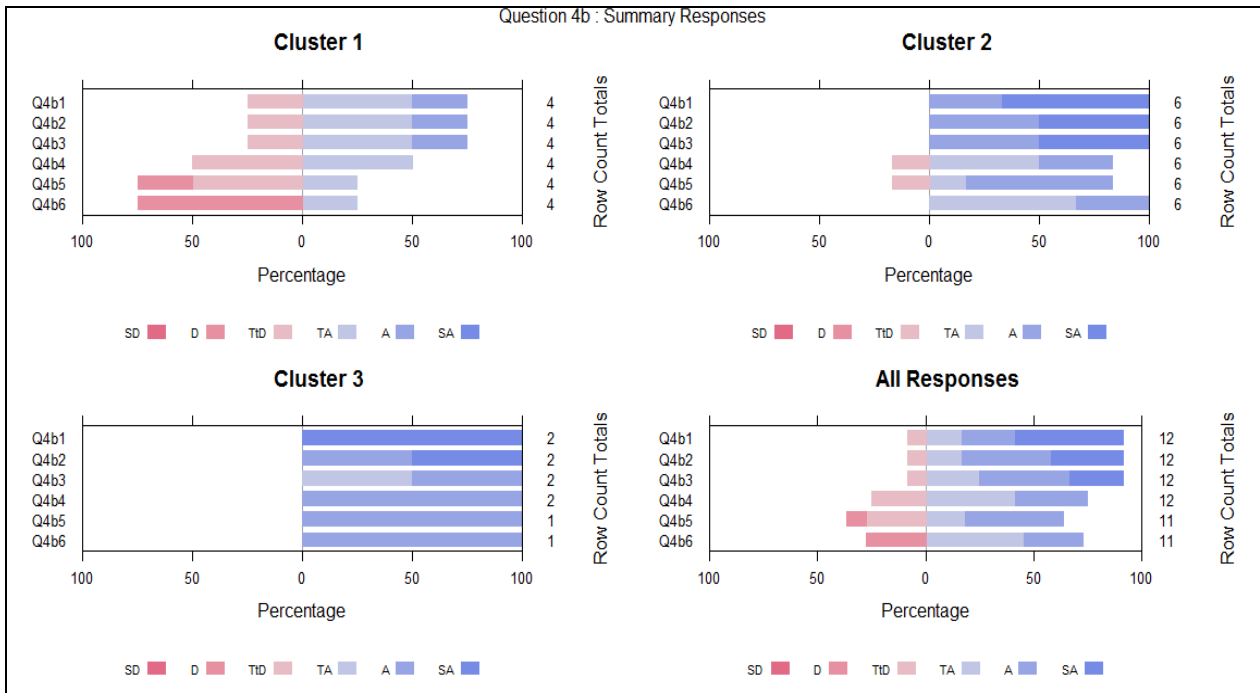
**Figure B1-5: Summary Response by Cluster to Question 4b.
(Use of performance information: monitoring.)**
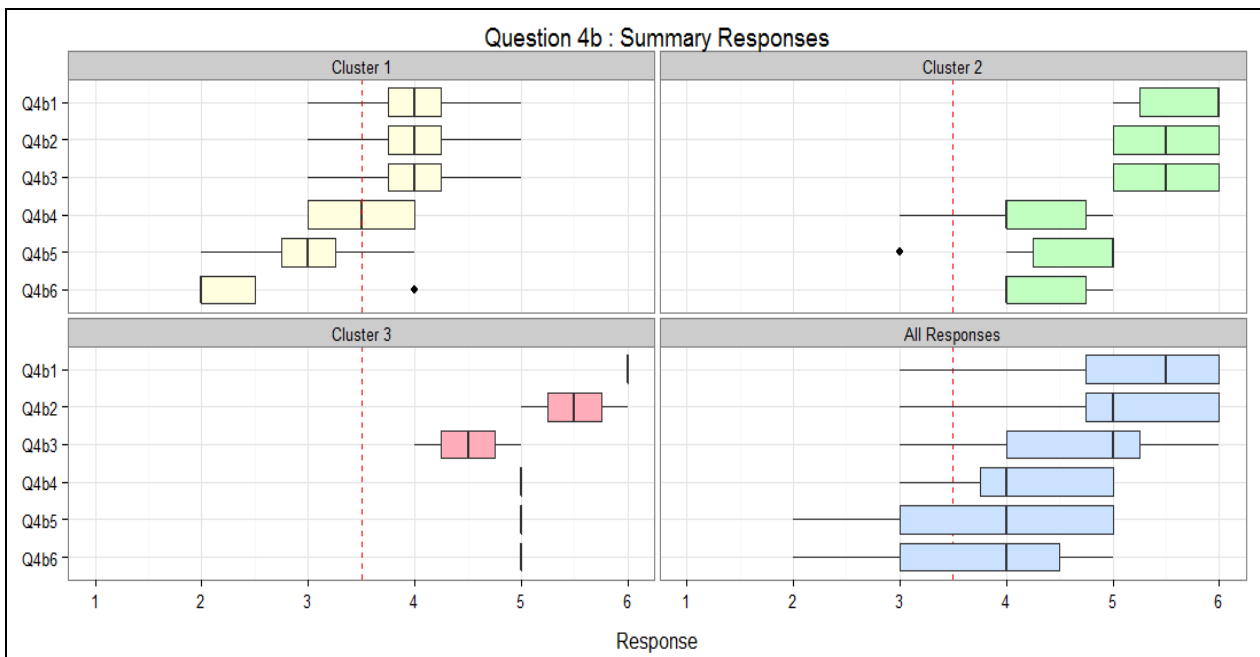
**Figure B1-6: Boxplot Summary Response by Cluster to Question 4b.
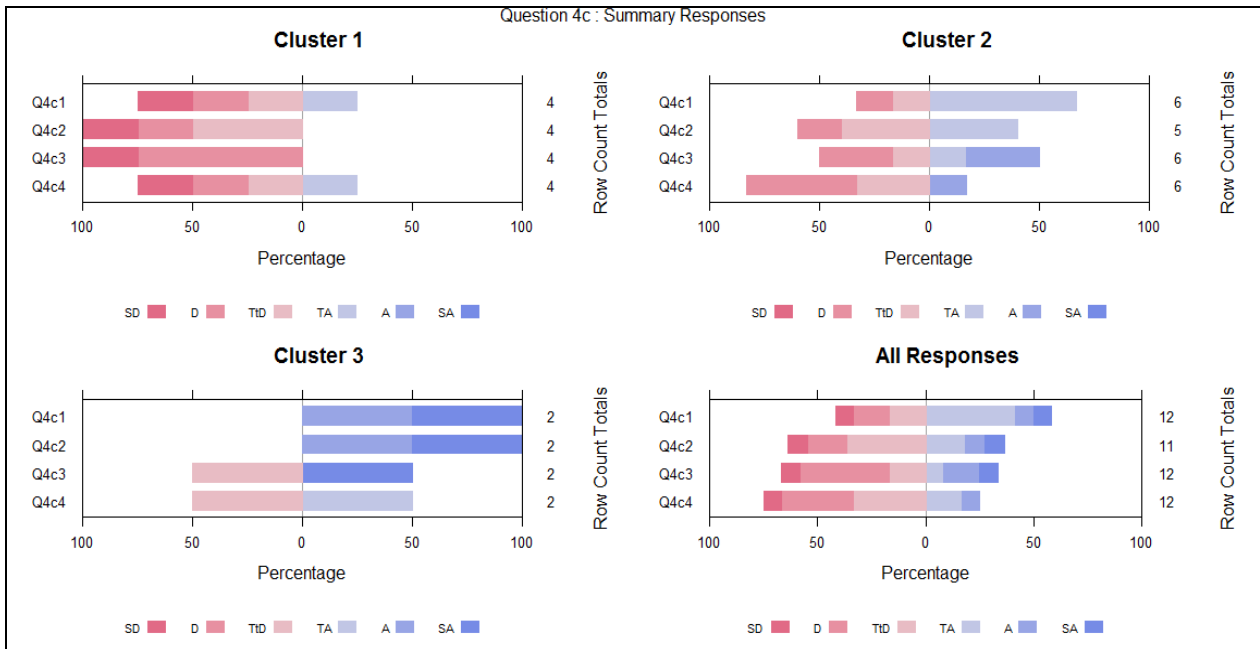(Use of performance information: monitoring.)**

**Figure B1-7: Summary Response by Cluster to Question 4c. (Use of
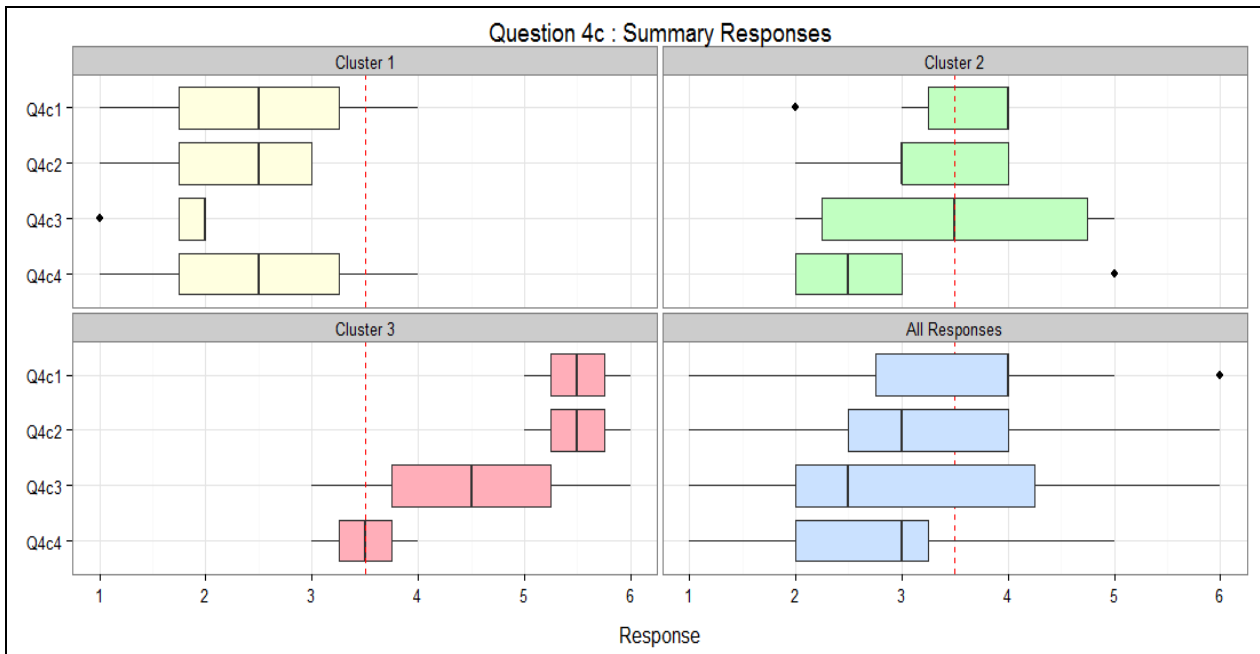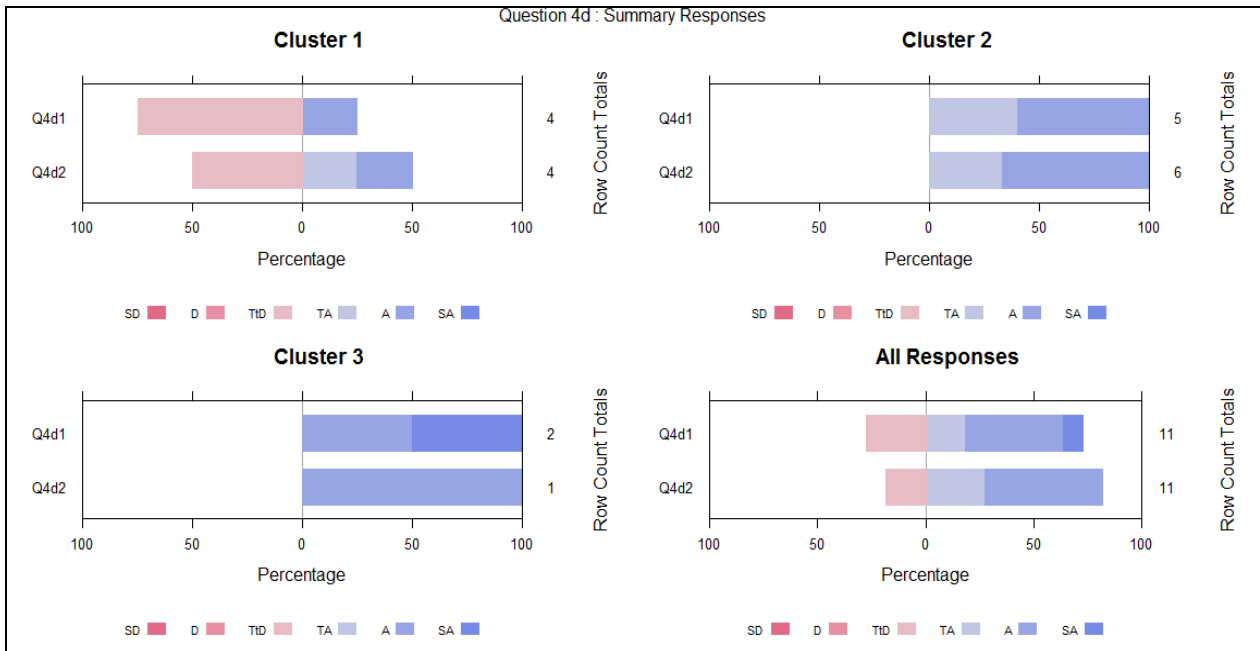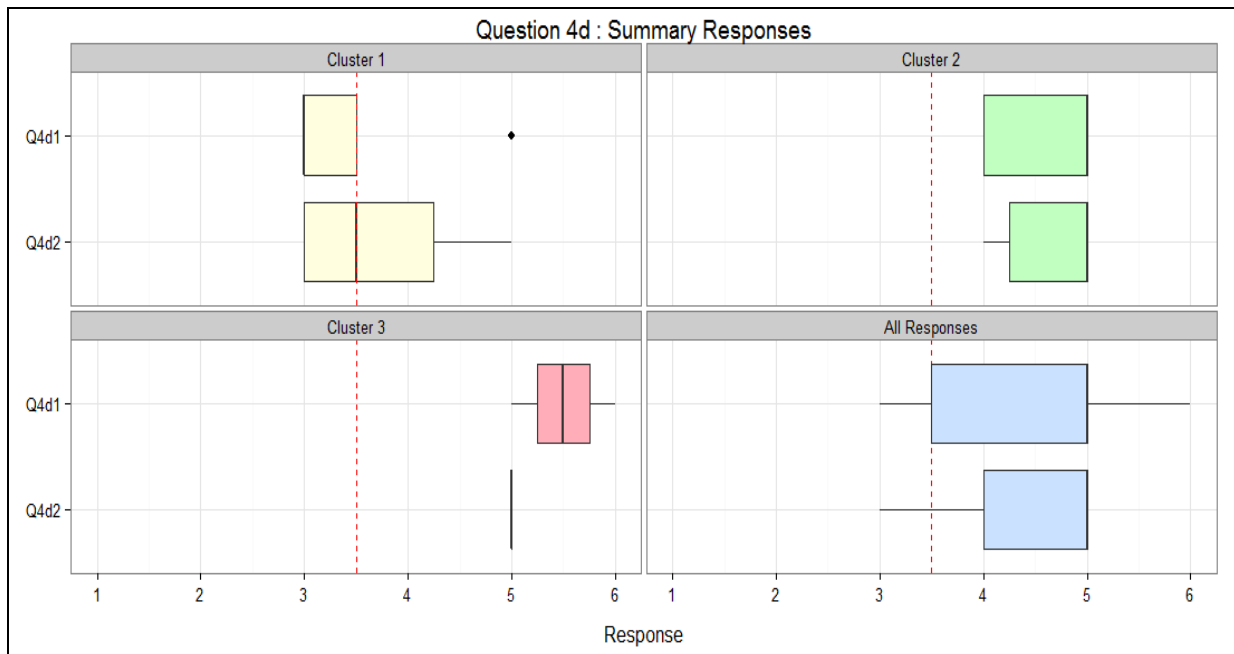performance information: validating causal relationships.)**

**Figure B1-8: Boxplot Summary Response by Cluster to Question 4c. (Use of
performance information: validating causal relationships.)**
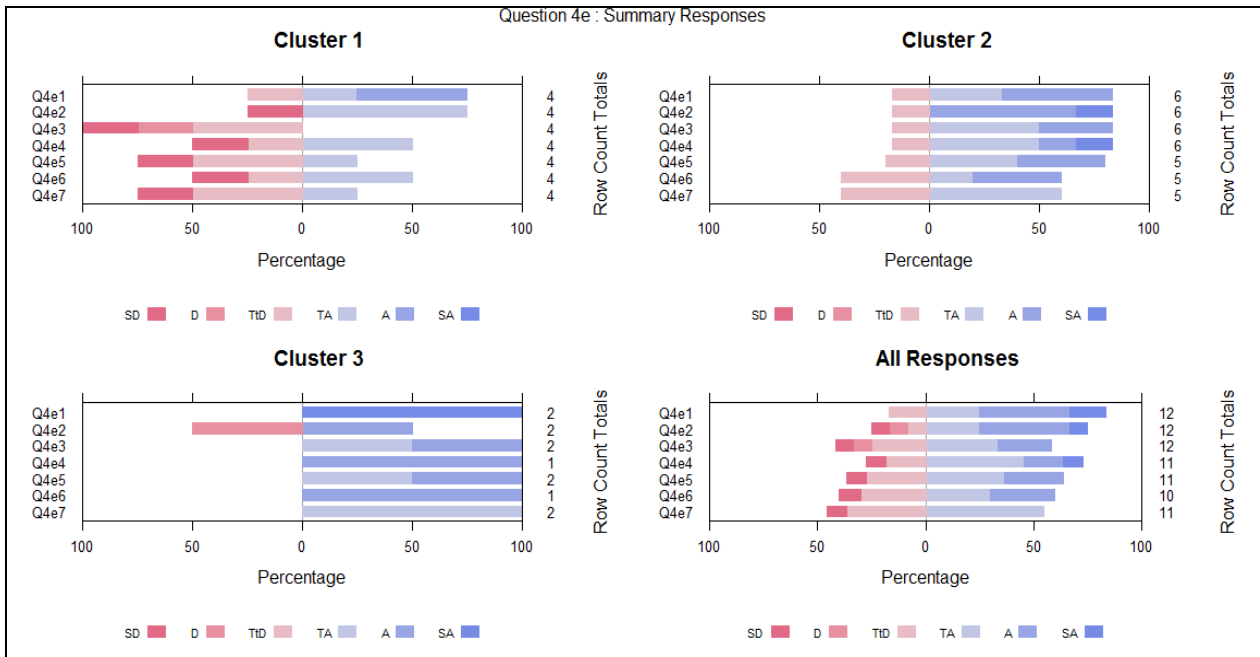
Figure B1-9: Summary Response by Cluster to Question 4d.
(Use of performance information: problem finding.)

Figure B1-10: Boxplot Summary Response by Cluster to Question 4d.
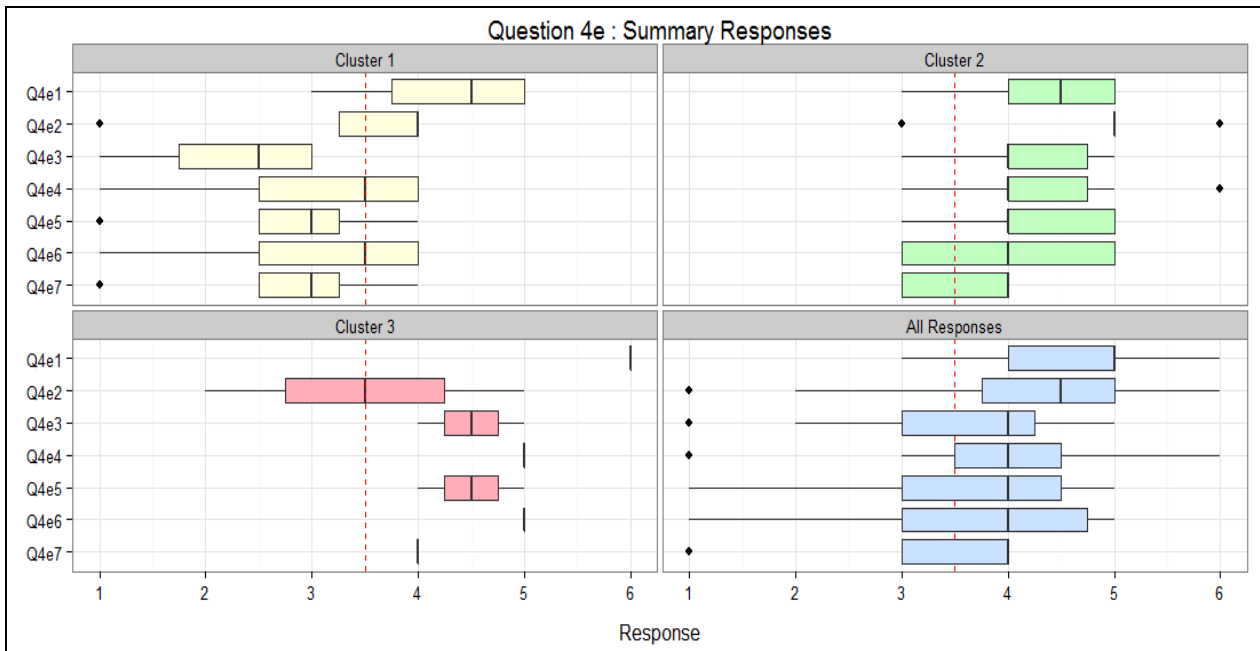**(Use of performance information: problem finding.)**

Figure B1-11: Summary Response by Cluster to Question 4e.
(Use of performance information: problem solving.)
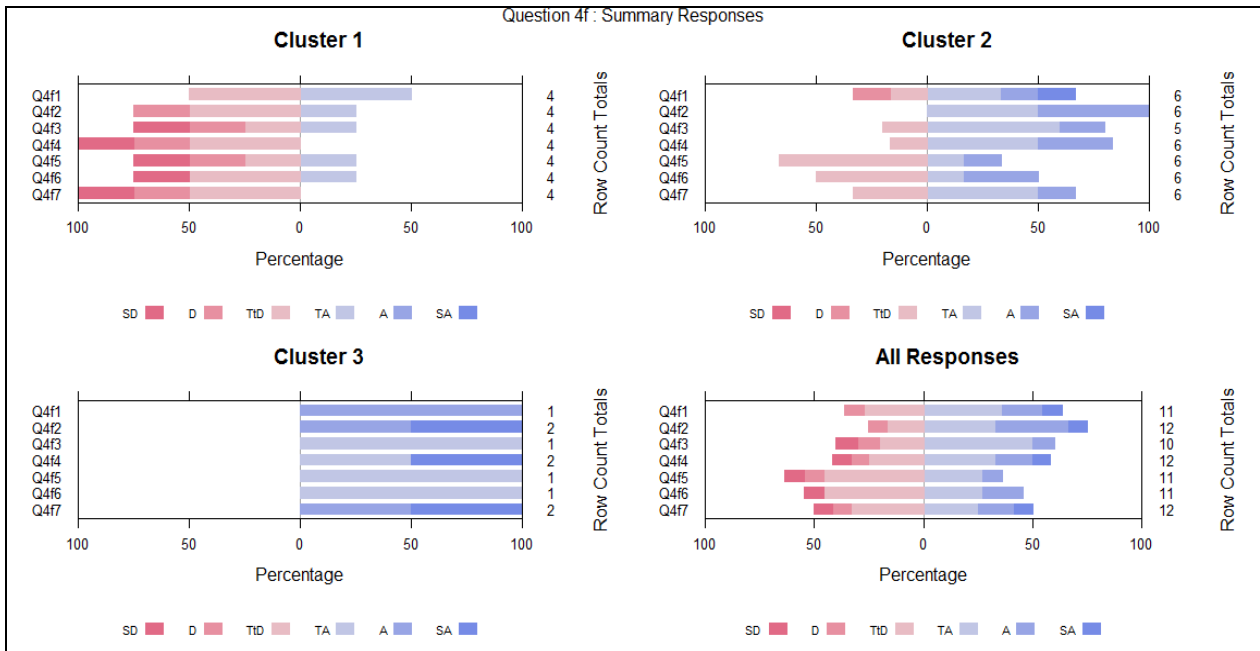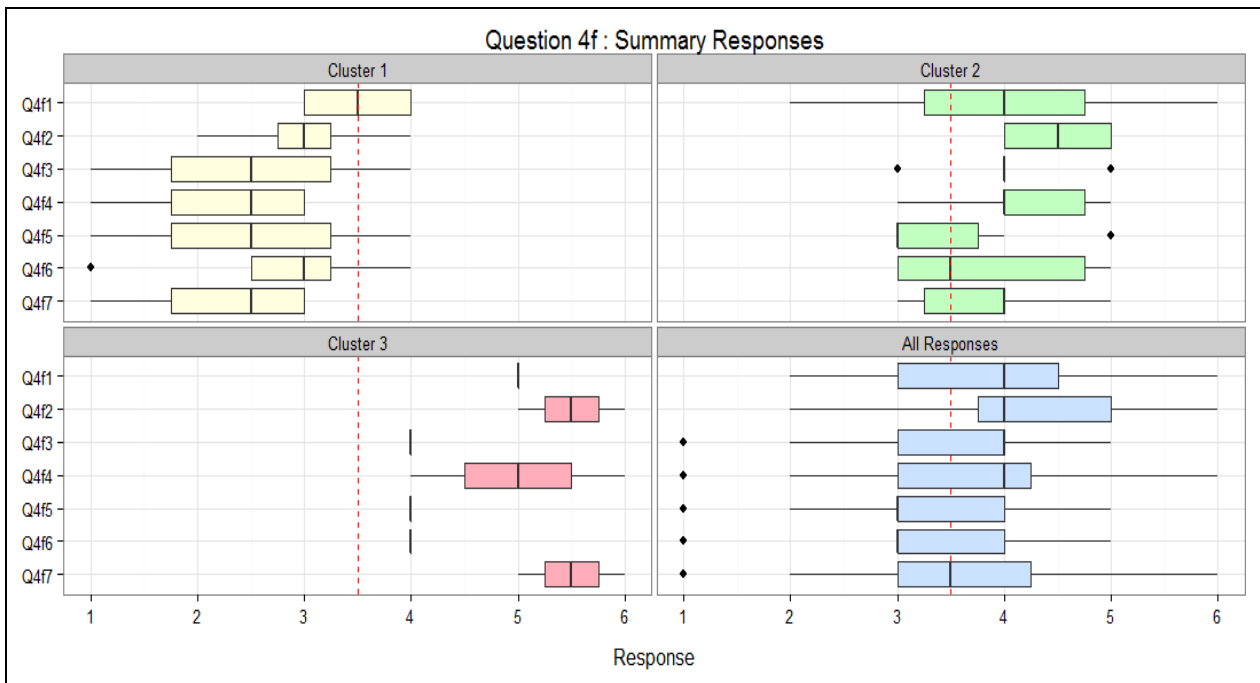

Figure B1-12: Boxplot Summary Response by Cluster to Question 4e.
(Use of performance information: problem solving.)

**Figure B1-13: Summary Response by Cluster to Question 4f.
(Use of performance information: validating improvement actions.)**

**Figure B1-14: Boxplot Summary Response by Cluster to Question 4f.
(Use of performance information: validating improvement actions.)**

Annex C – SYSTEMATIC LITERATURE REVIEW OF PERFORMANCE MEASUREMENT PRACTICES IN THE MILITARY SECTOR: FINAL REPORT

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C.1 REPORT SUMMARY

This project was completed through the Undergraduate Research Program at Virginia Tech, which provides undergraduate students an opportunity to participate in academic research as credit toward their degree. The motivation for this research was to provide support to the NATO SAS-096 technical work group in their study of Performance Measurement (PM) systems used in the military (project titled "Key Performance Indicators in Measuring Military Outputs"). In order to verify and further develop their work, the SAS-096 group defined the need to investigate the theoretical and academic foundations of this research area. Therefore, the research team at Virginia Tech conducted a Systematic Literature Review (SLR) to provide both an understanding of the state of the academic research in this area and to synthesize the types of systems and practices evident in the literature.

Performance measurement systems are being used more often across a wider range of organisational settings, which has led to a divergence in the practices and frameworks being used. One area that has been of particular interest in recent years is the public sector. A preliminary review of the literature suggests that there is a significant amount of research being conducted on the government sector while focus on the military sector seems to be much lower. In addition, it seems that there is little consensus concerning the metrics and frameworks used in different areas of the public sector. This study focused on evaluating various characteristics of literature, investigating how PM systems are studied and documented in the military sector, and synthesizing the frameworks, categories, and performance metrics used.

The project began in the Fall of 2014 with an initial scope to evaluate the literature concerning PM practices in the public sector and to compare practices among different areas of the public sector. The first stage of the project, conducted during the Fall semester in 2014, consisted of developing and pilot testing the SLR search strategy by applying the search to two platforms (i.e., ProQuest and Web of Science). While reviewing the results of the search, the research team discovered that the literature area is much larger than initially

expected. The team decided that the scope of the review needed to be narrowed in order to provide an effective analysis that could be feasibly completed during the semester projects. Therefore, the scope was adjusted to focus only on the military sector and the project was extended to include a second semester, which was conducted during the Summer semester in 2015. The team performed a preliminary analysis of the publications identified during the first stage and the results were documented in a previous report. The second stage of the project applied the revised criteria to the remaining platforms and performed an analysis of the complete set of publications found during the SLR.

This report describes the final results from the second stage of the project, which includes a discussion of the SLR approach and analysis of the military sector literature from all five of the platforms included in the study. The results suggest that the literature is in a relatively early stage of development with few examples of researchers investigating advanced themes such as identifying best practices. Synthesis of the frameworks, categories, and metrics suggests that, while many systems are based on existing performance measurement frameworks, there is evidence that both researchers and practitioners are creating customized systems that blend existing and context-specific categories and metrics. The findings suggest that a Defence-level framework that is adapted for the military sector is needed.

C.2 INTRODUCTION

Enterprise-wide Performance Measurement (PM) systems are known for making a significant contribution to the effectiveness of organisations and are increasingly being applied to a variety of organisational settings [1], [2]. In addition to many private sector settings, these systems are also being adapted for use in the public sector to guide strategic activities and improve organisational performance. However, several aspects of these organisational settings complicate the use of PM system and require customized approaches and practices [3].

While there are many significant studies on PM practices in the public sector, a brief review of the literature suggests that some areas of the public sector, such as healthcare and government, are studied frequently while the focus on the military sector appears to be much lower. To understand the current state of the literature on practices associated with military use of PM systems, a comprehensive review and synthesis of the literature is needed. The purpose of this research was to apply the Systematic Literature Review (SLR) methodology providing a comprehensive yet well-scoped search of the literature. In addition to identifying the relevant literature, this approach also provided a framework for an in-depth analysis of the characteristics of the literature as well as content areas such as compiling the frameworks, categories, and performance metrics presented in each publication[1].

The results of this study support the NATO work group's efforts, which address the following objectives as part of "SAS-096: Key Performance Indicators in Measuring Military Outputs":

1) Identify elements of the overarching structure of the PM system.

2) Identify typical measures (which may also be referred to as CSFs or KPIs).

3) Create a comprehensive list of metrics.

4) Identify areas that are typically difficult to measure.

5) Summarize analyses and findings coming from industry, public management and defence best practices.

6) Develop the proposed assessment tool.

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[1] Publication is used as the general term here to refer to documents identified in the SLR since these may include a number of different types of documents, including papers, reports, and theses/dissertations.

The first three objectives are addressed by the evaluation of PM characteristics (i.e., categorization of all frameworks, categories, and metrics presented in the literature), the fourth and fifth objectives are addressed by the analysis of themes, and the final objective is addressed through mapping the results of this study to the existing framework and results from the SAS-096 work group.

C.3 METHODOLOGY

An SLR is a rigorous methodology for reviewing the literature that is repeatable and less susceptible to reviewer biases. This methodology originated in the medical field but has expanded into other fields in recent years [4], [5]. The SLR methodology was chosen because it is flexible enough to support the scope and aims of this research while still providing a structured and comprehensive review of the literature. In addition, an SLR follows an explicit approach that is more defendable and can increase the validity of the work. The method used in this research is adapted from Tranfield *et al.* [7] and the Cochrane Collaboration [5] approach and consists of six phases which are summarized in Figure C-1 [6], [7].
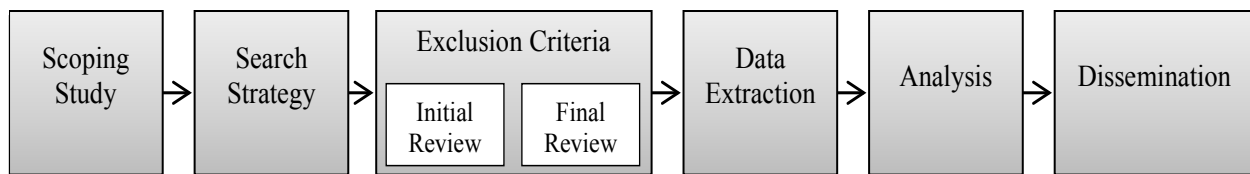

Figure C-1: Phases of the Systematic Literature Review. See Refs. [6], [7].

The scoping study was conducted to gain a general understanding of the literature and to confirm the value of conducting this type of review. During this phase, a set of representative publications was collected as the 'Scoping Publication Set,' which was used to develop the search strategy. Next, the search strategy was developed and tested. During this phase, various search terms were explored and evaluated to determine the final set of terms. In addition, advanced search tools were tested extensively to evaluate their impact on the search structure and capture rate, which is the percentage of publications in the Scoping Publication Set that are captured by execution of the search strategy. Once the search strategy was finalized, the exclusion criteria were applied in two phases: an initial review of just the titles and abstracts and then a final review that consisted of reading the full publication in detail. The result of this phase is the 'Final Publication Set' that was evaluated for this SLR. Then, data were extracted from the Final Publication Set, which required careful planning and pilot testing to ensure that the appropriate data extraction tools were chosen to support a high-quality review [8]. Analysis of the data consists of mixed methods with an emphasis on quantitative or bibliometric tools [5], [7]. Finally, the results were disseminated to provide a contribution to the body of knowledge reflected in this research area.

The SLR was conducted in a group setting involving four primary researchers, which provides several advantages to the research. First, a group setting allowed for a more comprehensive review in a relatively limited time period. This structure also affected several aspects of the strategy and evaluation of publications, increasing the robustness of the review. All evaluations were made with at least two reviewers per publication and disagreements were settled by a more senior researcher and through conversation within the entire research team.

C.3.1 Conducting the Scoping Study

The project began by identifying publications focused on any area of the public sector; as mentioned earlier, the research team quickly discovered that this literature area was much too vast for the scope of this project. During Stage 1, the scope of the search included the government sector, the military sector, and publications

that cover the public sector in general (i.e., that don't identify a specific area). This resulted in an initial Scoping Publication Set of 37 representative documents that were used to develop the search strategy. The scope of the review was later narrowed to allow for a more detailed review during the second stage of the project and was limited to military sector publications that included frameworks, categories, or metrics reducing the scoping set to 10 representative publications.

C.3.2   Developing the Search Strategy

The scope of the project was defined to investigate the literature directly concerned with PM design and use in the public sector. To accomplish this, the search strategy was designed to search the Title and Abstract fields, which would identify publications directly focused in this area while still controlling the scope of the results. Next, the platforms were chosen based on aspects such as the variety of publication types included, and the type of coverage offered. During this phase, the research team worked with the Virginia Tech university librarians for engineering and military studies to identify a comprehensive set of platforms for this review. The final set of platforms and their coverage are shown in Table C-1. This set of platforms was chosen to allow for a 100% capture rate of the Scoping Publication Set, which is discussed in more detail in the Discussion of Results section.

Table C-1: Platform Coverage of Publication Types. (X = significant emphasis of this type of publication, x = emphasis of this type of publication.)

Platform / Type of Publication	Books and e-Books	Academic Articles	Conference Proceedings	Dissertations and Theses	Trade Journal	Technical Reports	News Articles	Military
ProQuest	X	X	X	X	x	X	x	x
Web of Science	X	X	X	X	–	–	–	–
EBSCO host	X	X	X	x	x	x	x	x
Engineering Village	X	X	X	x	x	x	–	x
Air University	x	X	X	x	–	X	–	X

Next, the primary concepts of the search strategy were identified to be performance measurement, public sector, and frameworks, each of which were then decomposed into several basic search terms. To further develop the concept decomposition, the Scoping Publication Set was investigated for themes and terminology that may be relevant to this literature area. This initial set of terms was then tested in a series of searches to determine which terms were the most useful in capturing relevant publications and which terms were redundant or not related. Through several iterations of testing, the search terms were narrowed to a final set, shown in Table C-2, which captured all of the initial 37 publications from the scoping set in Stage 1 and yet also provided for a feasible scope of search results.

Table C-2: Final Set of Search Terms. (Note: quotations refer to terms searched exactly as shown.)

PM System	Public Sector		Frameworks
"performance measurement"	"public sector"	military	Framework(s)
"performance management"	Non-profit	"armed forces"	Category
"balanced scorecard"	Non-profit	Army	Categories
"measuring performance"	Not-for-profit	Navy	Model(s)

PM System	Public Sector		Frameworks
"assessing the value"	"public management"	"air force"	Scorecard(s)
"measurement agenda"	government	Defence	Metric(s)
"performance contracts"	Municipal (ities)	Defence	Measure(s)
"defence measurements"	"local authority"	"command and control"	Indicator(s)
"defence measurements"	"public organisation"	naval	System(s)
	City		Criteria
			"performance area(s)"

The search terms were then combined to create a simple Boolean phrase and searched under similar conditions in each platform. Finally, the only limiter that was applied in the strategy was that the publication must be written in English. It is important to note that the strategy did not require that the full text of the publication be available in the platform in which it was identified, given that the research team could use alternative methods to find publications initially labelled "not available" from executing the search. This process resulted in "re-capturing" approximately 30 – 40% of the publications initially reported as not available by the respective platform. Alternative search methods included searching Google Scholar and using several Virginia Tech library resources such as Summon and reviewing individually indexed journals. The results of the final search are shown in Table C-3.

Table C-3: Final Search Results.

Database	No. Raw Results	No. Limited Results	Capture Rate
ProQuest	3,762	3,612	97.4%
Web of Science	1,621	1,272	100.0%
EBSCO host	3,236	3,171	97.1%
Engineering Village	1,679	1,640	100.0%
Air University	2,598	2,589	55.6%

Table C-3 reports the number of raw results (i.e., the number of publications resulting from the search) in addition to the number of limited results (i.e., the number of English-language publications captured by each search). Finally, the capture rate for each platform is reported, which shows that two platforms capture all of the publications in the scoping set indexed in that platform, achieving a 100% capture rate. The other platforms have an acceptable capture rate considering the trade-off between comprehensiveness and scope of the work. The exception to this is the Air University platform, which has a capture rate of only 55.6%. This platform was included because it explicitly focuses on military applications, but the search functions offered are limited compared to the others. Therefore, instead of being able to search Title and Abstract in this platform, the platform searches only the Abstract, resulting in some of the scoping study publications being missed by the search. However, the low capture rate is an acceptable trade-off for the access to a unique set of publications that this platform provides to the analysis.

C.3.3 Applying the Exclusion Criteria

The exclusion criteria were applied in two steps. First, the limited results from each platform were evaluated by reading the Title and Abstract. During this step, reviewers applied the broad criterion that the publication

must discuss PM in the public sector. This process resulted in 1,639 publications that were evaluated during the second step, which consisted of reviewing the remaining publications by reading the full text and applying a more detailed set of exclusion criteria as shown in Table C-4. This process consisted of having two reviewers read each publication and either accept it or document which exclusion criteria had not been met. The reviewers agreed on approximately 80% of the ratings and all disagreements were then resolved by evaluation from the third reviewer and discussion in the research team. Through this process, 51 publications were identified for the analysis. In addition, the NATO work group provided three reports that were not available in the published literature to include in the analysis, resulting in a Final Publication Set of 54 publications.

Table C-4: Application of Final Exclusion Criteria.

Exclusion Criteria	No. Publications Removed
Publication was a duplicate or otherwise not acceptable.	38
Publication was not about PM in the public sector.	311
Publication was not related to the military (i.e., healthcare, education, etc.).	719
Publication was not about the right type of PM system (i.e., maintenance, employee appraisal, etc.).	250
Publication did not include a framework, category, or metric (FCM) but was generally related: • Publication focused on implementation or use. • Publication focused on effectiveness or outcomes. • Publication focused on reasons for use or what instigated the system adoption.	270
Final Set of Accepted Publications	**51**
Include three reports provided by the NATO work group	*54*

It is important to note that two subsets of publications that were excluded during this process may be useful in future research. First, there were 719 publications identified in the search that are from different areas of the public sector. These publications were identified due to the original scope of the research, which was on the public sector in general, and were later excluded when the scope was narrowed to the military sector. These publications could be used in future work to further evaluate the differences between the military and other areas of the public sector. Second, there were 270 publications that were from the military sector and related to this research but did not include frameworks, categories, or metrics, which were the focus of this review. These could also be used in future research to investigate PM practices in the military more broadly and to provide further context for interpreting the results of this study. In addition, these publications may include important themes such as identifying areas that are hard to measure, lessons learned, and best practices.

C.4   RESULTS AND DISCUSSION

The analysis of the Final Publication Set (54) is organized into three parts. First, the characteristics of the literature were reviewed and selected bibliometric analyses were conducted to provide an understanding of the current state of the academic research. Then, relevant themes were identified and investigated in the literature to provide further context for the review and to explore any evidence of areas that are hard to measure, best practices, or lessons learned. The characteristics of the PM systems were then investigated

in terms of the frameworks, categories and metrics used and the results were compared to the current conceptual model proposed by the NATO working group.

C.4.1 Characteristics of the Literature

Before beginning the discussion of the complete analysis from Stage 2, it is important to recall the publications per year findings from Stage 1, which are shown in Figure C-2. As noted previously, the scope of the Stage 1 analysis included government and general public sector publications but was limited to only two platforms. Evaluation of the number of publications per year for this set shows that the literature is primarily made up of publications focused on government applications (68%) while only 30 of the 234 (13%) were focused on the military. In addition, publications that studied the public sector in general and did not specify a focus area were also included under the 'general' classification (representing 19%). The trends in publication suggest that there has been a general increase in this research area. However, this trend is primarily driven by publications from the government sector. As the figure shows, publications in both the military and the government sectors began early but publications focused on the military sector seem to be more consistent over time. This suggests that further research in the military sector is needed.
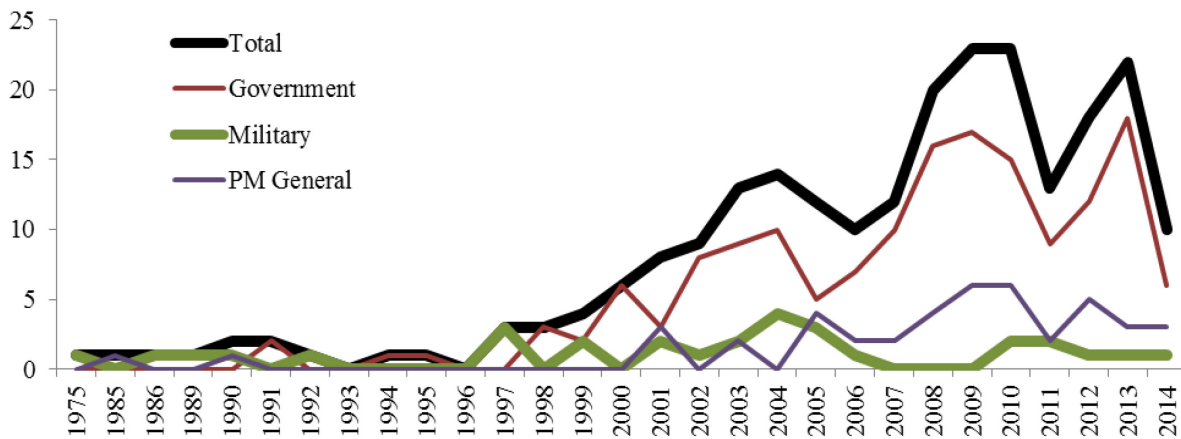

Figure C-2: Publications Per Year from Stage 1.

The scope of the research was then narrowed to the military sector and publications that explicitly included frameworks, categories, and metrics resulting in the Final Publication Set of 54, which is the focus of the remaining analysis. Figure C-3 shows the total results from Stage 1 (as shown in the previous figure) along with the publications per year of the 54 military publications from Stage 2. It is interesting to note the similarity between the military trend line from the final analysis, which included all five platforms, and the military trend line found in Stage 1, which was based on only the subset of military publications from ProQuest and Web of Science. A review of Figure C-3 suggests that there has been some increase in the military publications but there is not a distinct trend. In addition, it seems that military-focused publications may tend to lag behind general public sector research further supporting the assertion that increased focus is needed in this area.

The Final Publication Set was then evaluated to determine the types of publications represented and to identify the most common sources (i.e., magazines, academic journals, etc.). As mentioned previously, the search strategy did not have any limitations concerning the type of publication to allow for the identification of as many publication types as possible. Figure C-4 shows the proportion of each type of publication represented in the Final Publication Set and Figure C-5 shows the most common publication titles. The results show that there is a relatively good balance of academic (i.e., academic journals and theses/dissertations) and practitioner publications (i.e., magazine articles and technical reports). It is interesting to note the significant number of theses/dissertations, which primarily come from the U.S. Naval

Postgraduate School and the U.S. Air Force Institute of Technology. The results also show the most common academic journal and magazines that may serve as useful sources for relevant information.
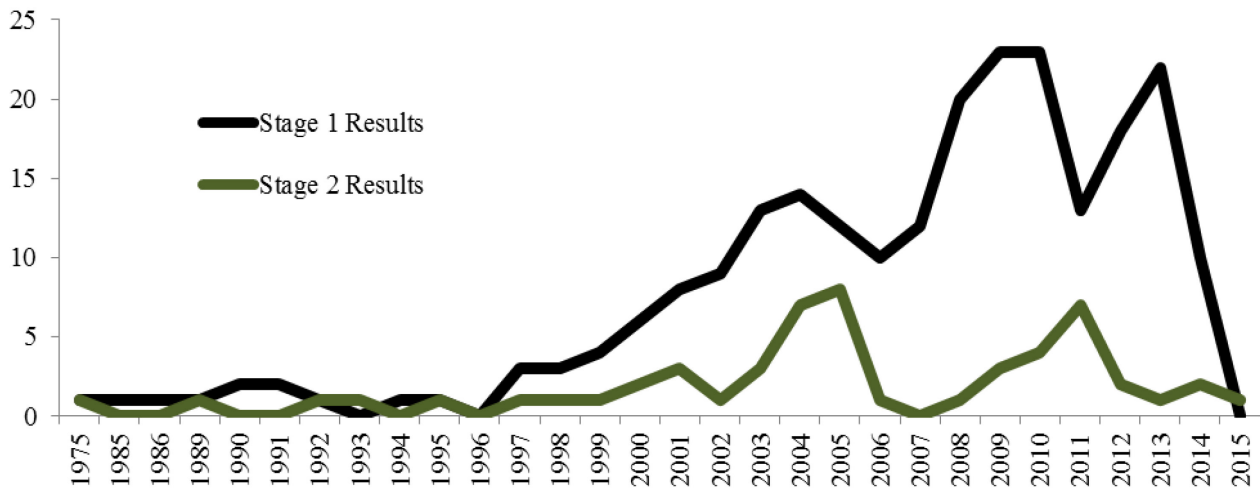

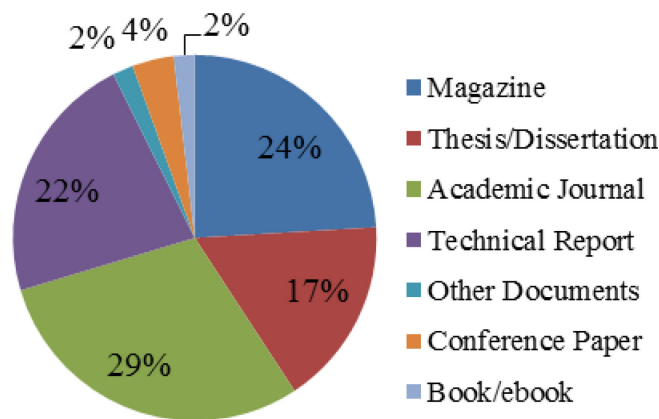**Figure C-3: Comparison of Stage 1 and Stage 2 Publication Trends.**

Figure C-4: Proportion of Publication Type.

Type	Title	No. Publications
R	Naval Postgraduate School	6
AJ	Int. J of Productivity and Performance Management	2
M	Armed Forces Comptroller	2
M	Army AL&T Magazine	2
M	Cost Management	2
R	Air Force Institute of Technology	2
R	Joint Analysis and Lessons Learned Centre	2

Figure C-5: Most Common Publication Sources.

In addition to evaluating characteristics of the publications, several author characteristics were investigated to provide further context for the analysis by understanding the authors' backgrounds as well as identifying prominent authors in the Final Publication Set. Ninety-two unique authors were identified with only eleven having authored more than one publication. The author's disciplines were then categorized to gain a better understanding of the perspectives and theoretical approaches underlying this research area. For clarity, each author was assigned only one discipline category. Disciplines were identified for 67% of the authors by evaluating the author information provided in the publications. The results, shown in Figure C-6, show that most of the authors were either professionals or academic researchers in the Management Sciences. It is interesting to note that, while Military Sciences is represented in the Final Publication Set, there are only a few authors that identify themselves as associated with the military (i.e., Military Officers and academic researchers in the Military Sciences). In addition, the results showed that 26% of the publications had authors across multiple disciplines providing some evidence for multi-disciplinary work in this area. Next, the authors' country of residence was investigated, and the results are shown in Figure C-7. It is important to note that 70% of the authors were from the United States and are omitted from the figure for readability. The results show that the authors primarily come from North America, Europe, and Asia.
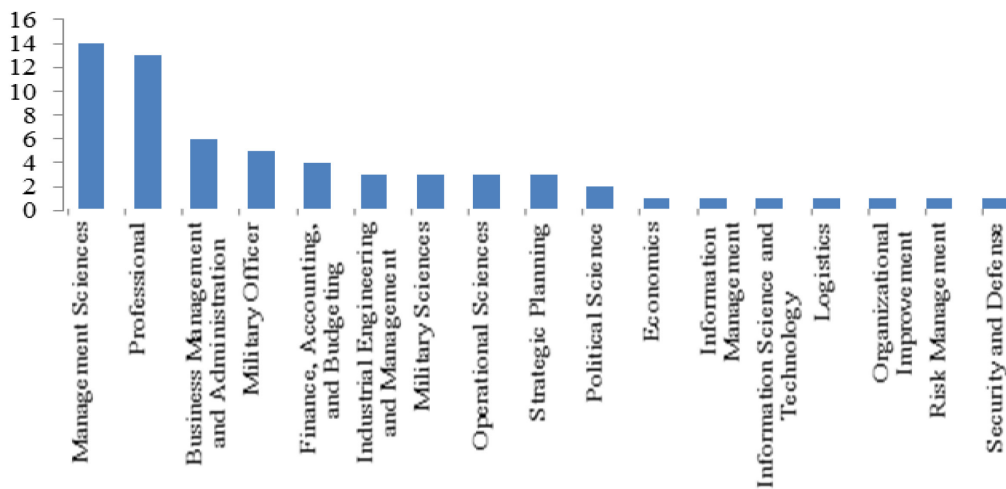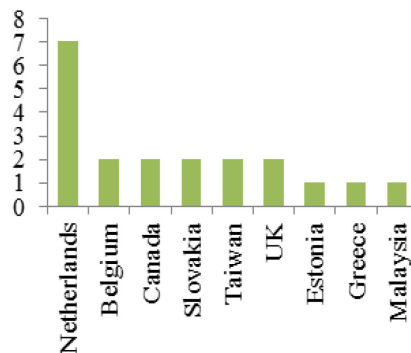

Figure C-6: Author's Discipline.

Figure C-7: Author's Country.

To further investigate collaborations among the authors, a co-authorship network was created, and the results are show in Figure C-8. In this figure, each node represents an author and the size of that node is proportional to the number of publications for which they are an author. The lines connecting the nodes, or

'edges,' represent that the two nodes were co-authors of the same publication. Like the node size, the thickness of the line represents the number of publications that the two co-authored (i.e., the number of 'collaborations'). The co-authorship network is dispersed and, therefore, the diagram was reduced to only include authors of more than two publications and any additional authors of those publications. Therefore, Figure C-8. shows the most prominent authors and their co-authors. The results show that there are four prominent research groups and one additional author that has no collaborators. It is interesting to note that the most common author was represented by three publications and, therefore, it seems that this research area is not a primary topic for many researchers. In addition, the groups shown in Figure C-8. are all isolated and there does not seem to be any evidence of collaboration among groups.
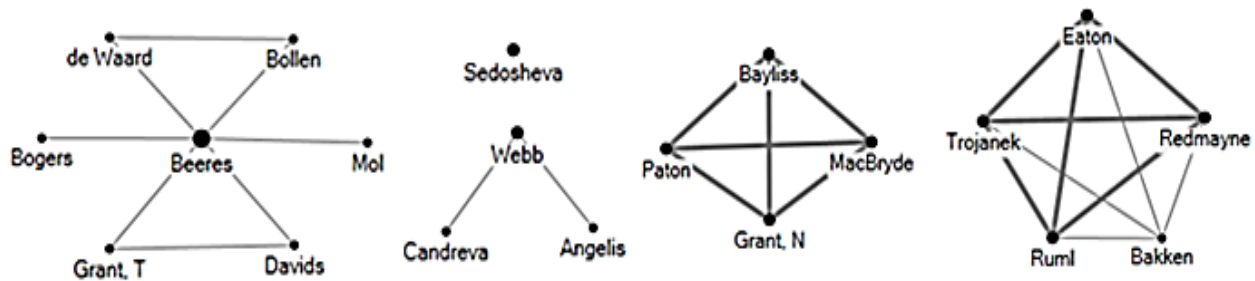

Figure C-8: Co-Authorship Network.

To further investigate the level of development of this research area, the methodologies used in the publications were also evaluated. Figure C-9 shows a breakdown of the number of instances of each method present in the Final Publication Set. The results show that approximately 11% of the publications in the set applied more than one research methodology. In addition, the most common method in both academic and non-academic publications is concentrated on evaluating cases. This is due in part to the nature of this research, which is focused on identifying the frameworks, categories, and metrics present in the literature. However, there are several examples of additional exploratory and advanced approaches. The findings suggest that this area is in a relatively early stage of development and additional studies that utilize more advanced and mixed methods may be useful to further develop this research area.
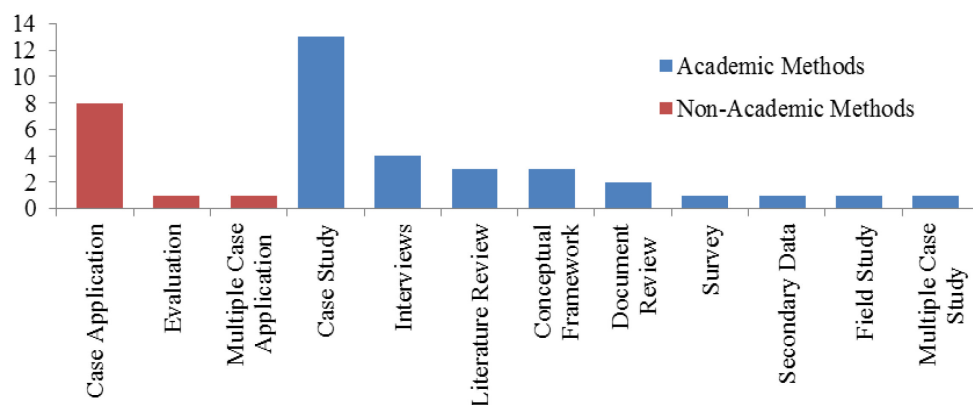

Figure C-9: Breadth of Research Methods.

To provide further context for the conclusions of this research, several aspects of the content of the publications in the Final Publication Set were investigated. First, the branches of the military studied were evaluated and the results are shown in Figure C-10. The results show that almost half of the publications have a general focus on Defence-level performance measurement and do not identify a specific branch. The

Army, Navy, and Air Force account for most of the publications that were branch-specific, but there were also examples from other branches represented. It should be noted that, while they are not obvious military-related, areas such as the Coast Guard and Homeland Security are included in this study as they are considered part of the military in some countries. The NATO work group is interested in developing a Defence-level PM system and, therefore, the publications identified should provide appropriate general data on the PM frameworks, categories, and metrics as well as some evidence concerning how this may vary among some branches.
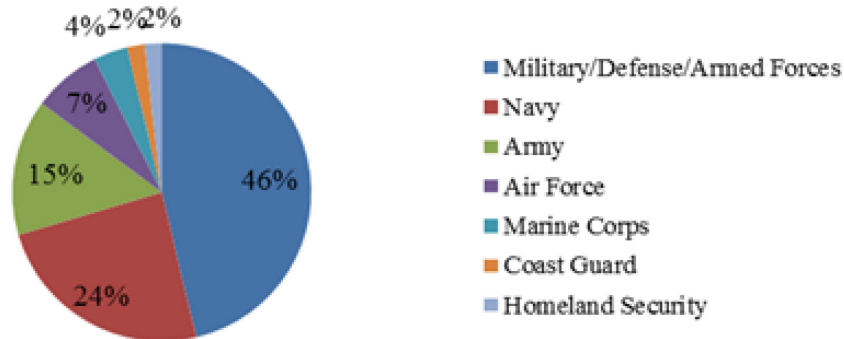

Figure C-10: Proportion of Military Branches Represented.

Since many of the publications conducted some type of case study or survey, the country of study from each publication was also investigated. Twenty-six countries were represented in the Final Publication Set and the distribution is shown in Figure C-11. The United States was the focus of 33 of the publications but is not included in the figure for readability. It is important to note that there were several instances of an author studying a country other than their own country of residence. Finally, the core task of the organisational unit being studied was investigated and was categorized as shown in Figure C-12. The most common core task studied in the Final Publication Set was Financial Management, which is somewhat expected due to the traditional use of PM. However, the results show that there are examples of PM systems being designed for military-specific organisational units such as Warfare, Acquisitions, and Command and Control.

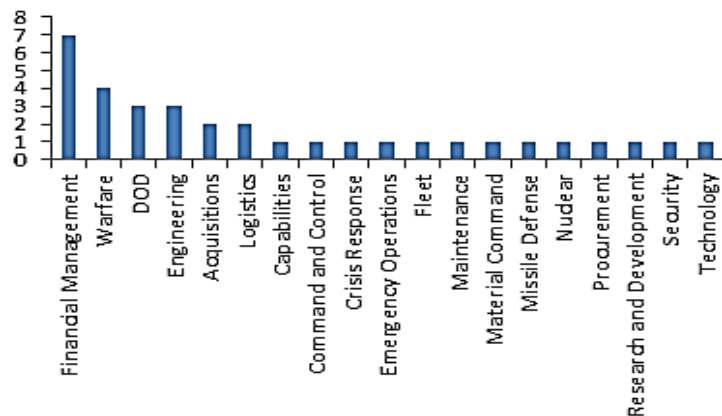**Figure C-11: Most Commonly Studied Country. (U.S. excluded from graph.)**

Figure C-12: Most Commonly Studied Core Task.

C.4.2   Themes in the Final Publication Set

While the frameworks, categories, and performance metrics from each publication were collected and analyzed, the remaining content and various focus areas could also be relevant and may provide insights into the reliability of the conclusions drawn from the synthesis. Only 57% of the publications were directly focused on the PM system. While the remaining publications were not necessarily focused on discussing the PM system, they either had a secondary focus on the PM system or at least included some of the categories and metrics for the system. To evaluate the content of the publications, three themes were identified, which are aligned with the fourth and fifth objectives of the NATO working group, in order to gain a more general understanding of the content of the Final Publication Set. These themes are not mutually exclusive such that one publication may focus on more than one theme identified. The prevalence of the three themes are summarized in Table C-5, which shows that very few of the publications focused explicitly on any of the three themes and only the first theme (i.e., the publication identifies areas that are hard to measure) is mentioned with any regularity.

Table C-5: Main Themes Identified in the Final Publication Set.

Theme	Primary Focus	Any Mention
Publication identifies areas that are hard to measure.	4%	31%
Publication identifies best practices.	7.6%	7.6%
Publication identifies lessons learned.	7.6%	9.6%

These findings suggest that the research area is still in a relatively early stage of development with many authors identifying challenging areas to measure while few examples of recommendations for practice. In addition to the lack of thematic data, the apparent lack of maturity in this area reduces the contribution of a thematic analysis. One way to address this issue is to evaluate the secondary set of publications that did not meet the fourth exclusion criteria; i.e., publications that are directly related but do not include frameworks, categories, and metrics. These publications focus on PM practices in the military but do not include specific details of the system. However, they may include information on supporting topics, which could enable a detailed thematic analysis to synthesize the information on areas that are hard to measure, best practices, and lessons learned. While a complete thematic analysis was not applicable, Table C-6 summarizes several examples of statements from the thematic data.

Finally, one additional theme that was identified in the Final Publication Set is a focus on connection between strategic management and PM. More specifically, 21% of the publications focused on strategy mapping and 10% provided their strategy map. This finding suggests that the NATO group's emphasis on strategy and mapping the causal relationship among performance categories is timely and could provide a significant contribution to this research area.

Table C-6: Examples of Themes.

Hard to Measure Areas	
Beeres (2010)	"According to Speckbacher (2003) public organisations 'are built around their mission which is hardly measurable, and they serve a multitude of constituencies whose goals and needs may be quite heterogeneous.'"
Webb (2010)	"Consistent with the literature, the SWE has found it difficult to create a useful outcome measure, but has built a performance management system that provides detailed information about specific outputs."

Arnold (2005)	"The three main areas for metrics improvement recognized by this research are human capital, teamwork (integration), and communication. These can also be the hardest areas to measure because of the difficulty in objectively quantifying performance in those areas, particularly in teamwork and communication."
Marquis (2006)	"Even though deterrence is not easy to measure, however, most analysts tend to think that it is worth pursuing."
	"Tracking the resources for AMEDD international activities will be difficult because those responsible for AIA planning and execution do not always have control, or even visibility, over funding."
Angelis (2009)	"Measures of effectiveness can be difficult to define and use with accuracy. In the DoD community, we often substitute input or output measures for outcomes."
Best Practices	
Alderman (1993)	"Measures should include those processes that managers of the activity control. They should exclude measures over which the activity has no control."
	"Measures should be distinguishable from measures of work process even though work process measures contribute to improving the performance of output efficiency or effectiveness."
Polymenidis (2003)	"The scorecard should use consistent terminology throughout the organisation."
Lessons Learned	
Buss (2005)	"Alignment and visibility of all processes and activities are important."
	"It is important to select a good strategic-planning and performance-management model and continue to use it."
Marquis (2006)	"Inputs Are Not the Key to Assessment."
	"Distinguishing Between Outputs and Outcomes Is Critical."
	"Knowing When an End Has Been Achieved Is Important."

C.4.3   PM System Characteristics

To complete the synthesis of the Final Publication Set, all of the frameworks, categories, and metrics identified were captured. The research team organized the data in an Excel database, which allows the data to be sortable enabling further investigation and development of a comprehensive list of metrics. An excerpt of the database is shown in Figure C-13.

Figure C-13: Excerpt From the PM System Characteristics Database.

Fifty-four unique frameworks and 70 unique categories were identified with some publications studying more than one framework and others only including categories and metrics without specifying a framework. The frameworks were classified as being derived from an existing framework (i.e., BSC, Performance Prism, etc.) or as a custom model as shown in Figure C-14. The results show that approximately two-thirds of the frameworks are derived from the Balanced ScoreCard (BSC). The only other existing framework that was used was the Logic Model (i.e., input, process, output model) and several of the frameworks were completely customized.
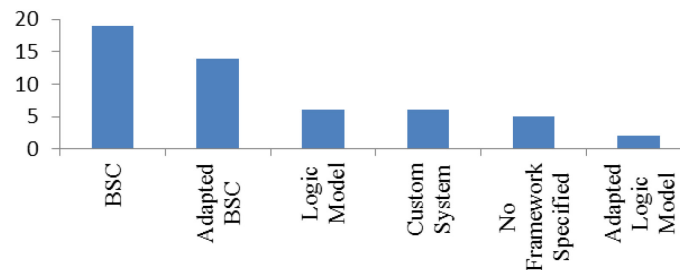
Figure C-14: Frameworks Identified in the Final Publication Set.

Next, the categories were investigated and the most commonly-studied categories are summarized in Figure C-15. The categories were further separated into groups based on the existing framework that the category is generally associated with. For example, the first four categories listed in this figure (i.e., Financial, Internal / Business Process, Customer, and Innovation, Learning and Growth) are the four categories for the standard BSC. However, other versions of the BSC often include alternative categories that are more relevant in specific contexts such as using Resource Management instead of Financial in the public sector version. The results show that the most common categories are generic with only a few examples of military-specific areas. This suggests that, while some frameworks are incorporating custom content, many of the cases are simply adopting an existing framework instead of creating a framework customized to this context.
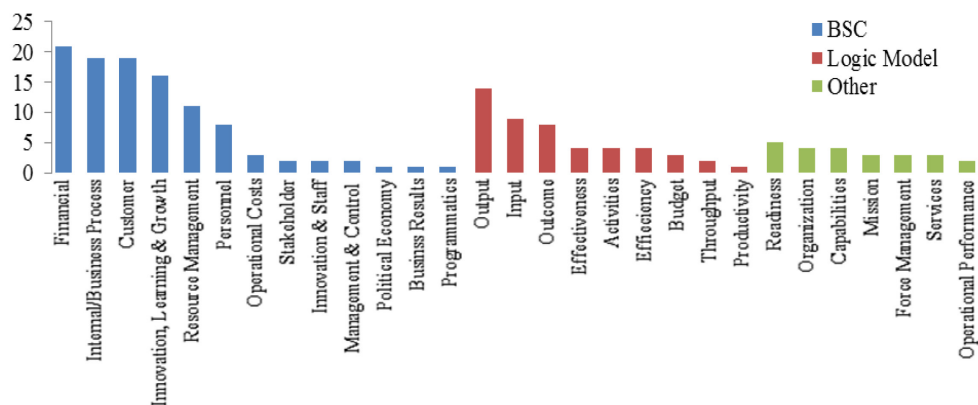
Figure C-15: Most Common PM Categories.

To gain a deeper understanding of the prevalence of each category, the proportion of the most common categories were identified for each branch of the military and for publications that did not specify a branch. The results are shown in Figure C-16, which also includes the percentage of the Final Publication Set represented by each branch. Although the sample for each is relatively low, the figure provides some evidence for variations in category use among the branches.

Next, the source of each category was investigated, and the results are shown in Figure C-17. This figure shows the branches that include each of the most common categories shown in Figure C-15. For example, the Financial category is the most common and it has been used by all of the represented branches. It is interesting to note that some of the most common categories are used relatively narrowly such as the Mission category, which was only used in general publications (i.e., did not specify a branch) and in the Army.
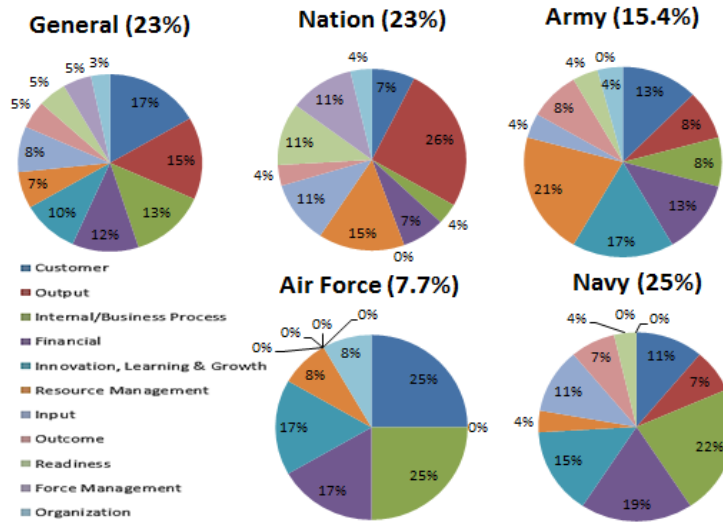
Figure C-16: Differences in Category Prevalence by Branch.
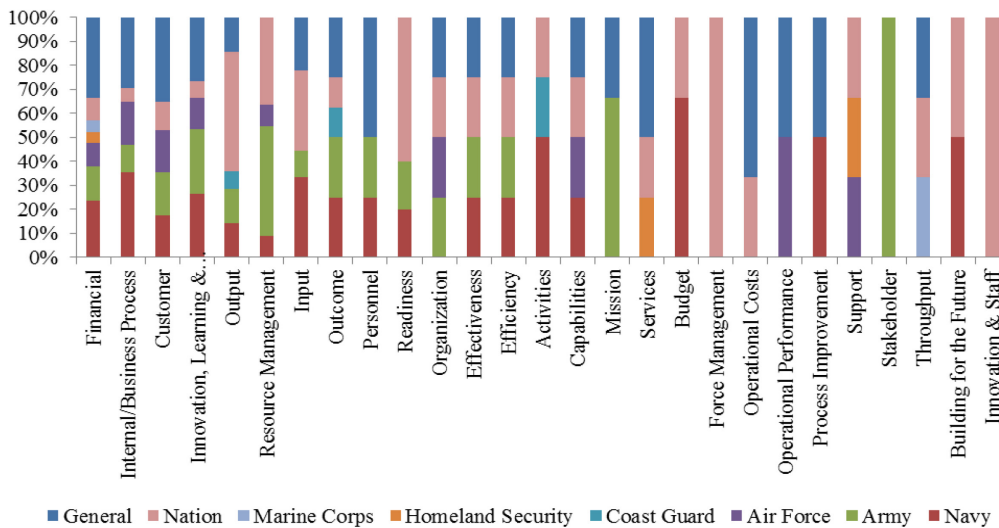
Figure C-17: Source of PM Categories.

In addition to investigating how often the categories are used independently, the co-occurrence of categories, i.e., instances of two categories being included in the same PM system design, were also investigated using social network analysis. The resulting network is shown in Figure C-18. Like the network in Figure C-8, the nodes in this figure represent a single category and the size of the node is proportional to the number of PM systems that included it. The edges in this figure indicate that the two categories were used in the same PM system and the thickness of the edge represents the number of times the categories co-occurred. To improve the readability of the network, co-occurrences that happen only once are omitted from the figure.

The network shows two distinct clusters with one consisting primarily of categories associated with the BSC and the other with categories associated with the Logic Model. In addition, use of the public sector version of the BSC, which typically includes categories such as Resource Management and Stakeholders, is also evident. The results show that, while many systems are still based on existing frameworks, there is some evidence of customized systems that blend the existing frameworks and incorporate military-specific categories. This is more clearly seen in Figure C-19, which does not omit the co-occurrences that happen only once.
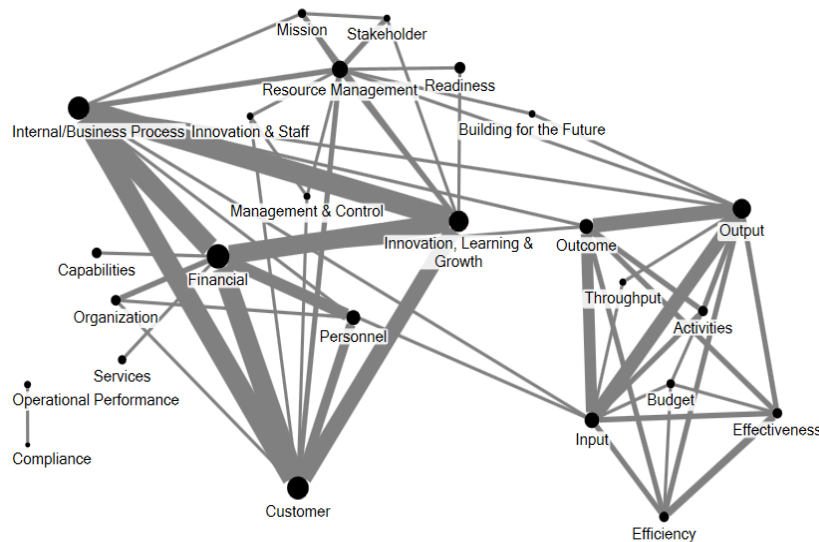
Figure C-18: Limited Co-Occurrence of PM Categories.
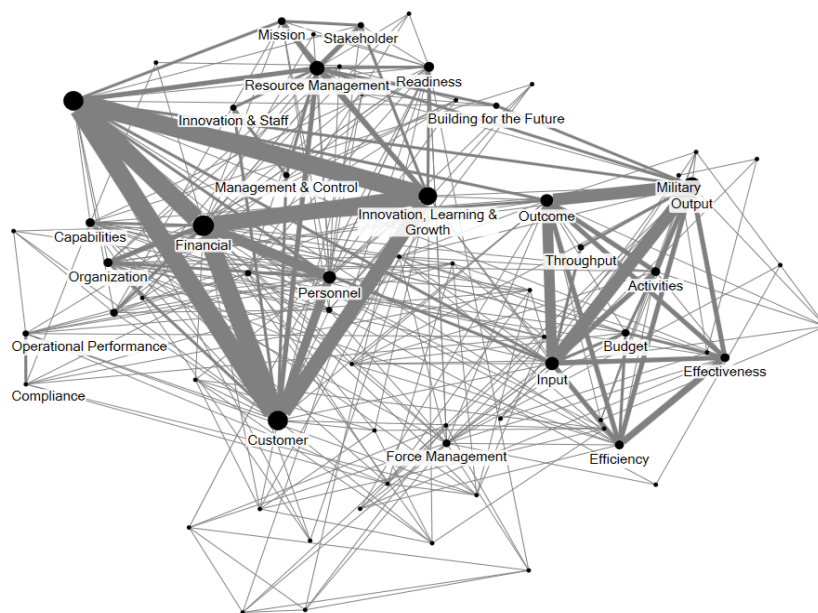
Figure C-19: Co-Occurrence of PM Categories.

Analysis of the metrics present in the literature show that approximately 32% of the publications included metrics. To gain a better understanding of the types of metrics represented, the social network in Figure C-20

was recreated with the size of the node proportional to the number of metrics associated with that category. The results indicate that output and outcome measures were the most commonly identified although the BSC categories were used more often. It is also interesting to note that, while several publications identified military-specific categories, there are relatively few that included military-specific metrics.
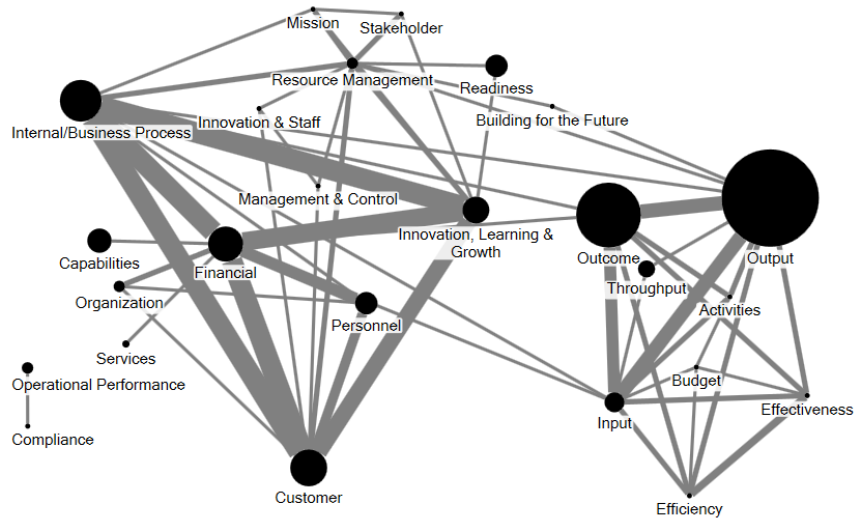
Figure C-20: Proportion of Metrics Identified. (Note: size of node indicates number of metrics identified within that category.)

Finally, the most common categories identified in the literature were compared to the preliminary framework currently being developed by the NATO work group as an initial attempt to investigate how well the framework is supported by the literature. Figure C-21. shows the mapping of the most common categories to the dimensions of Means, Ways, and Ends that are used in the preliminary framework. The results provide some support for some categories, illustrated in Figure C-22, such as Readiness and Mission, as well as potential additional categories that can be considered for future development of the preliminary framework.
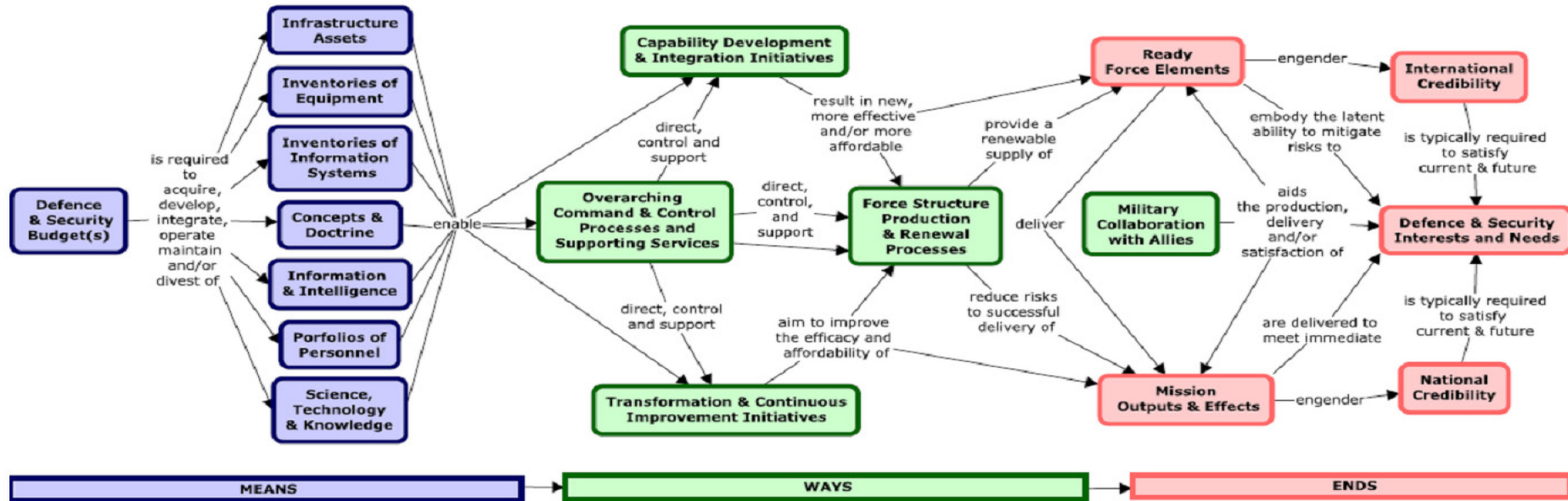
Figure C-21: Preliminary PM Framework Defined by NATO SAS-096 Work Group.

Figure C-22: Identified Categories Mapped to the Preliminary Framework.

C.5 CONCLUSIONS

The literature on PM systems in military organisations is relatively limited compared to other areas of the public sector. However, the types of publications are more varied with a higher proportion of theses/dissertations and reports. Analysis of the authorship characteristics shows that there is a small core set of authors and a lack of collaboration among author groups. While 26 countries are represented in this review, 61% of the publications focused on PM practices in the United States, which may influence the interpretation of the results. In general, evaluation of characteristics of the literature suggests that this research area is in a relatively early stage of development and may be less mature, as compared to other research areas/fields. This is also evident by the narrow use of methods as well as the low number of publications that identify areas that are difficult to measure, best practices, or lessons learned.

Analysis of the PM system characteristics reveals that the large majority of frameworks are derived from the Balanced Scorecard from Kaplan and Norton. However, there is significant variability in the categories and metrics being used and the results show that custom systems typically consist of a mixture of established categories and custom-defined categories. Additionally, the results show that most applications rely on generic categories with specificity at the metric level; however, it may be more prudent to consider increasing the specificity of the category level to create a more appropriate framework for this context. Finally, mapping the categories identified in this review to the current preliminary framework proposed by the NATO work group provides support for many of the categories used in the preliminary framework as well as provides some additional alternatives that can be considered. In addition, the results show that many publications are focused on utilizing strategic management with the PM frameworks supports the casual mapping of categories in the preliminary framework. The findings suggest that the NATO working group's preliminary framework reflects the trends and practices in the literature and their work could provide a significant contribution to this area.

C.6 ACKNOWLEDGEMENTS

C.7 REFERENCES

[1]   Keathly, H., Du, R., Olliges, K., Van Aken, E.M., and Letens, G. (January 2015). *Systematic literature review of performance measurement practices in military and government sectors; Results of an undergraduate research project Part 1*, Unpublished Technical Report.

[2]   Bititci, U., Garengo, P., Dörfler, V., and Nudurupati, S. (2012). "Performance measurement: Challenges for tomorrow", *International Journal of Management Reviews*, 14(3), pp. 305-327.

[3]   Neely, A. (2005). "The evolution of performance measurement research: developments in the last decade and a research agenda for the next", *International Journal of Operations & Production Management*, 25(12), pp. 1264-1277.

[4]   Micheli, P., and Kennerley, M. (2005). "Performance measurement frameworks in public and non-profit sectors", *Production Planning & Control*, 16(2), pp. 125-134.

[5]   Cochrane (2002). "The Cochrane Collaboration Open Learning Material." The Cochrane Collaboration Open Learning Material. The Cochrane Collaboration. Available at https://training.cochrane.org/ interactivelearning. Accessed 19 Aug. 2013.

[6]   Campbell Resource Center. The Campbell Collaboration. Accessed 19 Aug. 2013. http://www.camp bellcollaboration.org/.

[7]   Tranfield, D., Denyer, D., and Smart, P. (2003). "Towards a Methodology for Developing Evidence-Informed Management Knowledge by Means of Systematic Review," *British Journal of Management*, 14, pp. 207-222.

[8]   Cochrane, 2011, "Cochrane Handbook for Systematic Reviews of Interventions." Cochrane Handbook for Systematic Reviews of Interventions. The Cochrane Collaboration, Mar. 2011. Web. 19 Aug. 2013. http://handbook.cochrane.org/.

Appendix C-1: REFERENCE PAPERS OBTAINED FROM SYSTEMATIC LITERATURE REVIEW

The full set of papers obtained from the systematic literature review conducted by Virginia Tech is listed below.

Albright, T.L., Gerber, C.A., and Juras, P. (2014). How naval aviation uses the balanced scorecard. *Strategic Finance*, 96(4), pp. 21-29.

Arnold, R.J. (2005). Performance metrics for the program executive office for integrated warfare systems 1.0 and 2.0. Doctoral dissertation, Monterey, California. Naval Postgraduate School.

Beeres, R., De Waard, E., and Bollen, M. (2010). Ambitions and opportunities for assessing military performance in crisis response operations. *Financial Accountability & Management*, 26(3), pp. 344-366.

Cavoli, C. (2004). The Balanced Scorecard and other thoughts on metrics. *Defence & AT-L*, 33(1), pp. 9-11.

Davids, C., Beeres, R., and Grant, T. (2011). Command and control in the Afghan desert: A field study at a NATO headquarters. *International Journal of Intelligent Defence Support Systems*, 4(2), pp. 111-127.

McGrath, E.A. (2013). Strategic management plan: The business of defence FY2014-2015. Department of Defence Washington DC.

Dickinson, T.J. (2005). Assessing performance measurement for the Naval Surface Warfare Center, Port Hueneme Division. Naval Postgraduate School, Monterey, California.

Alderman, K.C. (1993). Performance measurement: Management for best value. *Armed Forces Comptroller*, 38(3), pp. 1-13.

Boynton, R.E., and Vaughan, L.E. (1998). Defining organisational measures for NAESU (No. NPS-64-98-001). Naval Postgraduate School, Monterey, California.

Grover, M.A. (1997). Strategic performance measurement in an Air Force logistics organisation (No. AFIT/GIR/LAL/97D-8). Air Force Institute of Tech., Wright-Patterson Air Force Base School of Logistics and Acquisition Management, Ohio.

Hackleman, A.S., Johnson, A.W., and Ahner, D.K. (2014). Nuclear enterprise performance measurement. *The Journal of Defence Modeling and Simulation: Applications, Methodology, Technology*, 11(3), pp. 245-264.

Haynes, S.R. (2003, January). Institutional metrics for the United States Marine Corps. In: System Sciences, 2003. Proceedings of the 36th annual Hawaii International Conference on System Sciences. IEEE.

Hepler, A.J. (2008). Balanced scorecard: Evaluation of Air Force materiel command's implementation and use (No. AFIT/GLM/ENS/08-03). Air Force Institute of Tech., Wright-Patterson Air Force Base School of Logistics and Acquisition Management, Ohio.

Kem, D.A., Jackson, B., Williams, A., and Stouffer, V. (2000). Performance metrics for defence working capital funds. A focus on supply management (No. LMI-PA804T1). Logistics Management Institute, McLean, Virginia.

Leighty, J.E. (2001). Criteria for evaluating united states marine corps installation strategic management. Naval Postgraduate School, Monterey, California.

Lewis, D., Glover, C., and Frye, R. (2009). Army strategic management system: Enhancing Logistics Readiness PB 700-09-05 41(5) Retrieved from http://www.alu.army.mil/alog/issues/SepOct09/asms_enhanced.html.

Lu, W.M., and Chen, M.H. (2011). A benchmark-learning roadmap for the Military Finance Center. *Mathematical and Computer Modelling*, 53(9), pp. 1833-1843.

Monetta, D.J., and Holmes, M.W. (1989). Performance measurement in the Navy industrial fund ordnance community. No. NOS-IHTR-1263. Naval Ordnance Station, Indian Head, Maryland.

Ivančík, R., and Nečas, P. (2012). System of balanced scorecard and its implementation in management of Norwegian Air Force and other military organisations. *Incas Bulletin*, 4(4), p. 141.

United States. Government Accountability Office. (2004). Defence management: Tools for measuring and managing Defence agency performance could be strengthened: Report to the Committee on Armed Services, U.S. Senate. Washington, D.C.: U.S. Government Accountability Office.

Polymenidis, I. (2003). The designing and development of a "Balanced scorecard" for the International procurement department of the procurement directorate in the Hellenic Navy Supply Center. Doctoral dissertation, Naval Postgraduate School, Monterey, California.

Rodakowski, R. (1995). Performance measurement for the National performance review (NPR), Government Performance and Results Act (GPRA), and Army Performance Improvement Criteria (APIC). Army Engineer District, Galveston, Texas.

Schriver, K.A. (2000). Strategic and performance plans for shore installations. Naval Postgraduate School, Monterey, California.

Schroeder, J.M., and Rosenband, A. (2009). Measuring Boston's security investment: Methods and tools to assess Homeland Security initiatives. Policy analysis exercise. Harvard University, Massachusetts.

Sedosheva, M. (2011). The Balanced scorecard and the new IT approach to the defence budgeting process. EBS Review, 28, pp. 67-82.

Sedysheva, M. (2011). Building high performance strategy of military expenditures: The utility function in the middle of defence budgeting. University of Petrosani, *Economics*, 11, pp. 271-286.

DoD financial indicators: DoD financial management balanced scorecard. (n.d.). The Free Library. (2014). Retrieved on July 14 2016 from http://www.thefreelibrary.com/DoD+financial+indicators%3a+DoD+Financial+Management+Balanced+Scorecard.-a0123330939.

Titus, C., and Rox, B. (2014). How the workforce of Corpus Christi planned evolution. Retrieved from http://asc.army.mil/web/access-bp-planned-evolution/.

Tomlyn, H.M. (2005). Can the current ministry of defence performance management regime cope with cognitive effects? *Defence Studies*, 5(3), pp. 323-345.

Walton, L., McDaniel, T., and Shyne-Turner, S. (2004). Air Force security assistance centre foreign military sales centre institutionalizes how it "develops and executes international agreements" by linking strategic initiatives to the balanced scorecard process. Defence Institute of Security Assistance Management. Wright-Patterson Air Force Base, Ohio.

Webb, N.J., and Angelis, D. (2009). Improving performance measurement in defence organisations. Armed Forces Comptroller, Available at: http://www.omagdigital.com/publication/?i=42492.

Webb, N.J., and Candreva, P.J. (2010). Diagnosing performance management and performance budgeting systems: A case study of the US Navy. *Public Finance and Management*, 10(3), p. 524.

Anonymous. (2004). The RMN Human resource challenge (Naval Forces – Special Issue), (07228880) pp. 31-34.

Band, J. (2004). Performance management in a volatile environment. *The RUSI Journal,* 149(1), pp. 48-51.

Beeres, R., and Bogers, M. (2012). Ranking the performance of European Armed Forces. *Defence and Peace Economics*, 23(1), pp. 1-16.

Buss, T.F., and Cooke, D. (2005). Performance measurement in defence acquisitions: A case study of the Navy. National Academy of Public Administration, Washington D.C.

Cambron, J.D., and Huberty, T. (2001). On target for excellence. In: Annual quality congress proceedings. ASQ; 1999. *American Society for Quality Control,* pp. 311-320.

Chesley, J.A., and Wenger, M.S. (1999). Transforming an organisation: Using models to foster a strategic conversation. *California Management Review*, 41(3), pp. 54-73.

Kwolek, M.J. (1992). An analysis of performance measurements systems in the Air Force Logistics Command's aircraft repair depots (No. AFIT/CI/CIA-92-015D). Air Force Institute of Tech., Wright-Patterson Air Force Base, Ohio.

Hill, W.J. (1990). The development of performance measurement systems used by the department of defence: C/SCSC and its forerunners. In: University microfilms, 107pp.

Lassen, G. E. (2010). Adaptation of balanced scorecard and multiple criteria decision-making methodologies to measure nation-state power. PhD Thesis, University of Southern Mississippi.

MacBryde, J., Paton, S., Grant, N., and Bayliss, M. (2012). Performance measurement driving change: a case from the defence sector. International journal of productivity and performance management, 61(5), pp. 462-482.

MacBryde, J., Paton, S., Bayliss, M., and Grant, N. (2014). Transformation in the defence sector: The critical role of performance measurement. Management accounting research, 25(2), pp. 157-172.

Jean-Charles, M. (2012). The impact of strategic planning and the balanced scorecard methodology on middle manager's performance in the public sector. *International Journal of Business and Social Science*, 3(1), pp. 114-127.

Marquis, J.P., Darilek, R.E., Castillo, J.J., Wong, A., and Thurston, C.Q., et al., (2006). *Assessing the value of US Army international activities* (Vol. 329). Rand Corporation, Santa Monica, CA.

Mol, N.P., and Beeres, R.J. (2005). Performance management in a setting of deficient output controls. *International Journal of Productivity and Performance Management*, 54(7), pp. 533-550.

Stevens, J.L. (2004). The balanced scorecard and Army strategic readiness system. Army AL & T. U.S. Government Printing Office. Retrieved July 14, 2016 from HighBeam Research: https://www.highbeam.com/doc/1P3-939371431.html.

Van Aken, E.M., Van Goubergen, D., and Letens, G. (2003). Integrated enterprise transformation: Case application in engineering project work in the Belgian Armed Forces. *Engineering Management Journal*, 15(2), pp. 3-16.

Woodley, P. (2002). Ship shape. *Financial Management,* 80(6), pp. 30-31.

Bush, P. (2005). Strategic performance management in government: Using the balanced scorecard. *Journal of Cost Management*, 19(3), pp. 24-31.

Whit, L.R., and Wood, F. (2005). Strategic, cost, and performance management in the Coast Guard and federal environment. *Journal of Cost Management*, 19(3), pp. 7-15.

Canadian Defence Forces (2011). Annual Performance Review (Q4 FY10/11).

Joint Analysis and Lessons Learned Centre (2011). Defence measurements: A composite metric approach (JALLC/CG/11/218).

Joint Analysis and Lessons Learnt Centre (2011). Motivating improved contributions to the alliance: Defence measurements (JALLC/CG/11/168).

Annex D – EXAMPLE STRATEGY
AND CONCEPT MAPS

This annex contains illustrative concept and strategy maps for two participating nations that were created in the process of developing the DPMF from responses to the RTG's questionnaire and additional documentation provided by the nations (see Figure D-1, Figure D-2, and Figure D-3). The concept maps and strategy maps were developed during phases 2 and 4 of the thematic analysis methodology (see Chapter 4 of the main text for further details).
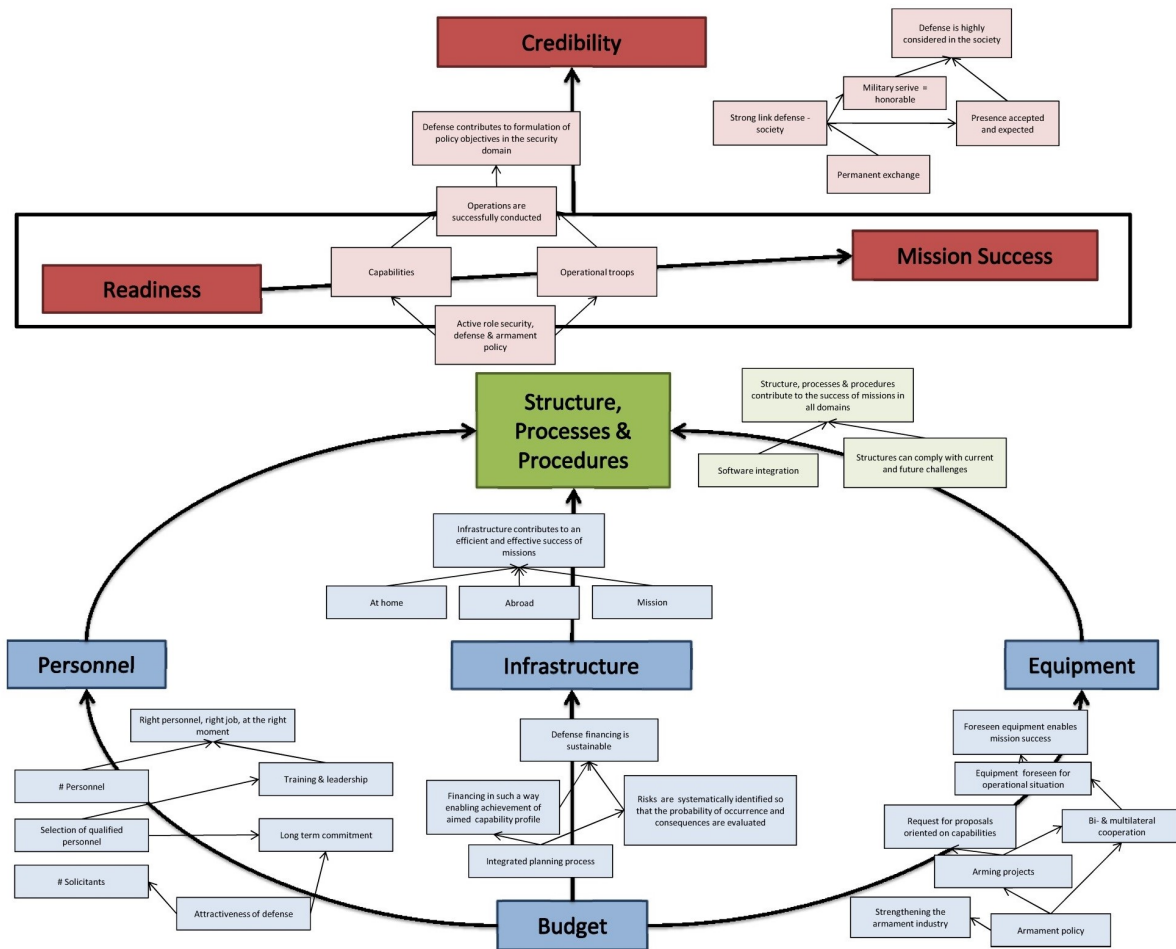
Figure D-1: Concept Map Illustration for Nation 'MJ'.

Figure D-2: Strategy Map for Nation 'CT' (Without Arrows).
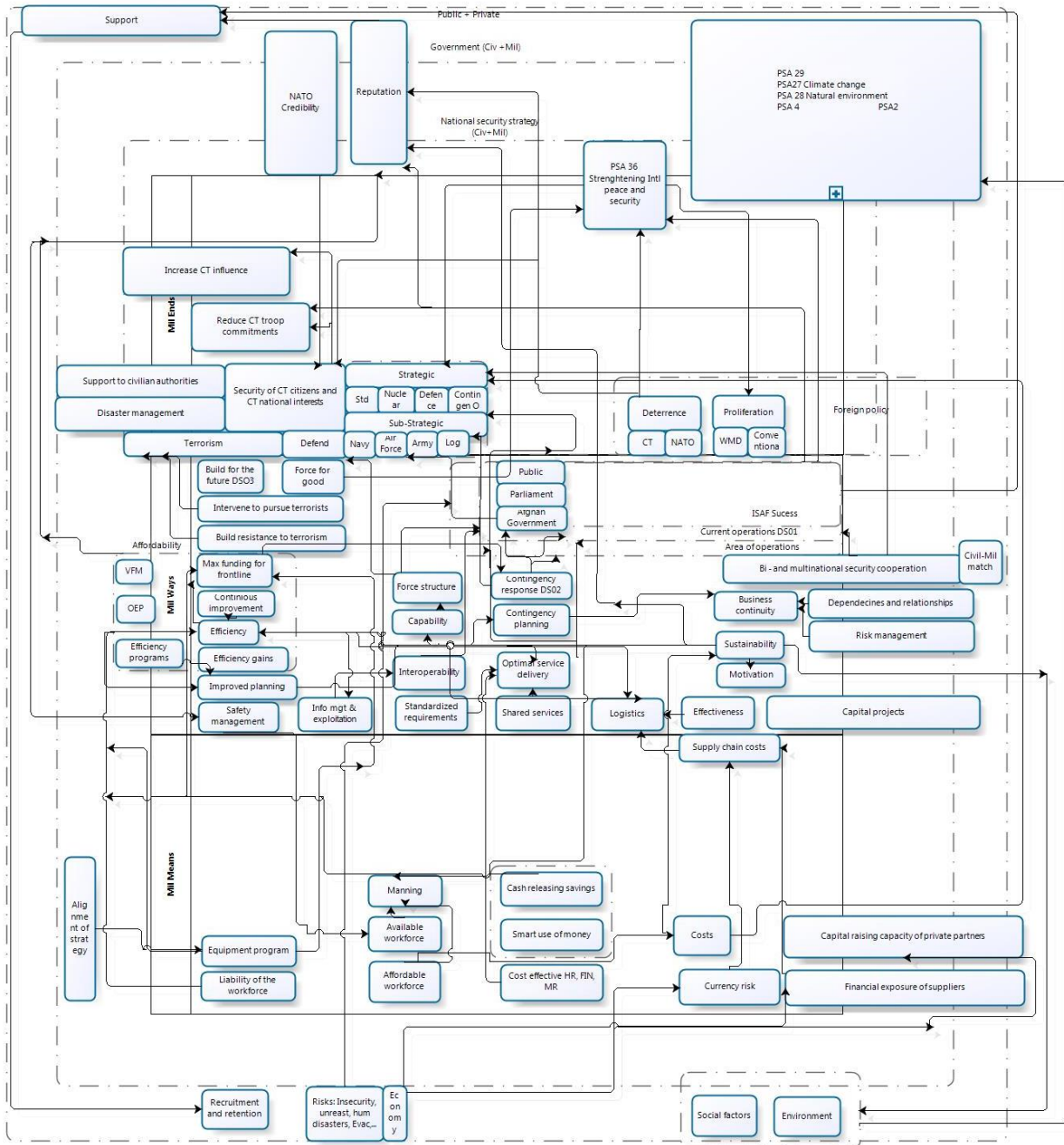
Figure D-3: Strategy Map for Nation 'CT' (Including Arrows).

Annex E – DEFENCE PERFORMANCE MANAGEMENT FRAMEWORK CATEGORIES

E.1 THE ENDS PERSPECTIVE

Categories that belong to the ends perspective include:

- National interests and defence and security needs;
- International credibility;
- National credibility;
- Mission outputs and effects; and
- Ready force elements.

E.1.1 National Interests and Defence and Security Needs

The category entitled national interests and defence and security needs encompasses the roles a defence organisation plays in its nation's whole-of-government approach to managing crises. Some larger nations have a comprehensive view of security that includes peace and security around the world. They may focus their attention on leading international coalitions, anti-proliferation activities and disarmament initiatives in addition to preserving their own national sovereignty and territorial integrity. Sovereignty, deterrence, disarmament and anti-proliferation are examples of major security issues that often exist beyond the purview of a nation's defence department alone; nations will often address these issues through the UN, NATO or the EU. Smaller countries typically have a more limited focus and tend to tune their level of ambition to preserving their territorial integrity within the purview of a coalition. In addition, these countries may aim to protect limited political and economic interests. In any case, a nation's ability to satisfy its own interests and its needs for defence and security typically requires it to establish its legitimacy on the national and international stages. As an illustration, certain types of operations – for example Non-combatant Evacuation Operations (NEO), disaster relief (at home and abroad), humanitarian operations, and search and rescue (home and abroad) – could serve to engender heightened levels of credibility within the home nation.

The sub-categories most frequently associated with this category include:

- Protect national sovereignty, territorial integrity and national way-of-life;
- Contribute to the achievement of overarching national interests and level of ambition;
- Provide continental defence, international stabilisation and support to allies;
- Protect against terrorism (foreign and domestic);
- Provide security via anti-proliferation and disarmament;
- Provide security by ensuring human safety and emergency response;
- Facilitate the attainment of particular political interests; and
- Provide social relevance to the citizens of the nation.

E.1.2 International Credibility

Whether directly or indirectly, international credibility is often viewed as an important mechanism for satisfying a nation's defence and security needs and interests. Most nations try to promote their security objectives and national interests on an international level by means of active participation in and cooperation

with various international organisations. They also strive to hold particular positions within alliances to ensure a bigger influence on international issues, collective actions, and the development of policy.

For many European nations, cooperation efforts are mostly targeted at the EU and NATO. Within such multinational constructs, international credibility is typically achieved by a nation's ability to produce and renew ready force elements, whether they exist as national elements or within a multinational force structure. A nation's efforts to enhance solidarity through shared visions, burden sharing, and the fulfilling of responsibilities within a collective or alliance are also encapsulated within this category. Other explicit examples of cooperative efforts include the development of common or integrated visions and frameworks, and the development of collective capabilities. Nations often state that their own security objectives and interests align with those of other nations and/or alliance organisations that they deem important to their national security strategy.

The sub-categories most frequently associated with this category include:

- National credibility and reputation pertaining to NATO and EU;

- General international credibility and reputation that is not specific to NATO and EU; and

- Multi-lateral diplomacy, treaties and other engagements with foreign military organisations.

E.1.3 National Credibility

In addition to a nation's credibility on the world stage, national credibility amongst key domestic stakeholders is typically required to satisfy a nation's interests and needs for defence and security. Whereas international credibility may be more important for smaller nations who wish to be seen as relevant players, larger nations sometimes tend to focus more on attaining credibility with their own governments and national populations. For some nations, both are equally important. In some cases, the enhancement of national credibility is thought to have both direct and indirect effects on recruitment and on the allocation of budgets to defence.

One important activity that defence departments undertake to strengthen their national credibility is the delivery of non-mission related programmes and services. These can include heritage programmes, youth programmes, cultural exhibitions, and involvement in defence and security debates. Fulfilling environmental and social responsibilities may be relevant here too. Some countries also promote the status of their military personnel (regular force, reserve force and veterans) among the national population. Over the long term, programmes, services and initiatives such as these typically aim to enhance national cohesion. Non-mission related programmes and services also aim at promoting shared national identity, a greater awareness of defence and security issues, a favourable mind-set towards defence, and stronger support for the defence department. In addition, some departments may also focus more narrowly on releasing timely information to key politicians and institutions (e.g., government, parliament, commissions).

Defence organisations also conduct activities to align defence policies and plans with families of government policies. As such, most countries with a national security strategy expect that the objectives of the defence department will be well aligned with those of the foreign ministry, and other ministries such as those responsible for development, international aid, the interior, finance and the economy. In some cases, defence plans also need to be aligned with and allow the defence organisation to provide support to other government departments and/or regional levels of government.

The sub-categories most frequently associated with this category include:

- Public support for defence;

- Social and environmental responsibility;

- Strategic communication and reporting to parliament, politicians and public; and

- Alignment of defence with national government leadership.

E.1.4 Mission Outputs and Effects

The objective of employing ready force elements on military operations is the generation of mission outputs and effects, thus helping to satisfy a nation's needs for defence and security and enhance its credibility with national and international stakeholders. Under this category, many nations focus on mission success despite there being no clear-cut definition for this concept. At the very least, mission outputs are typically required to be consistent with, and contribute to, the fulfilment of national defence and security objectives.

The desire to produce mission effects and obtain benefits from mission related outcomes is a driver for many other categories in the DPMF. For example, force structure production and renewal processes are usually tailored to sustaining ongoing missions across both short term and long term time horizons. Moreover, personnel, materiel, information and budgetary resources are all managed through their lifecycle with the aim of delivering enhanced mission outputs and effects.

When it comes to employing forces in operations, some nations tend to focus discussion within their strategy on prevention, anticipation and/or reaction. Other nations discuss the different types of operations they will engage in (e.g., crisis response operations, short term expeditionary deployments, sustained long-term missions).

The sub-categories most frequently associated with this category include:

- Military operations and standing military tasks;

- Defence services and military collaborations with other government organisations; and

- Ongoing command, control and coordination of military tasks.

E.1.5 Ready Force Elements

Force elements are employed to produce mission outputs and effects; thus, their existence plays an important role in the fulfilment of a nation's needs for defence and security. However, in modern warfare, successful participation in military operations cannot be achieved without first ensuring that a military force has a certain degree of readiness. Readiness is often gauged, either directly or indirectly, by measuring attributes associated with the volume, endurance, responsiveness, ability, and availability of a force. The desired state of readiness for each force element within a nation's force structure is also sometimes formally specified within a set of plans and directives. These may be nation specific, or agreements made within the framework of international organisations such as NATO and the EU. In fulfilment of these plans and directives, force elements are continuously produced, maintained and renewed. Some nations, especially the largest, pre-position forces outside their national boundaries in order to enhance responsiveness. Other nations may engage in comprehensive arrangements with allies in order to enhance their states of readiness in specific areas such as intelligence, strategic transport, cyber warfare, hybrid warfare, and psychological warfare.

The sub-categories most frequently associated with this category include:

- General and mission-specific readiness;

- Contribution of reserve forces (may include temporary conscripts);

- Alliance specific readiness obligations and commitments; and

- Pre-positioning.

E.2 THE WAYS PERSPECTIVE

Categories that belong to the ways perspective include:

- Force structure production and renewal processes;

- Capability development and integration initiatives;

- Transformation and continuous improvement initiatives;

- Military collaboration with allies; and

- The overarching command and control processes and supporting services, that provide high level direction and control for national efforts to achieve performance across all other performance categories.

E.2.1 Force Structure Production and Renewal Process

All defence organisations aim to have a certain force structure and subsequently to execute processes in order to continuously produce, maintain and renew a quantity of ready force elements from within that structure for possible employment in military missions. Of course, achieving this aim requires adequate levels of resources such as equipment, information systems, infrastructure, trained personnel, information and intelligence and funding. These resources then have to be managed through multiple capability development and transformation processes until the desired structure is achieved.

The force structure from which ready force elements are produced is mainly generated through transformation and continuous improvement initiatives, and through capability development initiatives. A force structure that is affordable, effective and continually upgraded provides a degree of assurance that desired mission outputs and effects will be achievable. While continuous improvement initiatives often aim to increase the efficiency and productivity of the force structure production and renewal process, capability development and planning initiatives result in the addition and removal of force structure elements.

The processes that produce, maintain and renew force elements (and produce large formations of force elements) are typically different for different parts of the force structure. For example, the activities required to produce land force elements are different from those required to produce naval force elements or air force elements. However, regardless of the force element type, there is typically a generic progression of activities in the readiness *production* process, i.e., there are activities which focus on readying individuals and creating small force element units, then there are activities associated with creating and readying larger formations that contain many smaller force elements, and finally there are activities for integrating or combining force elements that belong to different environments or services.

The *renewal* aspect of this performance category refers to the notion that, to some extent, force elements are recyclable. They can be ramped up to a particular readiness state, employed, and then returned from an employment to reconstitute themselves before ramping up again. Some force elements remain at high levels of readiness for long or indefinite periods of time, while others may cycle through readiness states more frequently.

The sub-categories most frequently associated with this category include:

- Production and renewal of the force;

- Adequacy and balance in the force structure and force posture; and

- Readiness-related training.

E.2.2 Capability Development and Integration Initiatives

Major capability development and integration efforts, which typically serve to introduce new capabilities and remove other capabilities from the force structure, are usually of strategic importance for a defence organisation. As such, many of the activities that fall within this performance category are directed and controlled by the overarching processes that direct and control the military as a whole.

Specific capability development and integration initiatives are often mentioned within national strategic documents. In many cases these initiatives are executed as projects within the context of one or more standing capability development programmes. Military capabilities themselves are often partitioned in accordance with a capability taxonomy which is often different from the taxonomy used to identify force elements within the force structure. Capability taxonomies differ from nation to nation, but they usually encompass:

- Conventional capabilities in the land, air, sea and common support domains;

- Rapid response or intervention capabilities;

- Mobilisation capabilities;

- Transport capabilities;

- Special operations capabilities;

- Space-based capabilities; and

- Cyber warfare capabilities.

In public facing strategy documents some nations emphasise particular capabilities whilst others do not. In cases where nations are not able to pursue particular capabilities on their own, they may seek to develop capabilities jointly or produce shared capabilities within an alliance context (e.g., EU, bilateral, multilateral, NATO, EDA, OCCAR).

Another important aspect of capability development is capability planning. Capability planning processes often include subordinate activities that:

- Assess the future security environment;

- Determine capability goals;

- Compare these goals against current or planned capability;

- Devise capability development options;

- Assess resource constraints;

- Take stock of government direction and compliance obligations;

- Conduct balance of investment analysis; and

- Then select projects or programmes that will integrate new or upgraded capabilities into the force structure, or remove capabilities that are no longer desired.

Capability development plans are produced in order to realise the most viable force structure within the available resource envelope. Key considerations during the development and execution of capability plans are the elemental components of every military capability, which include:

- Infrastructure;

- Equipment;

- Information systems;

- Concepts and doctrines;

- Information and intelligence;

- Personnel and training;

- Science technology and knowledge;

- Investment budgets;

- Force structure requirements; and

- The potential requirements of individual missions.

In some nations, capability development and integration for each capability partition is restricted to acquiring equipment and integrating it into the force structure. Other nations have greater ambitions and endeavour to develop new technologies and associated concepts, conduct more extensive warfare experimentation efforts, etc.

The sub-categories most frequently associated with this category include:

- Specific areas of focus for developing national capabilities;

- Establishment of priorities and scenario-based planning;

- Capabilities design, capability management and integrating the fundamental elements of capability;

- Capability sufficiency analysis and integrated capability planning;

- Operational experiences and lessons learned; and

- Concepts, doctrine and experimentation.

E.2.3   Transformation and Continuous Improvement

Transformation and continuous improvement initiatives can span the whole scope of organisational operations or they may focus on particular segments of organisational activity.

Often transformation and continuous improvement initiatives aim to improve the efficiency and affordability of other performance categories, e.g., the force structure production and renewal processes, command and control processes, capability development and integration processes, and the processes used to manage each of the individual resource types through their lifecycles (e.g., equipment, infrastructure, information systems, personnel, and budget). Resources of all types are also enablers for transformation and continuous improvement initiatives. Individual transformation and continuous improvement initiatives may result in changes to the organisation's processes, products, service levels, culture, policies and standards, accountability relationships, organisational structure, governance and decision making practices. They can also result in reductions and/or redistributions of resources including personnel, materiel, and infrastructure.

Presently, many nations are focussing on improving the role of knowledge management and information systems to enable transformation and continuous improvement efforts. Among other things, information systems and business intelligence can help facilitate the identification of opportunities to improve effectiveness and efficiency.

The transformation and continuous improvement category thus encompasses many of the restructuring and downsizing initiatives that are presently being undertaken inside the militaries of many nations. Initiatives such as these have often been driven by an overarching national aim to reduce defence and security budgets. Multinational formations and organisations such as NATO may also face pressures for more efficient spending that creates a need for transformational efforts.

The sub-categories most frequently associated with this category include:

- National transformation initiatives;
- Overarching efficiency, cost reduction and mandate rationalisation initiatives; and
- Focused improvement initiatives.

E.2.4   Military Collaboration with Allies

Military collaboration is a very pervasive performance category. Historically this concept has been of significance in the context of NATO and it continues to be an important component of modern expeditionary operations. It also seems to be gaining importance within the EU, especially as a consequence of the financial crisis in combination with the high costs associated with modern equipment programmes. Several nations in the EU have encountered difficulties meeting their security and defence objectives on their own, and as such, collaboration has become more necessary.

While many small countries in Europe have a NATO or EU focus, larger countries often have a wider view and participate in defence and security partnerships around the globe. In both cases, interoperability and multinational training are a key aspect of cooperation initiatives. Some nations may aim to contribute a part of their infrastructure, intelligence and a selection of ready force elements to produce a multinational force structure that can then be employed for the benefit of the alliance as a whole, thereby satisfying certain national purposes. Other nations are less ambitious and restrict their participation in joint ventures to information sharing.

The sub-categories most frequently associated with this category include:

- Interoperability improvements (including the adaptation of international standards);
- Common weapon programmes;
- Integration within multinational coalitions; and
- Multinational training.

E.2.5   Overarching Command and Control Processes and Supporting Services

Overarching command and control processes and the supporting services that belong to this performance category usually involve the upper echelons of a defence organisation. Typically, they aim to:

- Provide strategic direction and governance;
- Conduct programme planning and design;
- Allocate resources and take investment decisions;
- Manage strategic performance;
- Analyse exposure to risk; and
- Determine appropriate countermeasures.

This last performance category also encompasses efforts that help ensure that the military remains compliant with applicable laws, regulations, treaties, policies, and/or plans that exist within and between individual nations and multinational organisations. Finally, this performance category contains aspects connected to the effectiveness of certain centralised support services that often exist within a military organisation. Internal audit and evaluation are one example; others may include legal services and communication.

Initiatives belonging to the performance categories 'capability development and integration' and 'transformation and continuous improvement' aim to change the state of a defence organisation. As such, a

synergistic balance must be struck between these two categories. A balance must also be struck in connection with the allocation of organisational effort to developing and renewing ready force elements. Determining and managing the balance between all three of these is within the purview of the overarching command and control category of performance.

The sub-categories most frequently associated with this category include:

- Performance management and reporting;

- Strategic management practice;

- Risk and consequence management;

- Internal audit and accountability; and

- Support services.

E.3 THE MEANS PERSPECTIVE

Categories that belong to the means perspective include:

- Inventories of equipment (i.e., materiel);

- Infrastructure assets;

- Inventories of information systems;

- Personnel, organisation and culture;

- Information and intelligence;

- Science, technology and knowledge; and

- The defence and security budget.

E.3.1   Inventories of Equipment

Equipment is an essential component of any capability and it is an important enabler of each of the categories that belong to the ways perspective of the DPMF. Equipment is also an important component of every force element that conducts military operations. Readiness cannot be achieved and success in operations cannot be obtained if equipment is not operational and available in quantities that accord with national ambitions.

Since the military budget is usually limited, there is often tension between the acquisition of new equipment and the upgrade and maintenance of existing systems. Priorities are therefore established and re-established as conditions change. For example, when mission success depends on the availability of new or modified equipment, budgets are often reallocated to hasten acquisition and delivery of that equipment to operational theatres.

In their strategic documents, many nations refer to equipment from the perspective of acquisition and maintenance. In some cases, this perspective is expanded to include the entire set of life cycle processes for materiel, including:

- Requirements definition;

- Research;

- Development;

- Integration;

- Operation;

- Maintenance;

- Upgrade and divestment.

In some nations, equipment is often envisaged in parallel with science, technology, and industrial capabilities. For a few nations, equipment acquisition and maintenance policies are tailored to promote their national industrial base.

Some countries combine infrastructure and equipment into a single thematic area; here they have been split into separate categories.

The sub-categories most frequently associated with this category include:

- The execution of materiel acquisition and procurement;

- Material availability, readiness and contingency for operations;

- The overarching management of equipment programmes / portfolios;

- The execution of ongoing materiel maintenance, testing, upgrade and divestment; and

- Equipment-specific policy and strategy.

E.3.2   Infrastructure Assets

Infrastructure is also a key element of many military capabilities and an enabler of many of the performance categories of the ways perspective of the DPMF.

The infrastructure used by the military should enable existing units to become operational, maintain their required levels of readiness and, as applicable, support the delivery of military operations. Infrastructure management is also closely linked to the equipment and personnel categories of performance. The quality of infrastructure has a direct impact on the environment and on the welfare and well-being of personnel. As with equipment, some countries employ an explicit life cycle approach to their management of infrastructure, while in other countries the approach to infrastructure management is more *ad hoc* or less formal. Also, while some countries may emphasise base development, others may be more focused on the rationalisation of infrastructure without compromising functional and operational aspects.

The sub-categories most frequently associated with this category include:

- Availability of infrastructure and infrastructure expertise in accordance with operational requirements;

- Infrastructure and real estate portfolio management;

- Infrastructure acquisition, construction and improvement;

- Infrastructure divestment and disposal; and

- Environment.

E.3.3   Inventories of Information Systems

Several strategic thrusts pertaining to information system deployment may be taking place at any one time in a defence organisation. For example, information system security and protection is a current area of focus for many defence organisations. In some cases, this increased focus on security is linked to the development and expansion of dedicated cyber warfare capabilities. Information systems are also important components of

modern command and control systems, while knowledge management systems are inherently dependent on the quality of the underlying information systems. Information systems such as Enterprise Resource Planning systems (ERPs) are also key enablers for continuous improvement and transformation initiatives. However, the pursuit of advanced information systems is not without risks. On the one hand, information systems can help to rationalise costs through the enablement of better decision making and the adoption of better management practices. On the other hand, these systems require significant resources to develop and maintain. As is often the case, there is a need to determine an optimal balance between these two elements.

As with the equipment, personnel and infrastructure categories of performance, information systems may be viewed from a life cycle perspective to include:

- Requirements definition;

- Acquisition;

- Development;

- Deployment;

- User care and support; and

- Upgrade and divestment.

The sub-categories most frequently associated with this category include:

- Strategic information system initiatives;

- Management of information systems portfolios; and

- Ongoing information systems acquisition, deployment, security, user support, and divestment.

E.3.4   Defence and Security Budgets

The defence budget is important because it supports and is directly or indirectly linked to all other categories in the DPMF. Unsurprisingly, it is mentioned by all countries as a key strategic element. Some nations have defence-specific budget targets, e.g., 2% of GDP, but in most cases the budget is imposed upon the defence organisation through a variety of other circumstantial factors. In the longer term, defence departments may view an increase of the defence budget as a key strategic objective.

Due to recent reductions in most national defence budgets, greater tensions now exist when attempting to allocate the budget across the various categories of defence expenditure. While the personnel budget is usually more or less fixed, priorities must be set between the investment budget (which typically pays for capability development initiatives and the acquisition and upgrade of equipment) and the operating budget (which provides for the ongoing sustainment and maintenance of current capabilities). In this context, the apportionment and balancing of the defence budget in relation to MoD priorities becomes an important strategic activity. Risks and developments affecting this balance need to be monitored, detected and mitigated alongside expenditure levels to preserve good organisational functioning.

Military operations also draw on the budget and are a critical organisational activity. The employment of forces in theatres of operation is typically accompanied by a direct injection of funds from budgets that are held in reserve by central governments. This practice is based on the idea that participation in military operations results in an increased intensity of activity compared to the normal production and renewal of ready force elements. These reserve budgets provide increased funding to support front line activities, and ultimately, the generation of desired mission effects and outcomes.

If needs have also been identified with respect to science, technology and industrial development, portions of the investment budget may also be allocated to directly support the development of scientific know-how

within the military and/or the nation's industrial base. This is sometimes an important consideration since the viability of certain national industries is very much dependent on obtaining contracts or other financing arrangements from national defence departments. In some nations, defence organisations have access to unique funding approaches, e.g., private public partnerships, to maximise their financial leverage.

The sub-categories most frequently associated with this category include:

- Budget allocation and expenditure control;

- Levels of fiscal appropriation from the national government for purposes of national defence;

- The relative balance in the allocation of fiscal resources across defence programmes;

- Funding provided to international alliances;

- The relative balance in the allocation of fiscal resources across budget partitions; and

- Financial arrangements.

E.3.5   Information and Intelligence

Information and intelligence are rarely mentioned directly within national strategic documents. It is often omitted for security reasons and its importance is therefore implied. Intelligence capabilities that enable anticipation, preparation and foresight contribute to the overall effectiveness of a defence organisation. In other words, intelligence and the management of information can have significant influence on capability development and planning, force structure production and renewal, the delivery of ready elements, and the realisation of mission effects and outcomes. Other important aspects pertaining to this performance category are the organisational practices pertaining to information management, information sharing, information security, and information exploitation.

The information and intelligence are enabled by many other resource types. For example, it is heavily reliant on both trained personnel and information systems. The ability to collect, process, synthesise and distribute information that originates from the different domains of military interest is a fundamental characteristic of this category. These domains include the conventional land, air, and sea domains; the space domain; the electromagnetic domain; the social domain; the economic domain; and the political domain.

The sub-categories most frequently associated with this category include:

- Knowledge, intelligence, foresight, and anticipation; and

- Intelligence preparation, organisation, procedures and adaptation.

E.3.6   Personnel, Organisation, and Culture

Personnel, organisation and culture is a key performance category, which is almost always mentioned in national strategic documents. For example, it is directly linked to a nation's ability to produce, maintain and deploy ready force elements in fulfilment of its national ambitions. Capable personnel are also required to execute capability development and integration initiatives as well as transformation and continuous improvement initiatives. Paying for personnel typically also represents a significant draw upon the national budget for the military.

Performance with respect to the personnel category is often assessed through a lifecycle approach, which often includes:

- Recruitment;
- Selection;

- Retention;

- Occupational training;

- Professional development;

- Posting;

- Transfers; and

- Retirement.

Across this life cycle, many defence departments seem to be focussed on providing care and support to their personnel and ensuring high morale across the organisation. Defence organisations also typically want their departments to be attractive enough to promote retention and boost recruitment. This can be done, for example, by providing quality health care and family support; cultural development initiatives; and providing attractive retirement conditions. It is interesting to note that some countries opt to create a separate category for the care and support of personnel in order to highlight its importance within the national psyche, however in the DPMF this aspect has been included with other aspects pertaining to personnel because it appears to be an inherent part of managing a modern military. Care and support thus encompass a diverse set of initiatives and challenges.

Within the context of personnel, some countries place significant focus on reservists as a key component of their personnel policy. Other countries espouse the importance of maintaining a robust and professional military culture. In any case many of these aspects receive their strategic direction from the overarching command and control processes and supporting services that govern the defence organisation as a whole.

The sub-categories most frequently associated with this category include:

- The management of manning, organisational structure and personnel readiness;

- Care, support and morale of defence personnel;

- Recruitment and selection;

- Job attractiveness;

- Management of retention, transition, attrition and departure;

- Career planning, individual education and professional development;

- Working conditions; and

- Management of the reserve force.

E.3.7   Science, Technology, and Knowledge

Science, technology and knowledge is an important category for a few nations, especially those larger nations that have a significant defence industry. In the long term, the promotion of a strong science and technology base can help: preserve technological superiority, scientific and technical know-how; contribute to the national economy; and provide for revenues through exports. National interests also benefit from the export and promotion of defence specific science and technologies in cooperation with acquiring countries.

Although in reality this category has a much wider scope, science, technology and knowledge is most often described in connection with equipment policy and/or equipment acquisition programmes. These policies and programmes tend to:

- Enhance the viability, profitability, and sustainability of the science and technology sector;

- Help align this sector with national defence and foreign policy objectives; and

- Strengthen innovation and competitiveness within a nation's defence industry.

As is the case with equipment, whenever science and technology programmes are beyond the scope of a single nation, countries may resort to bilateral and multinational cooperation.

The sub-categories most frequently associated with this category include:

- Identification and development of defence science and technologies; and

- Collaboration with industry with regard to science and technology.

Appendix E-1: STRATEGIC STATEMENTS
AND PERFORMANCE METRICS

Category	Sub-Category	Strategic Statements	Reported Metrics
The Ends Perspective			
National interests and defence and security needs	Protect national sovereignty, territorial integrity, and national way-of-life	• Provide the ability for forces to intervene in situations where the security of the country is compromised • Strengthen national self-defence and territorial defence • Conduct peace time activities (including maintaining the territorial integrity • Ensure strategic autonomy and freedom of action • Protect national functions • Preserve nuclear and conventional sovereignty • Ensure the presence of capabilities required to fulfil national level of ambition: operational, in good time, and mission dependent • Guarantee major equipment supply	• Fraction of identified tracks in territorial waters
National interests and defence and security needs	Contribute to the achievement of overarching national interests and level of ambition	• Defend and promote national interests and those of the international community • Contribute to peace, security, and stability when deployed • Be a force for good, promote international legitimacy, and the rule of law	

Category	Sub-Category	Strategic Statements	Reported Metrics
National interests and defence and security needs	Provide continental defence, international stabilisation and support to allies	• Promote continental peace, stability, and security • Protect the EU • Protect NATO • Increase EU internal security • Manage mutual dependence • Promote international security and collective defence inclusive of NATO and the EU	
National interests and defence and security needs	Protect against terrorism (foreign and domestic)	• Ensure prevention at home • Modernise the anti-terrorism plan • Improve terrorism related cooperation • Build response to terrorism • Intervene to pursue terrorists • Conduct event response and consequence management	
National interests and defence and security needs	Provide security via anti-proliferation and disarmament	• Promote anti-proliferation and disarmament: Bio, chemical, bacteriological, delivery mechanisms, and conventional weapon systems • Combat spread of delivery mechanisms	
National interests and defence and security needs	Provide security by ensuring human safety and emergency response	• Protect nationals abroad • Conduct non-combatant evacuation operations (NEO) • Conduct search and rescue	

Category	Sub-Category	Strategic Statements	Reported Metrics
National interests and defence and security needs	Facilitate the attainment of particular political interests	• Stay politically relevant by being an organisation which is a handy tool for politics • Provide military advice regarding contributions, possibilities and limits • Play an active role in security, defence and arms policy	
National interests and defence and security needs	Provide social relevance to the citizens of the nation	• Be socially relevant for the citizens • Promote national history and heritage	
National interests and defence and security needs	Facilitate the enforcement of national and international laws	• Combat drug trafficking • Combat human trafficking	
National interests and defence and security needs	Facilitate the attainment of particular economic interests	• Contribute to strengthening of innovation and competitiveness of national arms industry • Provide return on investment • Invested in medium and small companies	
National credibility	Public support for defence	• Ensure a continuous exchange between defence and society about security policy issues and the special nature of military service in order to foster strong bonds between defence and society • Ensure support for armed forces • Promote motto and brand awareness • Promote national cohesion • Promote a shared vision	• Reputational polling • Polls, measures of the link army-nation • Regular polls to the people of about the will for defence • Percentage of military personnel compared to national population

Category	Sub-Category	Strategic Statements	Reported Metrics
National credibility (cont'd)	Public support for defence (cont'd)	• Encourage a defence mind-set • Promote resilience • Increase national legitimacy • Promote and defend national norms • Ensure that military service is regarded as honourable and is highly considered in society • Ensure that presence in the public is accepted and expected • Manage the public perception of defence • Meet the expectations of the population • Ensure public acceptation of on-going operations • Involve citizens, promote cultural contribution and awareness building	
National credibility	Social and environmental responsibility	• Contribute to society • Involve citizens, promote cultural contribution and awareness of national defence heritage • Promote reservists as mediators within society • Develop youth programmes • Promote military history and outreach • Improve veteran policy and conditions • Promote environmental sustainability	• Number of plans developed and implemented

Category	Sub-Category	Strategic Statements	Reported Metrics
National credibility	Strategic communication and reporting to parliament, politicians and public	• Provide reports to parliament • Use performance management to inform central government, parliament and the public • Provide operational status report to Parliament • Ensure structured reporting from units based on formal goals • Report on defence change initiatives to dedicated work-groups and to the public • Produce the Chief of Defence (CHOD) performance report (3 times per year) • Support National Audit Office reports	
National credibility	Alignment of defence with national government leadership	• Contribute to the formulation of policy objectives in the wider security domain (extending beyond defence) • Ensure alignment with Foreign Policy • Ensure alignment with National Security Policy • Play an active role in the fields of security, defence and armaments policy on a national level • Promote and support media, discussions and themes in the Parliament	• Percentage achievement of Federal Government sustainability commitments
International credibility	General international credibility and reputation that is not specific to NATO and EU	• Promotion and involvement in multinational defence and security cooperation • Remain implicated in multinational cooperation initiatives • Promote stability and security by playing an active role in the fields of security, defence and armaments policy on an international level	• Percentage of countries globally that report favourably towards our nation's defence engagement initiatives • Open Source Intelligence (OSINT), think tanks (such as the International Centre for Defence and Security ICDS)

Category	Sub-Category	Strategic Statements	Reported Metrics
International credibility (cont'd)	General international credibility and reputation that is not specific to NATO and EU (cont'd)	• Promote regional cooperation • Take the initiative and leadership in strategic international defence initiatives • Attain recognition through international cooperation • Provide a contribution to certain international organisations • Support other international institutions • Cooperate within Visegrad group • Promote and defend international norms (Rule of law, human rights, Geneva conventions, etc)	• Percentage of national obligations or commitments that have been met in accordance with bi-national agreements and plans
International credibility	National credibility and reputation pertaining to NATO and the EU	• Provide a contribution to certain international organisations • Shared priorities, assume responsibility, share burden and be solidary with NATO and EU • Have an active representation in NATO, EU, UN and OSCE • Increase the credibility of NATO • Fulfil the requirements that are imposed by international organisations (EU and NATO) • Man postings in key top level multinational operational structures	• Survey of force units assigned for NATO and the EU • Annually defence evaluates the status of implementation of national commitments to NATO and the EU • Number of personnel in defence in absolute numbers and as a percentage in relation to the national population (compared against international benchmark) • Percentage of the GDP for defence (compared against international benchmark)

Category	Sub-Category	Strategic Statements	Reported Metrics
International credibility (cont'd)	National credibility and reputation pertaining to NATO and the EU (cont'd)	• Perform an active role in security, defence and arms policy on an international level • Integrate into multinational structures • Promote EU public acceptance • Develop the EU framework for military action in crisis • Improve EU organisations, revitalise Commons Security and Defence Policy (CSDP) of the EU, EDA and OCCAR	• Percentage targeted participant participation in the sponsored Peace Support Operations (PSO) course • Cost per commitment • Percentage of ongoing services provided through NATO where national contributions are on track to successfully achieve objectives
International credibility	Multi-lateral diplomacy, treaties and other engagements with foreign military organisations	• Manage bi-and multilateral relations • Managing dependencies and relationships through multinational relations • Multi-lateral diplomacy and treaties • Manage international credibility of defence • Enhance power and reach through multilateral organisations and increase the ability to influence and act	• No of issues solved by defence spokesperson and liaison • Global engagement measures
Mission outputs and effects	Military operations and standing military tasks	• Contribute to peace, security and stability when deployed • Achieve success in standing military tasks in accordance with defence board priorities and strategy for defence technical instructions. • Provide a sufficient amount of operational troops to attain the national level of ambition	• Percentage of operations in which the operational objectives are successfully attained • Percentage of commanders intent that have been attained (operational objectives) • Percentage of the stated operational effects that have been attained

Category	Sub-Category	Strategic Statements	Reported Metrics
Mission outputs and effects (cont'd)	Military operations and standing military tasks (cont'd)	• Conduct operations successfully with the necessary personnel and other means • Provide collective defence through NATO and the EU • Conduct operations through the North American Aerospace Defence Command (NORAD) • Ensure continental defence • Ensure mission success by successfully conducting long term operations (crisis response operations, peace support operations and peace building operations) • Achieve success in theatre by improving security in Helmand in order to stabilise the region • Increase or decrease overseas troop commitments and exposure	• Percentage of the critical tasks that have been completed • Measure changes in the level of threat through the number of incidents, victims, etc. • Cost per operation • Number of on-going operations • Number of projected personnel that will be in operations • Number of operations where we have the lead • Number of military personnel deployed in operations • Number of personnel employed in operations vs. total number of personnel • Measures and indicators against operational objectives, e.g., promote: rule of law, governance, economic development, local government and security
Mission outputs and effects	Defence services and military collaborations with other government organisations	• Provide defence services and contributions to Government • Work with other Government departments to strengthen international peace, stability and provide support to wider national interests through soft power • Deliver disaster response and humanitarian relief • Deliver Search and Rescue (SAR) coordination and operations	

Category	Sub-Category	Strategic Statements	Reported Metrics
Mission outputs and effects (cont'd)	Defence services and military collaborations with other government organisations (cont'd)	• Support civil authorities • Fulfil military missions as well as give support to civilian authorities in non-military crisis situations • Promote Civil-military cooperation • Conduct crisis management • Provide non-security related support • Promote and support horizontal government initiatives	
Mission outputs and effects	Ongoing command, control and coordination of military tasks	• Ensure flexible Command and Control (C2) • Provide centralised operations and operations enablers, e.g., overarching C2, defence intelligence operations and operational support services • Possess an autonomous assessment, intervention and decision support capability • Effective military intelligence in operational theatres • Have a theatre and nation-specific integrated situation picture • Conduct regular assessments of ongoing operations and state of fulfilment of operational tasks • Present an integrated situation picture for theatres of operations and evaluate effective engagement of operational situations	• Coordination command and control centralised operations and operational enablement performance evaluation index (expressed as a percentage) • Command and control of domestic and international operations performance evaluation index (expressed as a percentage) • Comparison between the planned and executed navigation plans • Comparison between the planned and executed flight plans • Comparison between the planned and executed "Man Days"
Ready force elements	General and mission-specific readiness	• National military assets and capabilities remain ready to achieve politico-military ambition • Ensure availability of forces and capabilities in accordance with national level of ambition	• Percentage of war stock that's in place • Measure of operational readiness of the military units against pre-established readiness levels

Category	Sub-Category	Strategic Statements	Reported Metrics
Ready force elements (cont'd)	General and mission-specific readiness (cont'd)	• Keep units (personnel, equipment and training) at a readiness level that enables achievement of the ambition level • Assess readiness per capability: nuclear, conventional, peace-support … • Assess readiness per force: Land, Air, Navy, Marine, Special Forces, Logistics … • Be able to intervene in situations where the security of the country is compromised • Provide for contingency response: Ensure ability to provide for the most important contingency capabilities • Possess a credible intervention capability • Sustain force element readiness: e.g., suitability, availability of capability force elements (including the personnel, equipment, infrastructure, and information systems aspects) • Maintain operationality of force elements • Ensure rapid action when necessary	• Percentage of the time that planned operational readiness was achieved over the course of a year • Percentage of military units that meet the requirements concerning readiness
Ready force elements	Contribution of reserve forces (may include temporary conscripts)	• Ensure reserve contribution to operational capability	• Level of conscript training measured by number of training days in field conditions • Level of participation in the reserve training (after each training session)

Category	Sub-Category	Strategic Statements	Reported Metrics
Ready force elements	Alliance specific readiness obligations and commitments	• Provide certain capabilities in cooperation with other states\ • Implement NATO capability goals	• Ensure NATO sustainability request of 10 percent is met (sustainability stands for the ability of an army to continue long-term operations) • See to that no less than 8 percent (or 450 soldiers) of the UY total professional service personnel are sustained in operational areas • Ensure NATO deployability request of 50 percent (the total number of personnel that can be deployed has to be 50 percent) is met • Progress against plans
Ready force elements	Pre-positioning	• Anticipation and prevention abroad through prepositioning of forces • Attain efficiency of prepositioned forces	
The Ways Perspective			
Military collaboration and ensuring inter-operability with allies	Interoperability improvements (including the adaptation of international standards)	• Increasing the ability of the armed forces to act with others • Develop a lessons learned database on international interoperability • Increase knowledge of procedures and promote interoperability of equipment and command • Agree to and adopt EU, NATO and international planning standards	• Percentage of military units that have implemented interoperable command and control systems

Category	Sub-Category	Strategic Statements	Reported Metrics
Military collaboration and ensuring interoperability with allies	Common weapon programmes	• Conduct common weapon programmes and share capabilities with the EU, the private sector, local Government authorities, regional Government authorities, CT and EDA • Contribute to the building of common collective defence capabilities for those systems that are financially or technically not feasible by the defence department itself • Appeal to multinational armament cooperation initiatives if needed or if efficiency gains • Aim for a profitable capacity-oriented procurement through appropriate armament policy directives and armament projects relating to bi- and multilateral cooperation • Conduct technical, operational and financial evaluation of international cooperation projects • Increase collaboration within the EU defence industry	• Savings
Military collaboration and ensuring inter-operability with allies	Integration within multinational coalitions	• Integration into multinational formations • Participation in coalitions • Integration and common activities with other regional nations • Provide certain capabilities in cooperation with other states	

Category	Sub-Category	Strategic Statements	Reported Metrics
Military collaboration and ensuring interoperability with allies	Multinational Training	• Train to achieve multinational interoperability • Encourage international interoperable training	
Force structure production and renewal processes	Production and renewal of the force	• Ensure the presence of ready capabilities required to fulfil national level of ambition: operational, in good time and mission dependent • Identify current force structure requirements • Ensure that existing structures, processes and procedures allow for deployment-oriented mission accomplishment in all areas • Meet peacetime mobilisation and mothballing targets of reserve capabilities • Build the force structure according to the operational readiness posture • Meet standing force posture and readiness requirements • Bring about the realisation of the structure, e.g., produce ready force elements • Operationalise the structure according to operational readiness posture requirements • Conduct readiness evaluations of force units • Ensure readiness of contingents according to Transfer of Authority (ToA)	• Percentage score on the strategic force posture planning support evaluation index • Mostly used to track progress (variance report: plan versus actual, progress against plan, progress of initiatives against time)

Category	Sub-Category	Strategic Statements	Reported Metrics
Force structure production and renewal processes	Adequacy and balance in the force structure and force posture	• Have a long term balance between means, operational structure, troops, infrastructure and support activities • Possess a force structure that can comply with the requirements of current and future operations • See to that no less than 50 percent of the total professional personnel of the X is deployable	• Degree of availability of the MEE • The occupation ratio: percentage present in units compared to the organisation charts • The operationality of the personnel (based on the operational personnel per category) • Deployability of the force has to be 50 percent or greater • Ensure NATO deployability request of 50 percent (the total number of personnel that can be deployed has to be 50 percent) • Efficiency of troops, i.e., proportion manoeuvre and combat elements (60 percent) to supporting elements (40 percent) • Numbers of people in armed forces
Force structure production and renewal processes	Readiness-related training	• Meet training demands of operations, e.g., theatre specific training and the attainment of associated qualifications for individuals and units • Conduct force element integration training: Reserve training, common and joint education and training • Ensure adequate level of conscript training • Conduct readiness evaluation of all capabilities linked to operations	• Mostly used to track progress (variance report: plan versus actual, progress against plan, progress of initiatives against time)

Category	Sub-Category	Strategic Statements	Reported Metrics
Capability development and integration initiatives	Specific areas of focus for developing national capabilities	• Modernise the X combat capability • Focus on land forces • Focus on special forces • Focus on conventional capabilities • Focus on nuclear capabilities • Focus on response and intervention capabilities • Development of those capacities necessary for initial defence • Enhance early warning and ballistic missile defence • Build psychological defence capabilities • Focus on mobilisation capability • Reinforce Frontex • Build cyber warfare capabilities • Focus on hybrid warfare • Ensure and enhance strategic and tactical mobility • Enhance JIMP capacity • Possess command and Control, autonomous assessment, intervention and decision capability • Enhance imagery intelligence, electronic intelligence and space based means	• Progress against plans (regarding each DOTMPLFI component of a capability) • Progress against plans for projects (e.g., against schedule, scope and cost) • Mostly used to track progress (variance report: plan versus actual, progress against plan, progress of initiatives against time) • Measures on future equipment for future capabilities (such as project execution rate)

Category	Sub-Category	Strategic Statements	Reported Metrics
Capability development and integration initiatives	Establishment of priorities and scenario based planning	• Build for the future • Assure an efficient and effective development of capacities and capabilities through the formulation of priorities in the national and NATO defence planning process • Alignment and integration with NATO capabilities and capability planning processes • Implement NATO capability goals • Develop the national chapter in the NATO DPCS (Defence Planning Capability Survey) • Output based requirement mapping to tasks and scenarios against strategic objectives • Ensure that the armed forces meet the capability requirements stemming from the scenario portfolio	• Progress against plan
Capability development and integration initiatives	Capabilities design, capability management and integrating the fundamental elements of capability	• Support capability design and management (including medium term prioritised concepts) • Continuously develop desired capabilities • Monitor progress on acquisition of capabilities • Achieve targeted capability profile for national level of ambition • Conduct capability development in accordance with the DOTMPLFI concept	• Percentage of future capability gaps that have been closed • Percentage score on the capability development and integration evaluation index • Resource indicators put in connection with capability development are considered as quantifiable parameters based on which it would be possible to measure performance of the process

Category	Sub-Category	Strategic Statements	Reported Metrics
Capability development and integration initiatives (cont'd)	Capabilities design, capability management and integrating the fundamental elements of capability (cont'd)	• Exploit the DOTMLFPI concept as a tool for capability planning, capability development and capability integration processes • Use DOTMLFPI as a framework to assess the status of capabilities, the number and the distribution of personnel	
Capability development and integration initiatives	Capability sufficiency analysis and integrated capability planning	• Support strategic capability planning and strategic posture force planning • Ensure that structures are tailored to meet recent and future challenges • Ensure capability planning, assessment of individual units, the identification of capability shortfalls and their prioritisation • Conduct capability gap analysis • Conduct studies to evaluate options and solutions based on capability gaps • Prepare the future force - investment planning • Implement an integrated planning process (financial requirement analysis, resource plan in concordance with financial resources, identification of risks…) • Review all ongoing armaments projects with regard to new challenges, structures, processes and the prioritised capability profile	• Percentage score on the strategic capability planning evaluation index

Category	Sub-Category	Strategic Statements	Reported Metrics
Capability development and integration initiatives	Operational experiences and lessons learned	• Strategic plans and specific requirements resulting from lessons learned in operations are established for the further development of the prioritised capability profile • Build a lessons learnt database • Integrate operational experiences and requirements	• Percentage score on the lessons learned quality and impact evaluation index • Percentage score on the exploitation of advice and knowledge evaluation index
Capability development and integration initiatives	Concepts, doctrine and experimentation	• Ensure fundamental concepts for successful employment are developed • Promote doctrine development and warfare experimentation • Build on the total defence concept	• Percentage score on the state of concept and doctrine evaluation index • Percentage score on the warfare experimentation index
Transformation and continuous improvement initiatives	National transformation initiatives	• Maintain coherence with transformation plan including civil-military balance • Realise the a new defence structure • Conduct restructuring and transformation of the defence organisation • Increase organisational effectiveness • Bring about the new professional armed forces structure by 2020 of around 55000 personnel • Achieve stabilisation of the defence structure • Develop and implement the new armed forces model • Develop and implement the new operational contract • Preserve all units and garrisons	• Assessment of the implementation of the change programme against planned timescales • Variance reporting against plans (Personnel vs. plan, materiel vs. plan, etc.) • Evolution of the number of personnel

Category	Sub-Category	Strategic Statements	Reported Metrics
Transformation and continuous improvement initiatives (cont'd)	National transformation initiatives (cont'd)	• Reduce the number of personnel • Achieve a better balance between civilian and military personnel • Develop a civilian personnel development concept in accordance with the modified structure • Monitor progress of strategic change initiatives	
Transformation and continuous improvement initiatives	Overarching efficiency, cost reduction and mandate rationalisation initiatives	• Assess each programme for efficiency and undertake initiatives at finding departmental efficiencies • Evaluate the evidence, necessity, cost effectiveness and demand satisfaction of ops related undertakings • Conduct efficiency and cost reduction programmes through better administration and logistics, increased synergies, improved HR management, improved financial management, dual (civilian and military) use of resources and pooling of resources • Provide optimal service delivery through joint logistics and shared services • Provide better inventory management and distribution through the reduction in supply chain costs and the standardisation of requirements • Evaluate outsourcing options • Aim for affordability and financial efficiency	• Savings and efficiencies achieved • Reduction of overhead as percentage of total costs

Category	Sub-Category	Strategic Statements	Reported Metrics
Transformation and continuous improvement initiatives	Focused improvement initiatives	• Increase ICS (Internal Control System) maturity • Support proactive performance improvement initiatives	• Ad hoc: Defence renewal – measures for each initiative have been established • Implementation of specific projects against plans • Monitoring of savings realised (measured in cash terms)
Transformation and continuous improvement initiatives	Alliance transformation	• Transformation of NATO: Interoperability, restructuring and smart defence	
Overarching command and control processes and supporting services	Performance management and reporting	• Improve performance monitoring across all departments. • Evaluate the current state of the overall performance management of the armed forces, including perspectives on personnel, materiel, infrastructure, etc. • Conduct regular analysis on the implementation of different policy decisions or different lessons learnt • Support State Chancellery in keeping track of the fulfilment of Government programmes • Sustain and develop the Programme alignment architecture as mandated by the Treasury Board in order to monitor results and request funding from Parliament • Build a performance based tasking and reporting system, outputs vs. inputs	• Measures to track progress (progress of initiatives against time, variance report: plan versus actual)

Category	Sub-Category	Strategic Statements	Reported Metrics
Overarching command and control processes and supporting services	Strategic management practice	• Ensure that strategic requirements for successful armed forces employment are met • Develop MOD long-term vision, policies and strategies which draw strategic planning assumptions, such as strategic objectives, required and predicted resource framework, defence planning priorities and prospective national capability caveats with a view to achieve planned politico-military ambitions • Perform strategic development, coordination and the control of corporate policy, standards and guidelines • Ensure integration of national demands into international publications • Provide strategic direction and support to planning • Develop a ministerial planning guidance and a medium-term plan as a directive for the elaboration of short-term plans (annual plans) • Implement an objective-oriented planning process to interconnect defence planning with resource planning and budgeting • Align investment and business planning • Ensure that acceptable demands arising from risk analysis are incorporated in the budget • Ensure that operations related additional expenses are integrated into the planning • Ensure that operations are funded according to the required capability profile	• Plans developed and implemented • Ratio of management expenses per program • Generic: Measures of performance such as efficiency and effectiveness reflecting the generic performance metrics identified by Sink and Tuttle (1989) • Quality and impact evaluation index • Progress against plans for projects (e.g., against schedule, scope and cost) • Ad hoc: As part of the monitoring of objectives, measures are developed based on the causes of discrepancies. These measures are designed for reaching an agreed objective at a specified time or to amend this objective if necessary. The objectives and goals will be measured with approximately 60 up to 120 defined Key Performance Indicators (KPI´s). The amount of KPI depends on the focus of the report. • Assessment of the percentage of time national demands are incorporated in NATO policy, publications, doctrine and communiqués

Category	Sub-Category	Strategic Statements	Reported Metrics
Overarching command and control processes and supporting services (cont'd)	Strategic management practice (cont'd)	• Ensure completion of the goals set in defence strategy and policy planning sessions • Ensure that structures, processes and procedures contribute to the success of missions in all domains • Provide effective control for major projects so that they are delivered to agreed level on time • Focus on business architecture • Focus on operational analysis and business analytics • Promote the peace time management process model of the DU based on ISO15288 for developing, operating and maintaining military capabilities and processes • Become a mission focused organisation • Ensure operations employing personnel is the core business of the organisation	
Overarching command and control processes and supporting services	Risk and consequence management	• Evaluate the status of security threats and their impacts on national commitments to NATO and the EU • Perform budgetary risk management for operations for year X up to year X+5 • Determine effects of additional operations related expenses on current and future capability profile • Perform regular strategic risk assessments for the MoD area of governance	• Ad hoc: For the corporate risks, measures have been established that will assess the progress of the mitigation strategies which if successful should impact the performance gap

Category	Sub-Category	Strategic Statements	Reported Metrics
Overarching command and control processes and supporting services (cont'd)	Risk and consequence management (cont'd)	• Analyse and mitigate corporate risks • Support risk mitigation options for operationally critical projects	
Overarching command and control processes and supporting services	Internal audit and accountability	• Establish a holding to account process for owners of major processes and objectives • Address accountability issues for programmes involving more than one organisation • Apply financial accountability to the lowest levels of the organisation • Support regular audits and controls for the whole structure by the audit board	
Overarching command and control processes and supporting services	Support services	• Effective management and oversight of internal services • Effective executive support services • Effective legal services	
The Means Perspective			
Infrastructure assets	Availability of infrastructure and infrastructure expertise in accordance with operational requirements	• Provide infrastructure maintenance and user services • Ensure functional requirements are met: Infrastructure allows for effective and efficient mission accomplishment • Make the infrastructures ready and operational for the armed forces under budget and time constraints	• Facility condition rating (percentage) for real property assets • Percentage of defence real property that is suitable to defence requirements • Percentage of Residential Housing Units (RHUs) that are of a suitable condition for occupancy by defence members

Category	Sub-Category	Strategic Statements	Reported Metrics
Infrastructure assets (cont'd)	Availability of infrastructure and infrastructure expertise in accordance with operational requirements (cont'd)	• Provide for infrastructure that is attractive at home, abroad and during operations • Ensure infrastructure conforms to modern standards • Manage infra operations including maintenance and repair • Ensure deployability of service personnel with expertise in delivering infrastructure	
Infrastructure assets	Infrastructure and real estate portfolio management	• Promulgate Real property management framework and strategy • Manage fixed property (strategic maritime, land, aerospace and joint facilities) • Apply quality controlled accounting procedures for infrastructure with federal institute for real estate • Ensure establishment of expertise on infrastructure management • Minimise infrastructure related costs	• Real Property - environment and remediation programme cost per personnel Full Time Equivalent (FTE) • Level of expenditure on infrastructure (5 percent ceiling) • Percentage of real property maintenance, repairs and recapitalisations expenditures compared to replacement value of real property replacement costs • Real Property Replacement Costs (RPRC) per management FTE • Percentage defence real property score on the coordination, development and control performance evaluation index • Percentage management overhead costs for the infrastructure programme vs. the total cost of the infrastructure programme

Category	Sub-Category	Strategic Statements	Reported Metrics
Infrastructure assets	Infrastructure acquisition, construction and improvement	• Oversee completion of the infrastructure plan • Put into practice plans for new structures and modify existing plans if necessary • Execute acquisition of fixed property (maritime, land, aerospace and joint)	• Percentage new construction, betterments and recapitalisations on original schedule (over $1M) • Percentage new construction, improvements and recapitalisations on adjusted schedule (over $1M) • Percentage real property recapitalisation reinvestment in relation to total real property replacement cost • Money spent on infrastructure investments
Infrastructure assets	Infrastructure divestment and disposal	• Formulate and manage the divestment and disposal of infrastructure plan	• Percentage surplus real property land area compared to total owned • Percentage real property disposals undertaken within the treasury board's mandated timeframe
Infrastructure assets	Environment	• Oversee environment and remediation issues • Ensure establishment and deployability of infrastructure service personnel ready for operations with expertise in environmental protection	• Number of identified Unexploded Ordinance (UXO) sites legacy assessed per year • Percentage reduction in contaminated sites opening liability (sites which reported liability in the previous fiscal year)
Inventories of equipment	The execution of materiel acquisition and procurement	• Procure the weapons and equipment required for the success of the operations of the armed forces • Review of all production options • Orient request for proposals on capabilities • Conduct profitable and capability oriented procurement • Implement fast-track initiatives	• Progress against plans • Measure of delays in procurements • Percentage capacity level to acquire new assets • Percentage defence materiel acquisition projects on original and on adjusted schedule • Percentage non-defence materiel acquisition projects on original and on adjusted schedule

Category	Sub-Category	Strategic Statements	Reported Metrics
Inventories of equipment (cont'd)	The execution of materiel acquisition and procurement (cont'd)	• Reform the acquisition process to provide more agile and flexible support to the front line	• Percentage of materiel upgrade and technological insertion projects and upgrades on schedule
Inventories of equipment	Material availability, readiness and contingency for operations	• Ensure equipment readiness requirements are met • Ensure that the necessary equipment is delivered in operational condition, on time, within the budget and is kept operational • Foresee and fulfil equipment requirements for operational situations that enables mission success • Equip operational units with modern equipment adapted to their mission, in sufficient numbers, so that training as well as employment in the organic configuration are possible • Ensure fully equipped contingents are available for all operation theatres • Ensure that equipment is professional and safe • Ensure versatility and reliability of equipment	• Readiness of the equipment measured through equipment availability, average delay of execution, rate of performances achieved and temporary reductions of operational capabilities • Percentage of key fleets available to meet operational and force development tasks • Percentage of defence materiel portfolio considered un-suitable to readiness training and operations • Evolution in time of the number of existing and foreseen Mission Essential Equipment (MEE) with distinction between legacy and new material
Inventories of equipment	The overarching management of equipment programmes and portfolios	• Achieve and maintain a realistic equipment programme aligned with the strategy • Strategic maritime, land, aerospace and joint asset programmes and portfolios • Increase maturity of equipment programmes	• Percentage cost of managing the materiel acquisition programme compared to total materiel expenditures • Benchmarking with comparable countries with an equal Gross Domestic Product (GDP)

Category	Sub-Category	Strategic Statements	Reported Metrics
Inventories of equipment (cont'd)	The overarching management of equipment programmes and portfolios (cont'd)	• Identify shortfalls and conduct procurement prioritisation studies • Identification and prioritisation of acquisitions • Carry out affordable solutions after gap identification ranging from the modification of the use made of some equipment (to another mission) to a complete procurement plan • Prioritise acquisitions based on available budget and operational requirements • Ensure that contractual commitments are honoured	• Percentage cost of managing the materiel programme compared to total materiel capital programme
Inventories of equipment	The execution of ongoing materiel maintenance, testing, upgrade and divestment	• Ensure equipment renewal, upgrade and insertion • Manage equipment divestment and disposal • Conduct engineering, test, production and maintenance activities	
Inventories of equipment	Equipment-specific policy and strategy	• Formulate equipment policy strengthening role in international relations • Ensure alignment of industry and equipment maintenance policy • Formulate government-wide armament policy and objectives	
Inventories of information systems	Strategic information system initiatives	• Allow staff to focus efforts on data analysis by facilitating data collection and input through the use of integrated corporate systems • Assemble and implement a Management Information System (MIS) by 2015	• Percentage of IT projects within planned budget • Percentage of info systems capital projects on schedule (vs. original timeline and adjusted timelines)

Category	Sub-Category	Strategic Statements	Reported Metrics
Inventories of information systems (cont'd)	Strategic information system initiatives (cont'd)	• Promote efficiency through IT initiatives	• Percentage of info systems projects requiring senior management attention • Number of systems capital projects
Inventories of information systems	Management of information systems portfolios	• Draw a campaign plan that aligns with defence priority elements • Perform strategic development, coordination, and control of information systems and programmes • Improve information management and exploitation • Ensure that organisational IT and integrated software supports processes and procedures • Ensure that integrated data processing supports processes	• Portfolio lifecycle management programme cost per number of defence info system portfolio • Percentage of IT enabled investments that meet the business requirements • Actual expenditure on IT internal services category as a percentage of total departmental actual expenditure as stated in the public accounts • Percentage defence info systems score on the coordination, development and control performance evaluation index • Percentage costs to manage the information system programme vs. the total cost of the information systems programme
Inventories of information systems	Ongoing information systems acquisition, deployment, security, user support, and divestment	• Promote new information technologies • Oversee acquisition, development and deployment of IT systems • Provide system management and user support • Enhance Information system security	• Cost of IT systems • Cost of info systems acquisition, development and deployment programme relative to info system project expenses

Category	Sub-Category	Strategic Statements	Reported Metrics
Defence and security budgets	Budget allocation and expenditure control	• Apportion and balance defence budget in relation to MOD priorities • Align initiatives with performance gaps and compare them with different types of budget • Monitor expenditure level for major programmes • Regularly assess budget developments (risks and trends) • Conduct budgetary risk management for operations from year X to year X+5 • Develop and support risk mitigation options for operationally critical projects • Manage financial exposure of suppliers • Determine the effects of additional operations related expenses on the capability profile • Integrate operations related additional expenses in the planning	• Progress on investments to close capability gaps • The degree of realisation or budget fulfilment level (The percentage of the budget that has been spent) • Monthly use of budget • Follow-up of savings realised in supply and logistics (measured in cash terms) • Expenditure against plan
Defence and security budgets	Levels of fiscal appropriation from the national government for purposes of national defence	• Convince the Government to stabilise the budget (at least in the medium term) • Convince the Government to increase the defence budget to 2 percent of GDP • Determine general budget with Government and Finance ministry • Review the changes in the initial financial planning conditions of the 4-year plan	• Defence budget spent as percentage of GDP • Inflation rate • GDP changes in percentage terms • Changes in the inflation rate and GDP

Category	Sub-Category	Strategic Statements	Reported Metrics
Defence and security budgets	The relative balance in the allocation of fiscal resources across budget partitions	• Control payroll costs, keep personnel costs below X percent of the budget • Provide cost effective HR and improve payability whilst the balance and expenditure sheets undergo changes	• Proportions of defence expenditures (procurement, investment, material, personnel) • Expenditure on personnel, investment, infrastructure, etc. • Benchmarks with other NATO countries • Payroll, expenditure on personnel and personnel costs • Personnel expenditures against plan • Number of overtime hours • Level of expenditure on infrastructure (5 percent ceiling) • Level of expenditure on procurement of major equipment (20 percent minimum) • The percentage of the total budget invested in capital (NATO opts for an investment quote of 20 percent)
Defence and security budgets	Funding provided to international alliances	• Fund NATO-requirements • Provide funding for EU internal security	• Percentage of financial transfers made to NATO in accordance with national treaty obligations
Defence and security budgets	Financial arrangements	• Promote efficiency of financial resources through Public Private Partnerships (PPP), smart use of money and cash releasing savings	• Cost avoidances and cost savings

Category	Sub-Category	Strategic Statements	Reported Metrics
Defence and security budgets	The relative balance in the allocation of fiscal resources across defence programmes	• Fund operations in such a way that the required capability profile is met • Provide adequate means for the development of the necessary capacities • Contribute to the building of joint capacities for collective defence • Guarantee sustainable financing of a prioritised capability profile trough the Integrated Planning Process (IPP) in spite of changes in the initial fiscal planning conditions (according to changes in the inflation rate and GDP) • Provide funding for frontline	• Level of expenditure not related to force development (27 percent ceiling) • Overhead as percentage of total costs
Information and intelligence	Knowledge, intelligence, foresight and anticipation	• Monitoring of areas of interest • Increase situational awareness • Assess existing and emerging risks • Improve intelligence collection capabilities including those of the EU	
Information and intelligence	Intelligence preparation, organisation, procedures and adaptation	• Enhance preparation: organisation, procedures and adaptation • Improve knowledge of procedures and the interoperability of information and command • Improve coordination between intelligence agencies • Improve organisation culture of the intelligence agencies	

Category	Sub-Category	Strategic Statements	Reported Metrics
Information and intelligence (cont'd)	Intelligence preparation, organisation, procedures and adaptation (cont'd)	• Improve data processing capabilities • Improve system compatibility of different agencies • Implement business continuity contingencies	
Personnel, organisation and culture	The management of manning, organisational structure and personnel readiness	• Achieve a sustainable and payable manning of the structure so that current and ongoing operations may be conducted • Achieve a structurally balanced body of personnel (e.g., comprising 170,000+5000+x military and 55,000 civilian personnel by 2017) • Provide sufficient qualified and operational personnel to achieve manpower requirements (number, rank and mix of competencies…) • Keep the administrative element of defence below 10 percent of the total personnel • Ensure fully manned contingents are available for operations • Provide sufficient manning in order to comply with current and ongoing operations up to an acceptable level • Ensure operationality of the personnel in accordance to their operational category (Operational category corresponds to the occupied job)	• Survey of human resources and assessment of human resource management • Number personnel • Percentage priority 1 and priority 2 positions filled • Personnel numbers against plan, OFF / K (officers) • Personnel numbers against plan, specialist officers • Personnel numbers against plan, reserve officers • Personnel numbers against plan, GSS / K (Full time soldiers • Personnel numbers against plan, GSS / T (Part time soldiers) • Personnel numbers against plan, HAGS (Home Guard) • The occupation ratio: percentage present in units compared to the organisation charts

Category	Sub-Category	Strategic Statements	Reported Metrics
Personnel, organisation and culture (cont'd)	The management of manning, organisational structure and personnel readiness (cont'd)	• Implement staffing based on aptitudes, qualifications and achievements (the right person at the right post at the right time) • Ensure postings in key top-level operational structures	• Percentage of individual occupations that have the manning required to fill established positions at each rank • Percentage of the total regular force establishment that has been filled • Percentage of personnel that are dentally fit to deploy on domestic and international operations • Percentage of administrative personnel • Overhead as percentage of total costs
Personnel, organisation and culture	Care, support and morale of defence personnel	• Assure well-being and welfare of personnel • Maintain and enhance motivation (morale) • Implement measures to reduce operational stress • Ensure services such as medical care and casualty support are available to defence members and their families • Provide adequate medical care and health care • Promote "Esprit de Corps", values and cohesion • Strengthen the value basis of the armed forces • Ensure prospects for vocational advancement and equal opportunities	• Measure of member satisfaction with well-being services • Regular defence personnel survey, defence personnel satisfaction survey, military and civilian surveys, well-being questionnaires • *Ad hoc* personnel surveys • Percentage of personnel satisfied with services provided • Percentage of military members dissatisfied with the quality of life services utilised or available to be utilised • Percentage of personnel satisfied with the recognition they receive from the organisation compared to the percentage of personnel dissatisfied with the recognition they receive from the organisation

Category	Sub-Category	Strategic Statements	Reported Metrics
Personnel, organisation and culture (cont'd)	Care, support and morale of defence personnel (cont'd)		• Yearly changes in costs of morale and well-being programme in comparison with the total number of personnel members • Successful completion of SIV and RAD compliance surveys • Number of recognition items [ORMM + MSD] compared to 5 year average • Percentage medical clinic patient satisfaction with regard to their treatment and interaction with medical staff • Percentage compliance of LAB subspecialty with external quality control by discipline • Number of veterans under armed forces' monitoring responsibility who are rehabilitated, number of veterans rehabilitated • Average number of waiting list cases per case manager
Personnel, organisation and culture	Recruitment and selection	• Oversee recruitment and departure flow favouring a young and physically able force • Complete the defence personnel recruitment plan • Ensure that the number of new applicants make qualified personnel selection possible • Improve the organisational activities regarding recruitment to enable the recruitment and selection of qualified personnel	• Percentage of the regular force external strategic intake plan filled • Number of candidates vs. number of positions offered • Number of solicitants • Basic Military Qualification (BMQ) vs. Basic Military Officer Qualification (BMOQ) fill rate

Category	Sub-Category	Strategic Statements	Reported Metrics
Personnel, organisation and culture (cont'd)	Recruitment and selection (cont'd)	• Modernise the recruitment process providing a more adapted and flexible support for the frontline • Reform the recruitment process with a realistic and payable execution program • Implementation of conscript service	
Personnel, organisation and culture	Job attractiveness	• Create a good balance between military vs. private life • Ensure military service and employment opportunities are considered attractive both within and outside defence • Increase recognition of the military as a profession • Implement attractive financial statutes including appropriate salary levels and compensation systems for extra hours • Promote career possibilities (promotion) and equal opportunities • Promote gender diversity • Ensure regional diversity	• Percentage of employees who would recommend armed forces employment to others • Number of candidates vs. number of positions offered • Employee surveys • Turnover • Percentage mutations (except those due to normal rotations) • Voluntary exit rates • Benchmarking • Percentage of women in defence • Number of women in the armed forces • Percentage of women according to equal opportunities plan • Percentage of women in the armed forces, executive positions • Percentage of women in the armed forces, officers

Category	Sub-Category	Strategic Statements	Reported Metrics
Personnel, organisation and culture (cont'd)	Job attractiveness (cont'd)		• Percentage of women in the armed forces, specialist officers • Percentage of women in the armed forces, civilian personnel • Percentage of women in the armed forces • Percentage of women in the armed forces, GSS / T (Part time soldiers) • Defence personnel satisfaction survey • Percentage of employees who would recommend armed forces employment to others
Personnel, organisation and culture	Management of retention, transition, attrition and departure	• Monitor and analyse strength trends, attrition and intake • Minimise attrition (attrition stands for the people that leave the organisation much faster than foreseen) • Ensure that the most capable military and civilian employees commit to defence service for the long run • Encourage effective transition and external mobility	• Percentage of personnel leaving the armed forces, all causes • Percentage of personnel leaving the armed forces, at their own request • Percentage personnel moving between personnel categories • Percentage individuals commencing GMU (Basic Military Training) who continue to become Home Guard officers or receive long term employment • Turnover (directly connected with attrition, also gives an indication of the effectiveness of the communication, recruitment, selection, basic and professional education, the organisational culture and the infrastructure)

Category	Sub-Category	Strategic Statements	Reported Metrics
Personnel, organisation and culture	Career planning, individual education and professional development	• Promote career possibilities and planning • Ensure the development of personnel through professionalism and a career-long individual learning concept • Promote the development of leadership, civic education and values • Ensure personnel development activities are efficient and effective • Provide personnel with the necessary technical education and military training to meet the challenges of their posts • Ensure defence training meets the demands of operations • Implement competencies based and occupational training • Identify, prioritise and allocate resources (including funding) efficient and effectively • Promote common and joint education and training • Ensure post-selection technical and military training contributes to employer attractiveness by providing training that is innovative, transparent, flexible, on time, of the right quality and of the right quantity • Establish synergies with the national education system	• Percentage of trained effective regular force • Percentage of military personnel who disagree that the MY armed forces Professional Development (PD) programmes encourage and support self-development among MY members • The success of the PD Programme in qualifying those that started: Percentage of maximum load of PD courses achieved • The success of the PD Programme in qualifying those that started: Percentage of graduates vs. training plan target • The success of the PD Programme in qualifying those that started: Percentage of graduates vs. planned starts • The success of the PD Programme in qualifying those that started: Percentage of graduates vs. total starts • The success of the PD Programme in qualifying those that started: Percentage of maximum load of occupation training courses

Category	Sub-Category	Strategic Statements	Reported Metrics
Personnel, organisation and culture	Working conditions	- Create an attractive work environment - Promote safety management - Improve the handling of complaints - Conduct ad-hoc investigations - Cooperate with worker unions and representative organisations to increase the capacity for internal dialogue	- Analysis of work related accidents (percentage Cat ABC) - Number of injuries
Personnel, organisation and culture	Management of the reserve force	- Ensure reserve complement - Increase the ability to attract and retain reserve personnel for specific operations and locations in support of defence commitments	- Percentage of reserve personnel occupations considered healthy - Overhead expenses for reserve portfolio management
Science, technology and knowledge	Identification and development of defence Science and Technologies (S&T)	- Identify and assess significant defence technologies - Ensure integration of past operational experiences and new operational requirements - Preserve key capacities and technologies - Preserve technical superiority - Provide support to scientific training and to Research and Development (R&D)	- Amount of money spent on defence specific S&T - State of S&T facilities - Percentage score on the defence capability development and research evaluation index - Percentage score on the exploitation of advice and knowledge evaluation index - Percentage score on the development and integration evaluation index - Ratio of management expenses per S&T programme

Category	Sub-Category	Strategic Statements	Reported Metrics
Science, technology and knowledge	Collaboration with industry with regard to science and technology	• Contribute to the national economy and employment • Exploit defence industrial policy • Promote science and technology exports to secure the national industry's future • Strengthen the innovation and competitiveness of the national arms industry through profitable and capability oriented procurement • Promote EU defence industry collaboration • Maintain industry financing • Promote defence security and cooperation	• Amount of money spent on S&T that flows to industry • Money invested in medium and small companies

14. Abstract

This report describes a study to investigate the extent to which, and how, strategic-level decision makers in twelve NATO and partner defence organisations make use of performance management and measurement systems to assess their organization.

Based on a mixed methods approach combining quantitative and qualitative data from twelve nations with the results of a systematic literature review, this work proposes a new Defence Performance Management Framework (DPMF). The DPMF comprises a depiction of characteristic high-level defence performance categories, their underlying relationships, and possible performance measures for the various categories. It provides the senior defence leadership with an instrument to assess how they define and measure strategic goals so that they can better orient their activities and outputs to their strategic goals and key performance indicators.

Assessing the design of performance measurement systems across the participating nations generates insights that merit reflection with regard to areas (such as science and technology, and information and intelligence) that seem to be highly neglected, or categories that are generally poorly supported by metrics (such as the collaboration between nations).

Finally, the report highlights insights on defence performance management provided by an expert panel as well as important areas for future research.

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