NORTH ATLANTIC TREATY ORGANIZATION

SCIENCE AND TECHNOLOGY ORGANIZATION

AC/323(SAS-113)TP/689

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STO TECHNICAL REPORT **TR-SAS-113**

Future Defence Budget Constraints: Challenges and Opportunities

(Contraintes futures sur les budgets de défense : Défis et opportunités)

This Technical Report documents the findings of System Analysis and Studies (SAS) Panel Team 113.

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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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Published December 2016

ISBN 978-92-837-2033-1

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List of Acronyms

3D	Three-Dimensional
A2/AD	Anti-Access/Area Denial
AAT	Anti-Aircraft Tank
ACR	Armed Forces of the Czech Republic
ACT	Allied Command Transformation
AMPV	Armored Multi-Purpose Vehicle
APMI	Accelerated Precision Mortar Initiative
APS	Auxiliary Propulsion System
APUC	Average Procurement Unit Cost
A-RCI	Acoustic Rapid Commercial-Off-The-Shelf (COTS) Insertion
ARRA	American Recovery and Reinvestment Act
AS-PO	Army Service State Funded Institution
AUSA	Association of the United States Army
AVLB	Armored Vehicle Launch Bridge
BARV	Beach Armoured Recovery Vehicle
BCA	Budget Control Act
BWB	Federal Office of Defence Technology and Procurement (Germany)
C3	Consultation, Command and Control
CAN	Canada
CANES	Consolidated Afloat Networks and Enterprise Services
CapDiM	Capabilities Discussion Matrix
CAPE	Cost Assessment and Program Evaluation
CBO	Congressional Budget Office
CFDS	Canada First Defence Strategy
CFI	Connected Forces Initiative
CG&S	Common Goods and Services
CMRE	Centre for Maritime Research and Experimentation
CORA	Centre for Operational Research and Analysis (Canada)
COTS	Commercial-Off-The-Shelf
CPM	Customer, Product, Management
CPR	Capabilities Portfolio Review
CSO	Collaboration Support Office (STO)
CZE	Czech Republic
CZK	Czech Republic currency
DAU	Defense Acquisition University
DEU	Germany
DFAS	Defense Financial and Accounting Services
DI	Defence Investment
DIO	Defence Infrastructure Organization
DLA	Defense Logistics Agency
DMC	Defence Management Committee (Canada)
DND/CF	Department of National Defence/Canadian Armed Forces
DoD	Department of Defence (United States)
DoF	Department of Finance (Canada)
DOTMLPF	Doctrine, Organization, Training, Materiel, Leadership and education, Personnel, and Facilities

DOTMLPFP-I	DOTMLPF, Policy, and Interoperability
DPP	Defence Policy and Planning (Division)
DRDC	Defence Research and Development Canada
DWAN	Defence Wide Area Network (Canada)
EDA	European Defence Agency
EOQ	Economic Order Quantity
EPE	Enterprise and Platform Enablers
EPR	Economic Production Rate
EU	European Union
FACE(TM)	Future Airborne Capability Environment Technical Manual
FDF	Federal Defence Force
FNC	Framework Nations Concept
FRA	France
FYDP	Future Year Defense Program
GBAD	Ground-Based Air Defence
GBR	Great Britain
GCV	Ground Combat Vehicle
GDP	Gross Domestic Product
HED	Hybrid Electric Drive
HM	Her Majesty
HMS	His/Her Majesty's Ship
HNS	Host Nation Support
HQ	Headquarters
HR	Human Resources
I/O	Input/Output
IaaS	Infrastructure as a Service
ICD	Interface Control Document
IISS	International Institute for Strategic Studies
ILW	Institute for Land Warfare
IMF	International Monetary Fund
IPP	Integrated Planning Process
IPT	Integrated Product Team
IRONs	Imperatives, Requirements, Obligations or Needs
IS	International Staff
IT	Information Technology
ITA	Italy
JAB	Joint Assault Bridge
KCP	Key Cost Parameter
KMW	Krauss-Maffei Wegmann & Company
KPP	Key Performance Parameter
KSP	Key Schedule Parameter
L1A	Typically chief-of-staff to an Assistant Deputy Minister or Military Equivalent (Canada)
LAV	Light Armoured Vehicle
LEOBEN	Leopard Battle Tank User Group Programme (Translation from German)
LHD	Landing Helicopter Deck
LIRA	Long-Range Investment Requirements Analysis

MAD	Mutual Assured Destruction
MATC	Multinational Aviation Training Centre
MBT	Main Battle Tank
MEADS	Medium Extended Air Defense System
Mi	Mil Russian Helicopter Type
MILEX	Military Exercise
MINIMI	Fabrique Nationale Mini Machine Gun
MND	Minister of National Defence (Canada)
MoD	Ministry of Defence
MoF	Minister of Finance (Canada)
MoF SR	Ministry of Finance of the Slovak Republic
MOSA	Modular Open Systems Approach
MoU	Memorandum of Understanding
MS	Microsoft
NAC	North Atlantic Council
NAMSA	NATO Maintenance and Supply Agency
NATO	North Atlantic Treaty Organization
NDA	National Defence Act (Canada)
NDC	NATO Defence College
NDPP	NATO Defence Planning Process
NLOS-LS	Non-Line-Of-Sight – Launch System
NORAD	North American Aerospace Defense Command
NSPA	NATO Support and Procurement Agency
O&M	Operations and Maintenance
O&S	Operations and Support
OA	Open Architecture
OCO	Operational Commitment Overseas
OCS	Office of the Chief Scientist (NATO)
OPNAV RO	Office of the Chief of Naval Operations Requirements Officer
OSA	Open Systems Architecture
PAA	Program Activity Architecture
PaaS	Platform as a Service
PAL	Program Activity Leader
PAUC	Program Acquisition Unit Cost
PBL	Performance-Based Logistics
PDF	Portable Document Format
PM	Project Manager
PMF	Performance Measurement Framework
POC	Point Of Contact
POM	Program Objective Memoranda
PPBE	Planning, Programming, Budgeting & Execution
PPBS	Planning-Programming-Budgeting System
R&D	Research and Development
RUSI	Royal United Services Institute
S&T	Science and Technology
SAS	System Analysis and Studies (Panel)
SCMT	“Should Cost” Management Team
SDSR	Strategic Defence and Security Review
SFA	Security Force Assistance

SLAMRAAM	Surface Launched Advanced Medium-Range Air-to-Air Missile
STB	Science and Technology Board
STO	Science and Technology Organization
SWP	German Institute for International and Security Affairs
TBS	Treasury Board Secretary
TOC	Total Ownership Cost
TRL	Technology Readiness Level
U.S./USA	United States of America
UK	United Kingdom
USAF	United States Air Force
USMC	United States Marine Corps
USS	United States Ship
V4	Visegrad Group (Czech Republic, Hungary, Poland, and Slovakia)
VAT	Value-Added Tax

Acknowledgements

The SAS-113 Technical Team would like to acknowledge the valuable contributions of the following individuals:

- Dr. Francois Melese – Professor of Economics, Defence Resource Management Institute, Naval Postgraduate School.
- Dr. Adrian Kendry – Former Senior NATO Defence Economist.
- Mr. Han de Nijs – Branch Head, Operations Analysis NATO Allied Command Transformation.
- The team would also like to acknowledge the support of the following NATO Science and Technology Collaboration Support Office individuals:
  - LtCol Taylor Edwards, U.S. Air Force – Executive, NATO System Analysis and Studies Panel.
  - Dr. Timothy Povich, LtCol U.S. Army – Executive, NATO System Analysis and Studies Panel.
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Future Defence Budget Constraints: Challenges and Opportunities

(STO-TR-SAS-113)

Executive Summary

As members of the Alliance are forced to respond to the economic and security environment, and make difficult choices, it is imperative they consider the impact of their decisions on NATO's collective capabilities. To mitigate the macroeconomic effects of the Great Recession on defence spending, some NATO Nations coupled discretionary spending cuts with increased stimulus spending, while others cut individual discretionary spending categories to fund other higher priority programs. Analysis of the various macroeconomic impacts of the financial crisis, and strategies adopted by Member Nations to mitigate those impacts, reveals valuable lessons for the management of defence resources. Currently, each Member Nation manages its defence budgets in support of the Alliance independently, without fully leveraging successful resource management practices and lessons learned.

This study highlights the need for NATO to adopt an analytical framework that provides Alliance Nations a common foundation to achieve effective and efficient defence resource management. The aim is for countries to adopt resource management practices to maintain the future credibility and effectiveness of the Alliance. The proposed framework in this study organizes country contributions of defence management practices into four broad categories that assist Member and Partner Nations to better shape their responses to future budget constraints, safeguard national security, and support the Alliance – they are:

- Planning;
- Programming;
- Budgeting and execution; and
- Assessment.

Organizing country contributions into these four categories reveals multiple options to increase the efficiency and effectiveness of our forces.

SAS-113 determined that among participating Nations, there does not appear to be a systematic effort to engage equally in defence resource management strategies across the four categories. As a result, the study recommends:

- Expanding the proposed analytical framework;
- Establishing a Defence Resource Management Division to collect, analyze, and share crowd-sourced resource management practices; and
- Developing an annual NATO Defence Resource Management Symposium to share successful resource management practices.

Contraintes futures sur les budgets de défense : Défis et opportunités

(STO-TR-SAS-113)

Synthèse

Alors que les membres de l'Alliance sont obligés de réagir au contexte économique et de sécurité et de faire des choix difficiles, ils doivent impérativement tenir compte des conséquences de leurs décisions sur les capacités collectives de l'OTAN. Afin d'atténuer les effets macroéconomiques de la crise sur les dépenses en matière de défense, certains pays de l'OTAN ont associé une réduction des dépenses discrétionnaires avec une hausse des dépenses de relance, tandis que d'autres ont diminué quelques dépenses discrétionnaires au profit d'autres programmes plus prioritaires. L'analyse des divers impacts macroéconomiques de la crise financière et des stratégies adoptées par les pays membres pour atténuer ces impacts est source de précieux enseignements pour la gestion des ressources de défense. Actuellement, chaque pays membre gère ses budgets de défense à l'appui de l'Alliance en toute indépendance, sans exploiter au mieux les pratiques efficaces de gestion des ressources ni les leçons qui en ont été tirées.

La présente étude souligne la nécessité pour l'OTAN d'adopter un réseau d'analyse qui fournisse aux pays de l'Alliance un socle commun permettant une gestion efficace et économique des ressources de défense. L'objectif est que les pays adoptent des pratiques de gestion des ressources afin de préserver la crédibilité et l'efficacité de l'Alliance à l'avenir. Le cadre proposé pour cette étude classe les contributions des pays en matière de pratiques de gestion de la défense en quatre grandes catégories qui aident les pays membres et partenaires à mieux adapter leurs réponses aux futures contraintes budgétaires, préserver la sécurité nationale et soutenir l'Alliance – elles sont :

- La planification ;
- La programmation ;
- La budgétisation et l'exécution ; et
- L'évaluation.

Cette organisation des contributions en catégories révèle de multiples options pour accroître l'efficacité et l'efficience de nos forces.

Le SAS-113 a determiné que les pays participants ne semblent pas systématiquement déployer leurs efforts de manière uniforme dans les quatre catégories de gestion des ressources de défense. Par conséquent, l'étude recommande :

- D'étendre le cadre d'analyse proposé ;
- D'établir une division de gestion des ressources de défense qui recueillera, analysera et partagera les pratiques de gestion des ressources ; et
- De mettre en place un colloque annuel de gestion des ressources de la défense de l'OTAN afin de partager efficacement les pratiques correspondantes.

PROLOGUE

BACKGROUND

The Recession of 2008 – 2009 is viewed by many economists as the greatest challenge to the global economy in more than seventy-five years. In this latest recession, the world witnessed a collapse in international trade, a sharp contraction in global output, and a dramatic rise in unemployment. Global supply chains and financial interconnectedness magnified the impact of the fiscal crisis. While the low point of the financial crisis occurred between late 2009 and early 2010, the recovery has been unstable and protracted [9].

While many of the macroeconomic factors experienced as a result of the financial crisis are common among NATO Member Nations, the responses of participating Nations present varying reactions to the crisis. The diversity of Nation's strategies can be attributed to a wide range of influences, such as national priorities, security strategies, fiscal policies, and politics. Universal strategies adopted by participating Nations included heavy government involvement in attempts to counter the effects of the Great Recession and avoid economic collapse. Despite these measures, the general outcome was disappointing growth rates and unprecedented increases in deficits and debt.

Study team analysis identified five common economic factors that directly affected defence spending in the ten participating Member Nations:

1) Stagnant GDP growth;
2) High unemployment;
3) Decreased tax revenue;
4) Increased government spending; and
5) Increased government debt burden.

This study illustrates that while many macroeconomic factors influence government spending, Hartley and Solomon [9] suggest that a decline in GDP growth and increased unemployment most directly affect defence spending.

To address growing budget deficits and national debt, the reaction in most NATO Nations was to cut discretionary spending, including defence expenditures. This prompted NATO to launch several resource management initiatives to mitigate the risks national budget constraints presented to its goals of collective defence, crisis response, and cooperative security. These initiatives include: "Smart Defence", the "Connected Forces Initiative" (CFI), the "Framework Nations Concept" (FNC), and encourage multi-national cooperation; interoperability; and the development of defence capabilities through prioritization, specialization, and cooperation.

DECREASED DEFENCE SPENDING

Several factors influence NATO Alliance members' military spending. These include:

- Emerging threats or perceptions of threats to national interests;
- Domestic public perceptions and political influence on defence spending;
- National economic growth rates;

- Growth in government spending on non-defence programs;
- Deficits, debt, and net interest payments on the debt; and
- Alliance burden sharing agreements.

NATO Secretary General Stoltenberg stated that "*NATO can really add value when it comes to how defence budgets are spent by helping Allies align their priorities, plan together, pool their resources, and get the most for tax-payers' money*" [23]. Pooling and sharing defence resource management practices implemented by Member Nations in response to economic austerity can offer a valuable guide to help mitigate harmful impacts of budget cuts on the Alliance.

Figure PL-1 highlights the importance of resource management mitigation strategies by illustrating that in the five years after the Great Recession, average defence spending as a share of GDP by all NATO Nations declined from 1.72% in 2009 to 1.46% in 2013. In 2014, only three of the ten study team Member Nations met NATO's 2% goal for defence expenditure as a share of GDP. According to Henius and McDonald [28], this decline and the likelihood of continued resource management austerity could last for the next two decades. Since the Great Recession, defence spending among participating Member Nations declined an average of 0.2 percentage points from pre-recession levels (Figure PL-2). From 2010 to 2012, Henius and McDonald [10] point out that "*defence spending by NATO Member Nations decreased by some $45 billion dollars – the equivalent of Germany's entire annual defence budget.*" Similarly, most participating Nations struggled to meet the Alliance's goal to spend 20% of defence budgets on modernization (procurement of new equipment, etc.).

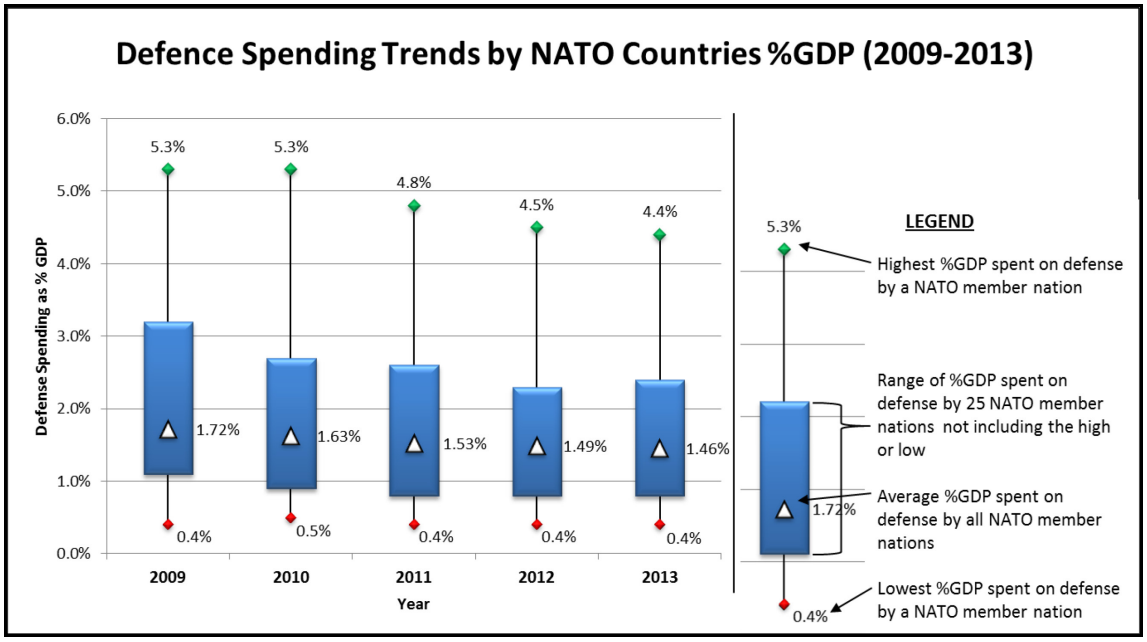
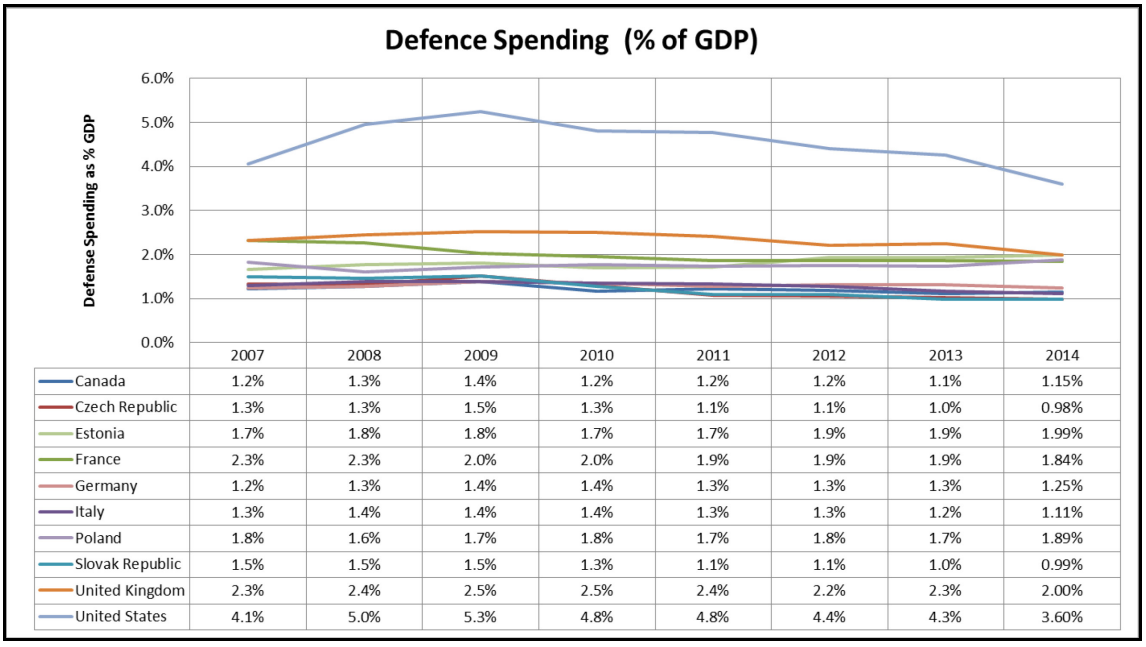


Figure PL-1: 2009 – 2013 Defence Spending by NATO Nations (% GDP). Source: NATO Financial and Economic Data, 2014.



	2007	2008	2009	2010	2011	2012	2013	2014
Canada	1.2%	1.3%	1.4%	1.2%	1.2%	1.2%	1.1%	1.15%
Czech Republic	1.3%	1.3%	1.5%	1.3%	1.1%	1.1%	1.0%	0.98%
Estonia	1.7%	1.8%	1.8%	1.7%	1.7%	1.9%	1.9%	1.99%
France	2.3%	2.3%	2.0%	2.0%	1.9%	1.9%	1.9%	1.84%
Germany	1.2%	1.3%	1.4%	1.4%	1.3%	1.3%	1.3%	1.25%
Italy	1.3%	1.4%	1.4%	1.4%	1.3%	1.3%	1.2%	1.11%
Poland	1.8%	1.6%	1.7%	1.8%	1.7%	1.8%	1.7%	1.89%
Slovak Republic	1.5%	1.5%	1.5%	1.3%	1.1%	1.1%	1.0%	0.99%
United Kingdom	2.3%	2.4%	2.5%	2.5%	2.4%	2.2%	2.3%	2.00%
United States	4.1%	5.0%	5.3%	4.8%	4.8%	4.4%	4.3%	3.60%

Figure PL-2: Defence Spending 2007 – 2014.
Source: NATO Semestrial Statistical Memo, 2015.

METHODOLOGY

Facing severe budget cuts, NATO members are increasingly forced to make hard choices to safeguard national security, while contributing to the future capabilities (and credibility) of the Alliance. NATO's success critically depends on the widespread application of effective and efficient defence resource management practices. Secretary General Jens Stoltenberg highlighted this challenge in his 2014 keynote speech to NATO's 60th Parliamentary Assembly:

> "*It is not just [the amount] we spend on defence. It is also about* ***what*** *we spend the money on [Effectiveness] and* ***how*** *we spend it [Efficiency].*"
>
> (Stoltenberg [24], emphasis added)

For this study, ten Member Nations agreed to participate (Canada, Czech Republic, Estonia, France, Germany, Italy, Poland, Slovakia, United Kingdom, and the United States). The participating Nations agreed to identify and evaluate resource management practices that could help NATO members and partners adapt to future defence budget constraints. This study develops a valuable inventory of resource management strategies for NATO members and partners facing financial stress.

Lessons learned from participating Nations are captured in a useful analytical framework offering valuable resource management practices for NATO and its partners. The framework couples realities of the political and economic environment with the theoretical and empirical literature. Additionally, it is designed to organize country contributions of defence management practices into four broad categories that help Member and Partner Nations better shape their responses to future budget constraints, safeguard national security, and support the Alliance. These four categories of practices follow the logic of the production function discussed earlier, and the Planning, Programming, Budgeting and Execution (PPBE) System [14]:

1) Rationalize Capabilities and Programs (Planning);
2) Improve Transparency and Accountability of the Resource Management Process (Programming);
3) Generate Operating Efficiencies (Budgeting and Execution); and
4) Promote Assessment Mechanisms.

It is instructive to observe the distribution of participating Nations' contributions across the four categories of the analytical framework. This reveals how participating Nations responded to recent fiscal constraints and where there may remain valuable opportunities for future contributions and applications. Located on NATO's website and updated in real time, this analytical framework *could* serve as a valuable organizing structure to collect and share future contributions from Alliance members and partners. The framework offers an ongoing opportunity to crowd-source defence resource management practices from Allies and others, to continuously improve the efficiency and effectiveness of the Alliance.

DEFENCE RESOURCE MANAGEMENT STRATEGIES

Defence resource management practices were evaluated using four main criteria:

1) The context in which they were employed (i.e. given the financial constraints, why did the country choose a particular initiative and how was it implemented?);
2) The results of implementing the practice (cost savings, key business changes, reprioritization of capabilities, etc.);
3) The capability impact (ability to provide NATO defence capabilities); and
4) Any lessons learned.

Of the ten participating Nations involved in this study, nine submitted a combined total of 41 defence resource management practices. Once evaluated, practices were assigned to one of the four categories of the analytical framework. This analysis provides a window for NATO and others to understand how participating Member Nations responded to the financial crisis.

The first three categories closely correspond to a production function approach:

1) Planning defence outputs (effectiveness);
2) Programming the best mixes of inputs to produce those outputs (efficiency); and
3) Budgeting to capture the full costs of all inputs, and executing those budgets through careful contracting to obtain the best possible costs, schedules and performance.

It is interesting to note that the first two categories encourage more proactive resource management practices, while the third represents more reactive responses to budget constraints. Most participating Nations contributions fell in the third category. Partitioning Nation contributions through this lens is helpful since it reveals that while most responses were reactive, there exist opportunities for more pro-active efforts to address future budget constraints. Figure PL-3 shows that the third category, "generating operating efficiencies" (Budgeting and Execution), accounted for 59% of all practices submitted, while only 15% were in the first category – better ways to plan defence outputs (Planning), and 18% in the second category – allocating the best mix of inputs to produce those outputs (Programming).

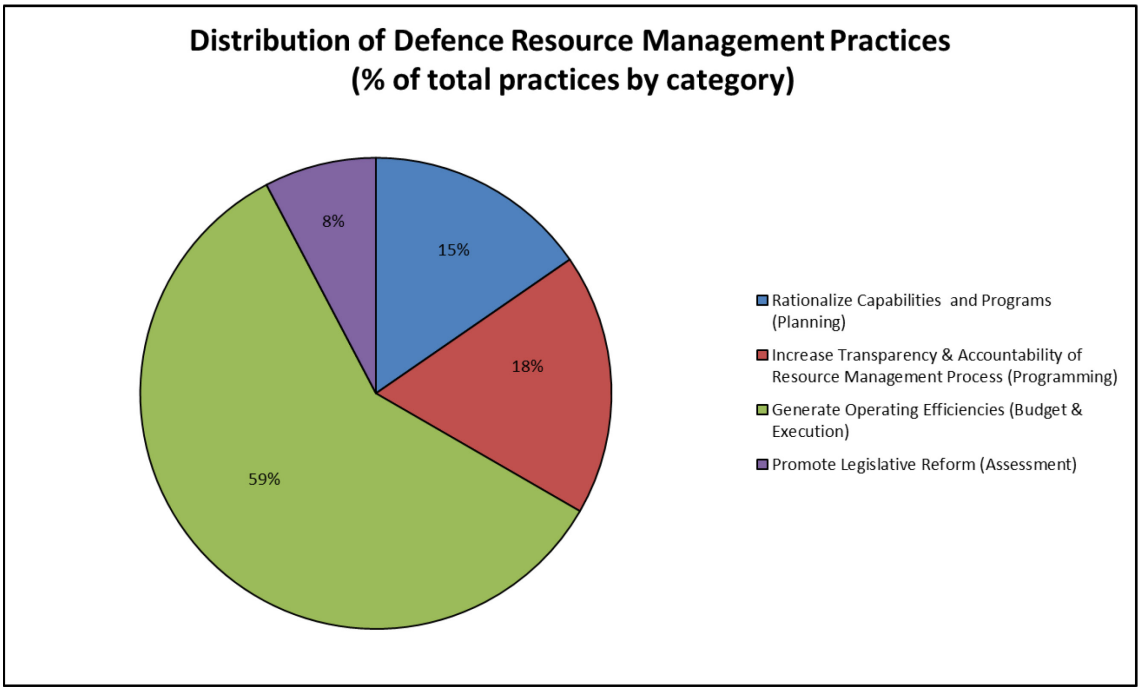


Figure PL-3: Classification of Participating Nations' Defence Resource Management Practices by Category.

Organized by country (see Figure PL-4), Canada and the USA appeared to focus largely on planning and programming (proactive approaches), whereas the Czech Republic, France, Germany, Italy, and Slovakia focused more on generating operating efficiencies through budgeting and execution (reactive approaches). Despite implementing a key resource management practice to generate operating efficiencies, Poland's main strategy in response to budget constraints was introducing new legislative reforms (Assessment Mechanism), which could be considered more proactive. The UK took a balanced approach, divided evenly between proactive and reactive resource management practices (i.e. between improving its strategic planning and generating operating efficiencies). Among participating Nations, there does not appear to be a systematic effort to engage equally in defence resource management strategies across the four categories of planning, programming, budgeting and execution, and assessment. Given this finding, organizing national defence management practices in the four categories reveals some missed opportunities to adopt defence resource management strategies that could improve the efficiency and effectiveness of the Alliance.

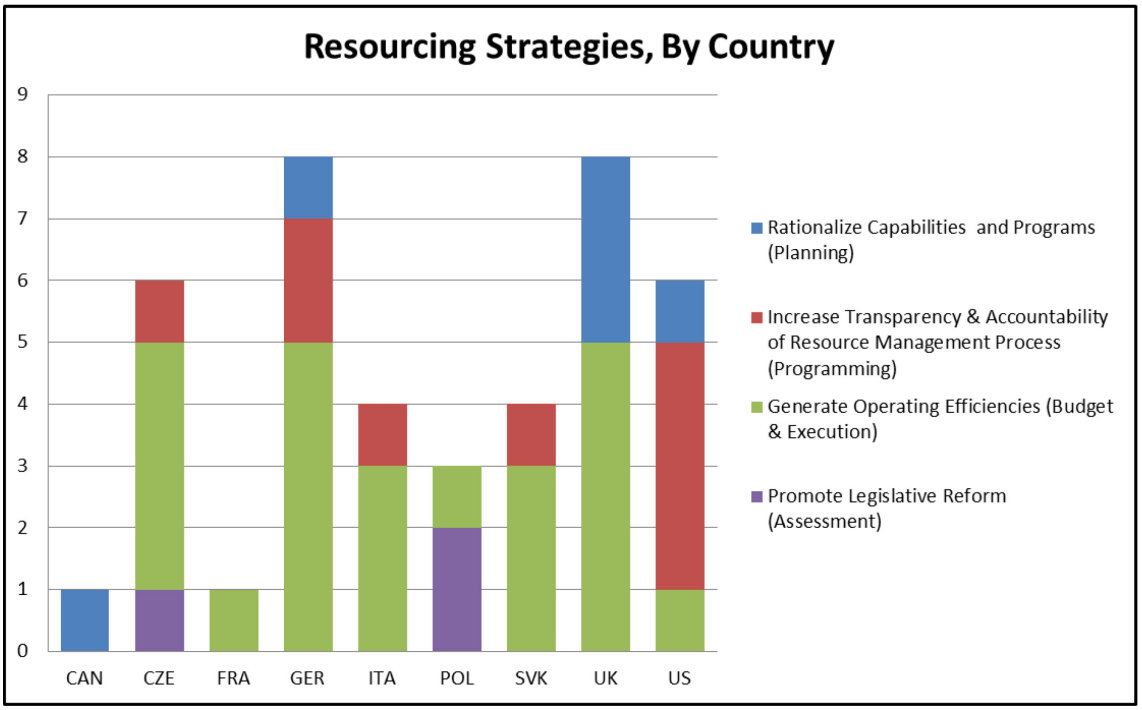


Figure PL-4: Classification of Defence Resource Management Practices by Participating Nation.

FINDINGS

From a macroeconomic perspective, the Great Recession impacted NATO members in similar ways. Among Member Nations that participated in the study, drastic declines in GDP growth at the peak of the financial crisis soon shifted to significant growth, before settling into a period of relatively flat growth. With ten of twenty-eight NATO Member Nations participating (34.5%), this study includes a representative sample of the Alliance. Aggressive economic and monetary policy responses to the financial crisis led many Nations to experience unprecedented levels of deficits and debt. From the start of the recession in 2007 until today, unemployment, tax revenues, and national debt burdens followed similar patterns in terms of volatility across the participating Member Nations. Negative impacts of the financial crisis forced NATO Nations to develop diverse strategies and policies to prevent economic collapse. As NATO Nations cut and reprioritized spending in an effort to stimulate their economies, they adopted a variety of defence management strategies to adapt to the new budgetary realities.

Currently, there is no generally accepted NATO-wide analytical framework to assist Member Nations to identify, organize, and share defence resource management practices. That being said, four general recommendations emerged from participating Nation contributions that offer a common framework to promote more effective and efficient use of defence resources:

1) Rationalize Capabilities and Programs;
2) Improve Transparency and Accountability of the Resource Management Process;
3) Generate Operating Efficiencies; and
4) Promote Assessment Mechanisms (e.g. legislative reform).

These four key components of the analytical framework closely correspond to the logic of the Planning, Programming, Budgeting and Execution, and Assessment system reflected in resource and financial management systems used by many in the Alliance. The goal of this framework is to assist member and Partner Nations better shape their responses to future budget constraints, safeguard national security, and support the Alliance by providing a common foundation to achieve effective and efficient defence resource management.

Chapter 1 – BACKGROUND / PROBLEM STATEMENT

1.1 INTRODUCTION

This study examines the impact and responses of selected Allies to the global financial crisis, and draws valuable lessons for the future of the North Atlantic Treaty Organization (NATO). The Great Recession severely upset the budget plans of all 28 NATO members.[1] The 21 European Union (EU) members of the Alliance saw their spending outstrip tax revenues, such that many struggled to meet EU mandates to keep deficits below 3% of Gross Domestic Product (GDP) and overall debt below 60% of GDP. This compounded the challenges facing all NATO members to spend no less than 2% of GDP on defence and at least 20% of defence on modernization [21].

Future budget constraints present both challenges and opportunities. This study develops a valuable inventory of resource management strategies for NATO members and partners facing financial stress. Lessons learned from participating Nations are captured in a useful analytical framework offering valuable resource management practices for NATO and its partners. The aim is for countries to adopt resource management practices to maintain the future credibility and effectiveness of the Alliance.

Despite recent political promises, serious questions remain about Allied spending on military operations, personnel, infrastructure, and equipment. Constrained defence budgets in most Member Nations may result in smaller force structures, slower rates of modernization, and/or fewer operational commitments. At the same time, an increasingly unstable security environment places greater demands on combined military forces of the Alliance to provide collective defence, crisis management, and cooperative security.

Several factors could influence NATO Alliance members' military spending in the years ahead. These include:

- Emerging threats or perceptions of threats to national interests;
- Domestic public perceptions and political influence on defence spending;
- National economic growth rates;
- Growth in government spending on non-defence programs;
- Deficits, debt, and net interest payments on the debt; and
- Alliance burden sharing agreements.

Countries adopt varied strategies in response to geopolitical and economic dynamics. Some Nations implement across-the-board spending cuts, attempting to retain a full range of capabilities, albeit at reduced levels. Other Nations adopt a portfolio approach that divests certain functions in order to protect core capabilities. Some countries view defence cuts as temporary, while others assume they are enduring. As members of the Alliance are forced to respond to the economic and security environment, and make difficult choices, it is imperative they consider the impact of their decisions on NATO's collective capabilities. Sharing resource management practices among Member Nations can increase the efficiency and effectiveness of the Alliance. It can help mitigate capability gaps, arrest capability declines, offer opportunities to develop new capabilities, and/or enhance the affordability of existing capabilities.

[1] The Great Recession refers to the period between 2008 – 2009 where world markets experienced abnormal levels of decline.

1.2 PURPOSE

The dual goal of this research is:

1) To identify and organize defence resource management strategies implemented by Member Nations to accommodate budget constraints; and
2) To recommend practical resource management strategies that provide the most effective and efficient national and NATO forces possible, given financial realities.

This study explores challenges and opportunities to implement these resource management practices in Member Nations. The aim is to help preserve and enhance NATO's existing capabilities, to provide an analytical framework for the development of future capabilities, and to capture lessons learned.

1.3 PROBLEM STATEMENT

In its current Strategic Concept document, NATO recognizes dramatic changes in the world's economic and security environment, but affirms that its "*essential mission will remain the same: to ensure that the Alliance remains an unparalleled community of freedom, peace, security, and shared values*" [17]. Following the Great Recession, Member Nations curtailed defence spending to the point that vital missions may be at risk. In his 2014 keynote address to the Parliamentary Assembly, NATO Secretary General Jens Stoltenberg warns that over the last five years, "*total NATO defence spending fell by twenty percent [and] some nations are cutting further*" [24].

In contrast to the decline in defence spending by the Alliance, other regions are experiencing increases in defence spending. According to Allied Command Transformation's (ACT) *2013 Strategic Foresight Analysis* [19], since the turn of the century defence expenditures grew in several key, non-Member Nations including China, India, North Korea, and Russia. Their analysis suggests that if this trend continues, it "*may result in a future imbalance in defence capability that could threaten regional stability and the security interests of the Alliance*" [19].

Currently, each Member Nation manages its defence budgets in support of the Alliance independently, without fully leveraging successful resource management practices and lessons learned. In 2014, Secretary General Stoltenberg emphasized that, "*it is not just about how much money we spend on defence. It is also about* ***what we spend that money on and how we spend it***" (Stoltenberg [24], emphasis added). The Secretary General went on to recommend that "*NATO can really add value when it comes to how defence budgets are spent by helping Allies align their priorities, plan together, pool their resources, and get the most for tax-payers' money*" [24]. Pooling and sharing defence resource management practices implemented by Member Nations in response to economic austerity, can offer a valuable guide to help mitigate harmful impacts of budget cuts on the Alliance.

1.4 RESEARCH OBJECTIVES

1) Explore defence budget constraints, responses, and capability impacts.
   a) Describe the nature of defence budget constraints that Member Nations have endured.
   b) Describe how Member Nation's defence ministries responded to defence budget constraints, to include specific strategies and/or methodologies.
   c) Identify potential impacts defence budget constraints may have had on capabilities.

2) Examine the results of participating Nation responses to defence budget constraints.
   a) Identify any resource management strategies or new processes implemented which mitigated budget constraint impacts on participating Member Nations; and/or
   b) Maximized the value of available defence funding (e.g. program budget categories, nature of response, context in which strategy was applied, results obtained, and lessons learned).

3) Identify valuable practices in defence resource management when responding to budget constraints which have broad applicability within the Alliance.
   a) Consider the potential application of successful budget strategies and processes for Member and Partner Nations to enhance national and NATO capabilities.

4) Assess opportunities and challenges in implementing various resource management practices identified in the study to continuously improve NATO's military capabilities.

1.5 SCOPE

Ten Member Nations agreed to participate in this study (Canada, Czech Republic, Estonia, France, Germany, Italy, Poland, Slovakia, United Kingdom, and the United States). The participating Nations agreed to identify and evaluate resource management practices that could help NATO members and partners adapt to future defence budget constraints[2]. Ideally, budget challenges would be directly correlated to capability impacts; however, participating Nations agreed to avoid this level of specificity.

Representatives from the ten Nations first examined their own historical defence budgets, beginning with the end of the Cold War, but with a special focus on more recent history (the post global financial crisis period: 2007 – onward). The scope of the study was designed to scale beyond the ten participating Nations during later phases when the team explores opportunities to apply selected resource management practices across the Alliance. The study includes the input of subject-matter experts from NATO member governments, NATO headquarters staff, Allied Command Transformation (ACT), academia, think tanks and industry groups. The study was conducted between January 2015 and February 2016.[3]

1.6 METHODOLOGY

The methodology for conducting this research consists of an analytical framework outlined in Chapter 3 that organizes selected "exemplar" country contributions, designed to promote more effective and efficient use of defence resources. Although best practice research methods were applied and serve as a foundation of the study, this analytical framework offers an opportunity to continuously collect and highlight valuable and broadly applicable defence resource management practices from across the Alliance.

1.6.1 Best Practice Research

The basis of best practice research is to identify alternative approaches to historical problems, and to recommend those that could provide the most effective solution(s) to similar problems today. This type of research is

[2] While data from Estonia and France was used in the macroeconomic analysis in Chapter 2, exemplars of defence resource management practices were not submitted by either country for use in Chapter 4.

[3] The study explicitly excluded analysis related to NATO's nuclear capabilities.

described as "*a way of action that appears better than any alternative ways of action and, at the same time, attains a defined goal*" [25].

In his article, *Theory and Methodology of Best Practice Research: A Critical Review of the Current State*, Vesley [25] identifies two basic approaches to best practice research. The first method is described as mostly quantitative and requires an exhaustive review of a population of practices using "statistical data analysis," which provides the basis to select best practices [25]. The second method, described as mostly qualitative, focuses on discovering best practices that fit a specific organization, usually through a case study. Unlike the first method, this is not an exhaustive review of an entire population of practices, but a more tailored review of practices within a specified set of criteria.

Early in the project, participating Nations employed more qualitative methods as they researched their respective country's defence budgets and identified promising initiatives via a targeted approach. Later in the project, participating Nations identified practices that were consolidated and captured in an analytical framework by the research team and represented an ordered population of resource management practices. Through internal review and team collaboration, a combination of qualitative and quantitative methods determined the final list of selected exemplar practices.

Vesley [25] outlines a four step process for the discovery and implementation of best practices. These steps are:

1) Analysis/Problem Framing;
2) Examples of Working Practices;
3) Explanation of Applicability; and
4) Extrapolation of Research.

Each of these steps is briefly explained below.

1) **Analysis/Problem Framing** – This step involves analysis of the organization or entity that the research aims to improve through the best practice research. It also aims to establish goals of the organization and why it has been successful or unsuccessful in achieving those goals. This step is reflected in the Prologue and Chapter 2, and the analytical framework developed in Chapter 3 to organize participating Nation contributions.
2) **Examples of Working Practices** – This step attempts to identify practices within other organizations that seem to be the best or most promising in terms of achieving desired goals. The practices identified in this study appear in Chapter 4, organized within the analytical framework.
3) **Explanation of Applicability** – This step further analyzes identified best practices, explaining the context in which the practice was applied and why it was successful. This is discussed in Chapters 4 and 5.
4) **Extrapolation of Research** – This final step attempts to apply the identified practice(s) that achieve the desired goals of an organization or entity (defined in step one). This appears in the concluding chapter.

1.6.2 Phased Approach

The project was organized in four phases scheduled over a one-year time frame. Figure 1-1 describes the timeline for the study. The study phases were established around research objectives and study team meetings conducted over the course of the year.

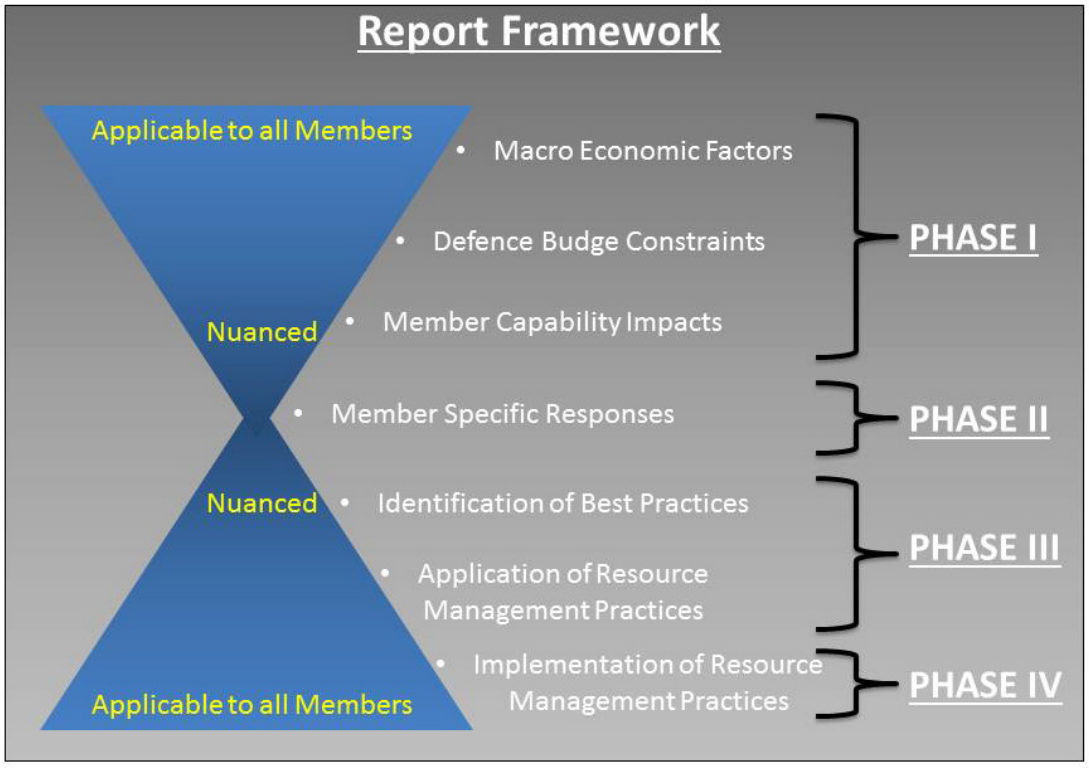


Figure 1-1: SAS-113 Report Phases.

Each of the phases is explained in detail below.

1.6.2.1 Phase I

Phase I immediately followed the January 2015 introductory meeting in Rome, Italy. In this phase, study team members achieved research objective one by exploring their respective Nation's defence budget constraints and implementation strategies. Phase I allowed participating Nations the ability to independently analyze the research problem through the lens of their own country via a comprehensive country-specific literature review. The final deliverable from Phase I consisted of a detailed paper analyzing each participating Nation's output from research objective one. This phase included a country-by-country presentation of research results that allowed collective review and interpretation by the entire team. Phase I concluded with a detailed brief by each participating Nation on their findings during the second team meeting in April 2015 in Washington, DC, USA.

1.6.2.2 Phase II

Phase II immediately followed the April 2015 team meeting. In this phase, participating Nation representatives examined responses in each of their respective countries to tightened budget constraints, satisfying research objective two. Throughout this phase, each Member Nation began to identify those practices which minimized the impact of budget constraints on defence, and/or maximized the value of available defence funding. The final deliverable from Phase II was a detailed paper analyzing each country's output from research objective two. Phase II concluded with detailed briefs by participating Nations on the results of objective two during the third meeting in July 2015 in London, England.

1.6.2.3 Phase III

Following the third team meeting in July 2015, Phase III required the study team to develop a comprehensive list of resource management practices from those presented in Phase II. This phase aimed to achieve research objective three by performing an in-depth analysis of the output from Phases I and II led by the study team, and including participating Nations representatives and prominent subject-matter experts. This phase offered an opportunity for team members to develop an analytical framework to organize participating Nation contributions, and incorporate new ideas and research insights into the study that had not previously been considered. The final deliverable from Phase III is a selection of resource management practices organized in four general categories that follow the spirit of the Planning, Programming, Budgeting and Execution System – a financial and resource management system similar to that used by many NATO members to build and execute defence budgets. Phase III concluded with Member Nations briefing results of objective three during the fourth and final team meeting in October 2015 in Ottawa, ON, Canada.

1.6.2.4 Phase IV

In the final phase, which immediately followed the fourth meeting in October 2015, the study team focused on research objective four; assessing opportunities and challenges to implement valuable resource management practices identified in Phase III. The objective is to continue to collect and share these practices widely across Member and Partner Nations to help mitigate the impact of future financial constraints on NATO military capabilities. The final deliverable from Phase IV is this research report.

1.7 BACKGROUND

The Recession of 2008 – 2009 is viewed by many economists as the greatest challenge to the global economy in more than seventy-five years. In this latest recession the world witnessed a collapse in international trade, a sharp contraction in global output, and a dramatic rise in unemployment. Global supply chains and financial interconnectedness magnified the impact of the fiscal crisis. Nations responded by implementing emergency fiscal and monetary measures to revive their troubled economies. The outcome was disappointing growth rates and unprecedented increases in deficits and debt.

To address growing budget deficits and national debt, the reaction in most NATO Nations was to cut discretionary spending, including defence expenditures. This prompted NATO to launch several resource management initiatives to mitigate the risks national budget constraints presented to its goals of collective defence, crisis response, and cooperative security. These initiatives include “Smart Defence,” the “Connected Forces Initiative” (CFI), and the “Framework Nations Concept” (FNC). At the 2014 Wales Summit, national leaders also unanimously committed to address declining defence budgets. These initiatives along with the Wales Summit Declaration are briefly discussed below.

1.7.1 Smart Defence

The concept of Smart Defence was first introduced in 2011 by former NATO Secretary General, Anders Fogh Rasmussen. The main premise of Smart Defence is to preserve and enhance NATO defence capabilities in the face of economic austerity that negatively impacts Member Nation defence spending. The former Secretary General envisioned that Smart Defence would be accomplished through prioritization, specialization, and cooperation.

- **Prioritization:** Achieved when Nations align their national security/defence priorities with NATO defence priorities and invest in those common capability areas.

- **Specialization:** Achieved when Nations deliberately focus and invest in capability areas where their country exhibits specific strengths (or comparative advantage) while focusing and investing less in capability areas which other Nations can deliver.[4]
- **Cooperation:** Requires Member Nations to coordinate efforts in areas such as research and development or acquisition. The aim is for Member Nations to benefit from sharing expenses they are incapable of shouldering individually, and to realize savings through economies of scale and collective ("monopsony") buying power.

Given the risks perceived by many individual Member Nations in relying on other members for their security, inherent challenges exist to implementing Smart Defence initiatives. Fortunately, NATO has experienced some progress since the concept was formally agreed to in 2012. Examples of successfully completed Smart Defence initiatives include:

- A multi-national logistics partnership for helicopter maintenance in Afghanistan;
- Centers of excellence as hubs for education and training; and
- An initiative for multi-national cooperation on munitions life-cycle management [20].

1.7.2 Connected Forces Initiative

The Connected Forces Initiative (CFI) was showcased in tandem with Smart Defence at the 2012 Chicago Summit. The CFI "*aims to enhance the high level of interconnectedness and interoperability allied forces have achieved in operations and with partners*" [18]. CFI is accomplished via three components that include: "*education and training, increased exercises, and better use of technology*" [1]. The CFI, together with Smart Defence, supports the 'NATO Forces 2020' concept; "*... designed to be a coherent set of deployable, interoperable, and sustainable forces equipped, trained, exercised, and commanded to meet NATO's level of ambition and able to operate together and with partners in any environment*" [18]. Follow-on measures as part of the CFI were agreed to during the Wales Summit in 2014. These included Alliance commitments to future military exercises and the development of joint policy in areas of training, education, and exercises.

1.7.3 Framework Nations Concept

Another promising initiative included in the Wales Summit Declaration is the Framework Nations Concept (FNC). The premise behind FNC is for smaller "*groups of Allies to come together to work multi-nationally for the joint development of forces and capabilities required by the Alliance, facilitated by a framework nation*" [21]. The Wales Summit Declaration identifies the first implementation of this concept, where ten Allies pledged to work together on multi-national projects with Germany acting as the lead Framework Nation. Initially, the focus is to "*concentrate on creating coherent sets of capabilities in the areas of logistics support; chemical, biological, radiological and nuclear protection; delivering fire-power from land, air, and sea; and deployable headquarters*" [21]. Defence planners at ACT suggest that further opportunities may exist to address current capability shortfalls through the FNC, and that ACT could facilitate other countries becoming Framework Nations.

[4] Note that this requires considerable coordination and trust among Member Nations to ensure specialized capabilities will be available to individual nations and the Alliance when needed.

1.7.4 Wales Summit 2014

In early September 2014, NATO member Heads of State and Governments attended the Wales Summit. During this meeting, Alliance leaders reaffirmed their "commitment to fulfill all three core tasks set out in (the 2010) Strategic Concept: collective defence, crisis management, and cooperative security". Furthermore, NATO leaders reached agreement on important initiatives, such as approval of the new NATO Readiness Action Plan, the Declaration on Afghanistan, and the Armed Forces Declaration. At the conclusion of the summit, Alliance leaders signed the Wales Summit Declaration that included specific guidance with regards to future defence spending. The details of the declaration are outlined below in Figure 1-2.

2014 Wales Summit Declaration Recommitment

1) Reverse the trend of declining defence budgets, to make the most effective use of …funds.
2) Allies currently meeting the NATO guideline to spend a minimum of 2% of their Gross Domestic Product (GDP) on defence will aim to continue to do so. Likewise, Allies spending more than 20% of their defence budgets on major equipment, including related Research and Development, will continue to do so.
3) Allies whose current proportion of GDP spent on defence is below this level will:
    a) Halt any decline in defence expenditure;
    b) Aim to increase defence expenditure in real terms as GDP grows;
    c) Aim to move towards the 2% guideline within a decade with a view to meeting their NATO Capability Targets and filling NATO's capability shortfalls.
4) Allies who currently spend less than 20% of their annual defence spending on major new equipment, including related Research and Development, will aim, within a decade, to increase their annual investments to 20% or more of total defence expenditures.
5) All Allies will:
    a) Ensure that their land, air and maritime forces meet NATO agreed guidelines for deployability and sustainability and other agreed output metrics;
    b) Ensure that their armed forces can operate together effectively, including through the implementation of agreed NATO standards and doctrines.
6) Annual progress review.

Figure 1-2: 2014 Wales Summit Declaration Recommitment.

Chapter 2 – ECONOMIC ENVIRONMENT OF DEFENCE MANAGEMENT

This chapter analyzes various macroeconomic factors contributing to defence budget constraints in Member Nations, country strategies in response to these factors, and subsequent impacts on defence capabilities. While many macroeconomic factors influence government spending, Hartley and Solomon [9] suggest that a decline in GDP growth and increased unemployment most directly affect spending, and in particular, defence spending. While the low point of the financial crisis occurred between late 2009 and early 2010, the recovery has been unstable and protracted [9]. An analysis of the macroeconomic impact of the financial crisis, and strategies adopted by Member Nations to mitigate those impacts, reveals valuable lessons for the management of defence resources.

2.1 NATIONAL MACROECONOMIC FACTORS

2.1.1 Overview

A review of national-level macroeconomic and defence data highlights factors which likely caused discretionary spending to decrease prior to and following the Great Recession. The study team analysis in Phase I identified five common economic factors that directly affected defence spending in the ten participating Member Nations:

1) Stagnant GDP growth;
2) High unemployment;
3) Decreased tax revenue;
4) Increased government spending; and
5) Increased government debt burden.

These are discussed in detail below.

When analyzed holistically, these five factors present a sequential constraint model, driven by the Great Recession, where each factor can be viewed as a consequence of its precursor (see Figure 2-1). Using this constraint model, strategic defence planners could characterize the chain of events that lead to decreased defence spending, and identify cost-effective intervention strategies to mitigate risks to national and collective defence capabilities.

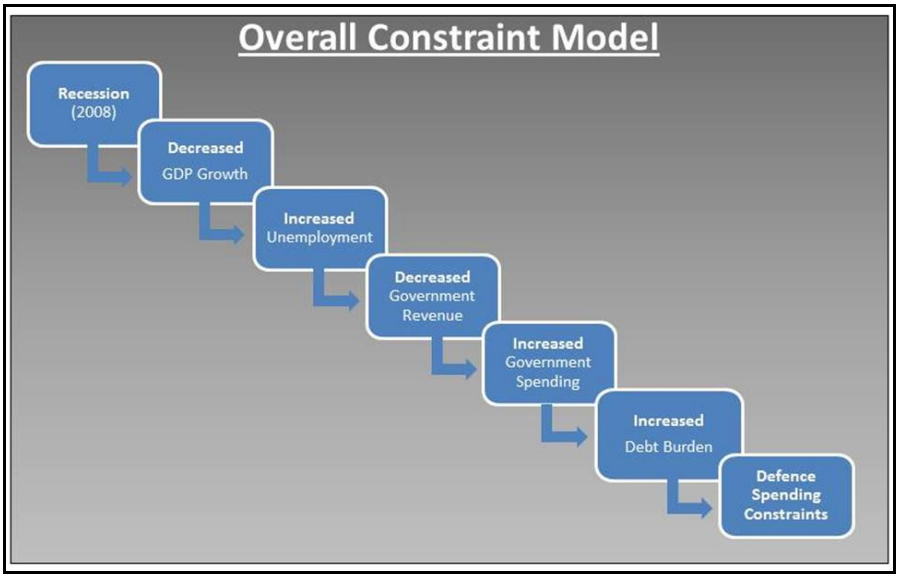


Figure 2-1: Macroeconomic Constraint Model.

2.1.2 Stagnant GDP Growth

In 2009, twenty-four NATO Member Nations registered negative GDP growth rates, a period that marked the worst recession since World War II (Figure 2-2) [13]. Between 2007 and 2009, the Nations included in this study suffered significant declines in GDP, ranging from 4.5% in the United States, to 23% in Estonia. The average cumulative decline in GDP among the ten participating Member Nations was 9.1% from the onset of the Great Recession in 2007 through mid-2009. Conversely, in 2009 and 2010, Nations participating in this study experienced substantial cumulative change in GDP growth rates, averaging 7.5%.

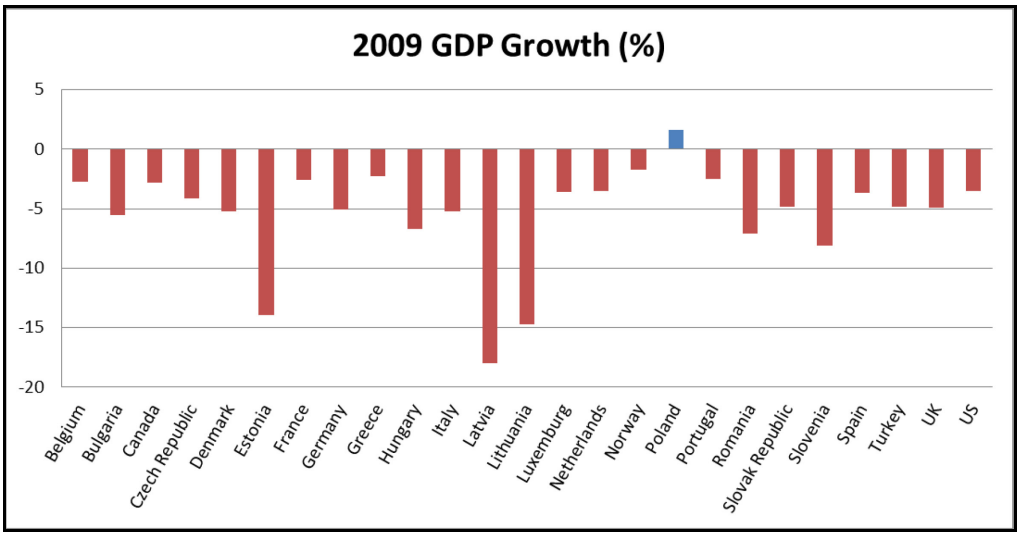
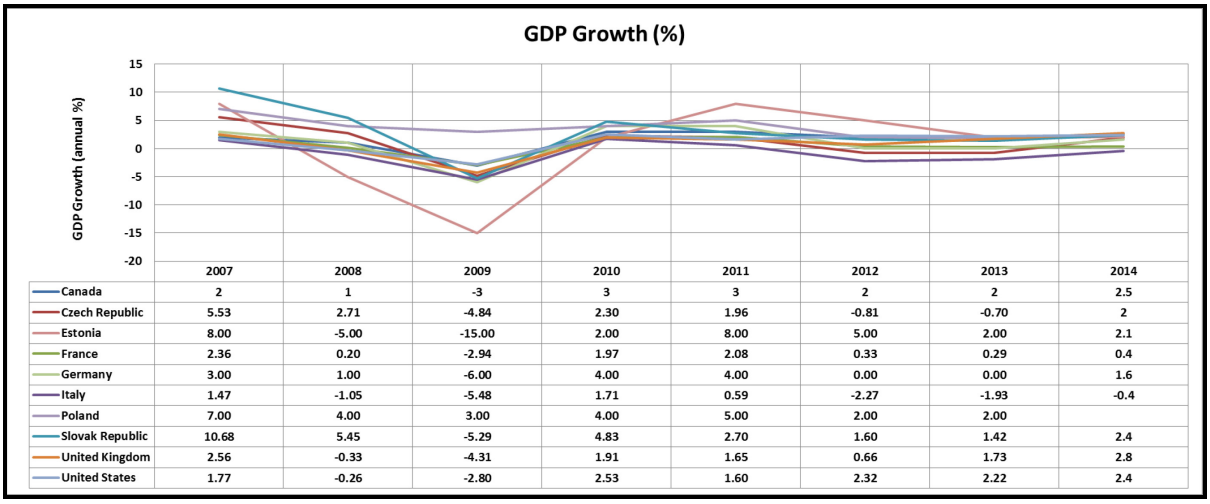


Figure 2-2: 2009 NATO Member Nation % GDP Growth.
(Source: IMF World Outlook, 2014 [13])

For purposes of comparison, the collection of all NATO Member Nations averaged a cumulative drop of 10.1% GDP from 2007 – 2009, followed by a cumulative change in GDP growth of 7.5% between 2009 and 2010. The similarities between the ten participating Member Nations and the population of NATO Nations, suggests the sub-set of Nations included in this study are a fairly representative sample.

While 2007 – 2010 was a period of turbulence, due largely to aggressive monetary and fiscal stimulus among Nations participating in the study, their GDP growth from 2011 – 2014 remained relatively flat. Average GDP growth during this latter period remained low or even negative in a few countries. Figure 2-3 reports GDP growth rates in the sample of participating countries between 2007 and 2014.



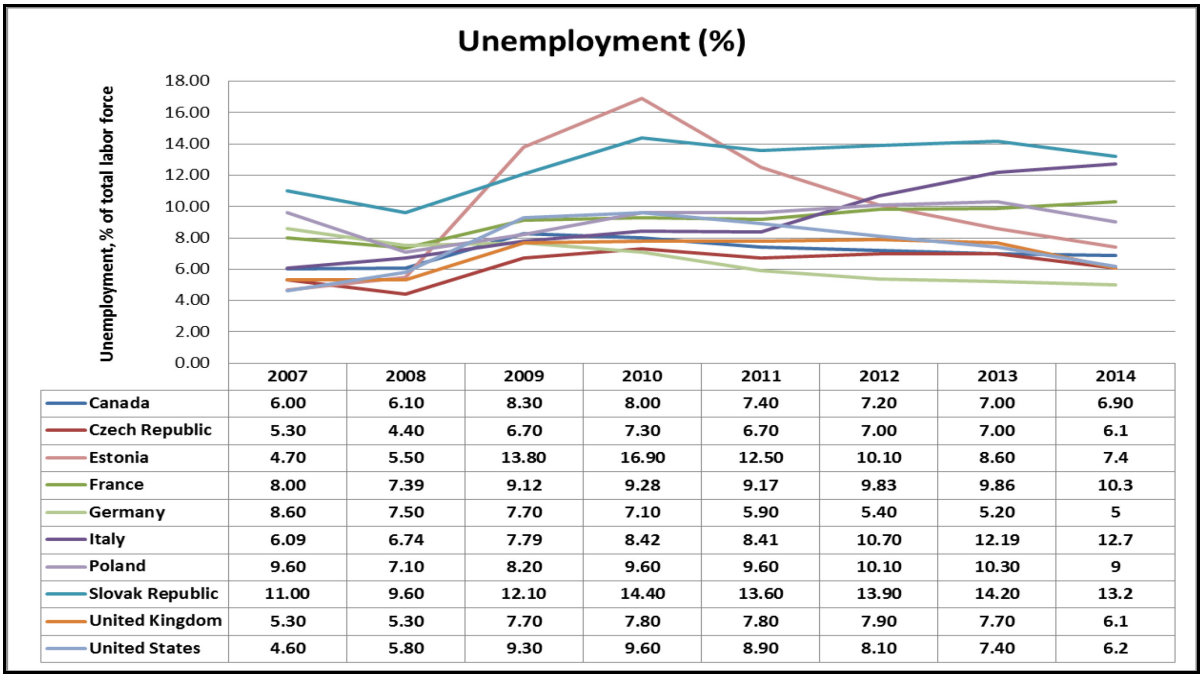
	2007	2008	2009	2010	2011	2012	2013	2014
Canada	2	1	-3	3	3	2	2	2.5
Czech Republic	5.53	2.71	-4.84	2.30	1.96	-0.81	-0.70	2
Estonia	8.00	-5.00	-15.00	2.00	8.00	5.00	2.00	2.1
France	2.36	0.20	-2.94	1.97	2.08	0.33	0.29	0.4
Germany	3.00	1.00	-6.00	4.00	4.00	0.00	0.00	1.6
Italy	1.47	-1.05	-5.48	1.71	0.59	-2.27	-1.93	-0.4
Poland	7.00	4.00	3.00	4.00	5.00	2.00	2.00	
Slovak Republic	10.68	5.45	-5.29	4.83	2.70	1.60	1.42	2.4
United Kingdom	2.56	-0.33	-4.31	1.91	1.65	0.66	1.73	2.8
United States	1.77	-0.26	-2.80	2.53	1.60	2.32	2.22	2.4

Figure 2-3: % GDP Growth 2007 – 2014.
(Source: World Bank, 2014 [27])

Based on the International Monetary Fund's (IMF) January 2015 projections, GDP growth is expected to remain relatively flat through 2016. Advanced economies are expected to grow at an average rate of 2.4% annually. Specific growth rates for the USA, European area (excluding UK), Canada, and the UK are forecasted to be 3.1%, 1.5%, 2.5%, and 2.1%, respectively. Based on these forecasts, uneven GDP growth is expected to dominate the global outlook. These findings suggest that GDP growth is likely to continue at a slow pace in NATO Member Nations, such that governments will continue to face challenges in adequately funding defence.

2.1.3 Increased Unemployment

The global financial crisis, compounded by persistent stagnation in national GDP growth, forced financial institutions to decrease their liabilities by tightening lending standards and reducing loans to companies and consumers. As a result of higher borrowing costs, many businesses reduced the size of their workforces. From 2008 to 2009, twenty-five NATO Member Nations experienced increased unemployment rates with an average rate of 8.6% across all NATO Member Nations [12]. Over the period 2007 – 2014, while some Nations participating in the study stabilized and ultimately reduced their 2010 peak unemployment levels (Canada, Czech Republic, Germany, Poland, UK, and the USA), others (France, Italy, and Slovakia) continued to experience unemployment rates exceeding 10% through 2014. Figure 2-4 shows unemployment rates for participating Nations from 2007 – 2014.



	2007	2008	2009	2010	2011	2012	2013	2014
Canada	6.00	6.10	8.30	8.00	7.40	7.20	7.00	6.90
Czech Republic	5.30	4.40	6.70	7.30	6.70	7.00	7.00	6.1
Estonia	4.70	5.50	13.80	16.90	12.50	10.10	8.60	7.4
France	8.00	7.39	9.12	9.28	9.17	9.83	9.86	10.3
Germany	8.60	7.50	7.70	7.10	5.90	5.40	5.20	5
Italy	6.09	6.74	7.79	8.42	8.41	10.70	12.19	12.7
Poland	9.60	7.10	8.20	9.60	9.60	10.10	10.30	9
Slovak Republic	11.00	9.60	12.10	14.40	13.60	13.90	14.20	13.2
United Kingdom	5.30	5.30	7.70	7.80	7.80	7.90	7.70	6.1
United States	4.60	5.80	9.30	9.60	8.90	8.10	7.40	6.2

Figure 2-4: Unemployment Rates 2007 – 2014.
(Source: World Bank, 2014 [26])

IMF forecasts suggest that while a decline in unemployment rates is expected from 2015 – 2019 (Figure 2-5), the overall decreases will be marginal, averaging less than 1 percentage point from 2014 levels across study team members [13]. By 2019, the average unemployment rate among participating Nations is expected to be 7.2%; down from the 2014 average of 7.4%. Average unemployment among all NATO Member Nations by 2019 is expected to be 8.3%, with a similar marginal overall average decrease of less than 1 percentage point from 2014 unemployment levels.[1] Extended periods of sustained high unemployment reduce income tax revenues. Based on this data, NATO Member Nations are likely to continue to experience lower tax revenues compared to pre-recession periods, creating continued pressure on public budgets, and constraints on defence spending.

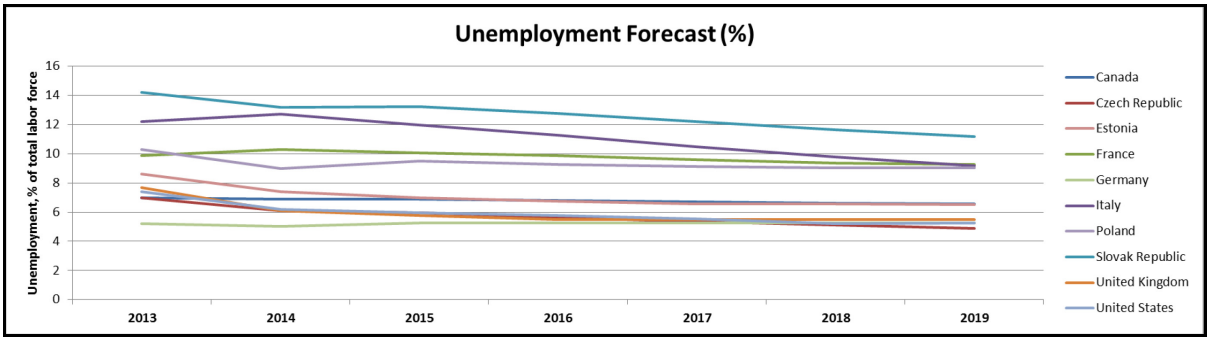


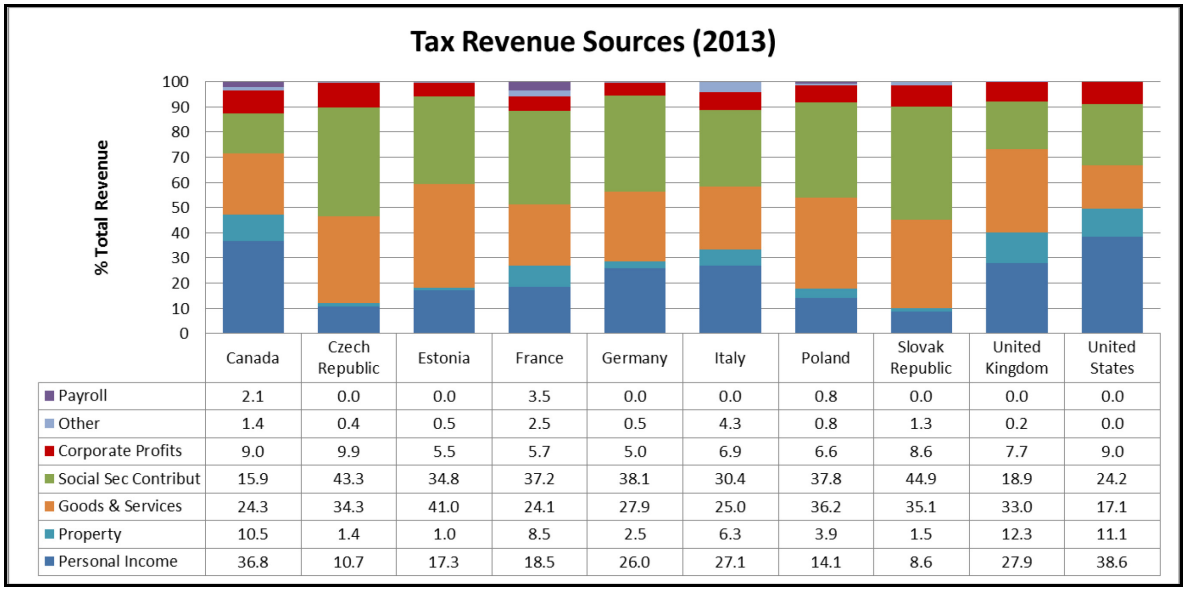
Figure 2-5: Unemployment Forecast 2015 – 2019.
(Source: IMF World Economic Outlook, 2014 [13])

[1] This excludes Croatia, Greece, and Spain's expected overall decrease of approximately 4.5, 11, and 5 percentage points respectively; all statistical outliers over this period.

2.1.4 Decreased Government Tax Revenue

The ability of a nation to adequately spend on defence is directly linked to its capacity to raise revenue, which in turn is directly tied to GDP growth and employment. On the corporate front, decreased demand and higher borrowing costs cut into profits. This is reflected in job cuts and unemployment reflected in lower corporate and income tax revenues[2], and which triggers automatic government (stabilizer) spending increases (transfer payments such as unemployment insurance, welfare payments, etc.).

The four largest government revenue sources among participating Nations are personal income taxes, personal property taxes, taxes on goods and services (VAT), and social security contributions. Note that these four consumer-dependent sources account for more than 87% of total government revenue (Figure 2-6).



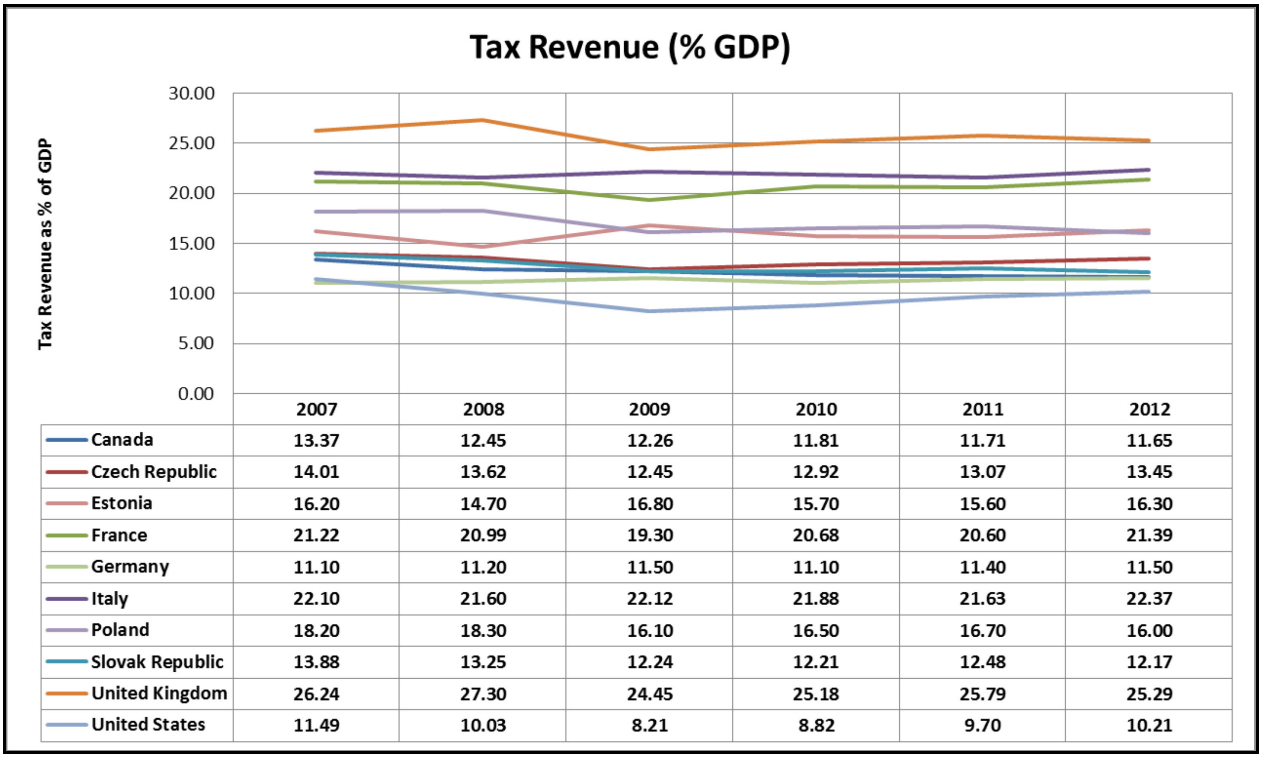
	Canada	Czech Republic	Estonia	France	Germany	Italy	Poland	Slovak Republic	United Kingdom	United States
Payroll	2.1	0.0	0.0	3.5	0.0	0.0	0.8	0.0	0.0	0.0
Other	1.4	0.4	0.5	2.5	0.5	4.3	0.8	1.3	0.2	0.0
Corporate Profits	9.0	9.9	5.5	5.7	5.0	6.9	6.6	8.6	7.7	9.0
Social Sec Contribut	15.9	43.3	34.8	37.2	38.1	30.4	37.8	44.9	18.9	24.2
Goods & Services	24.3	34.3	41.0	24.1	27.9	25.0	36.2	35.1	33.0	17.1
Property	10.5	1.4	1.0	8.5	2.5	6.3	3.9	1.5	12.3	11.1
Personal Income	36.8	10.7	17.3	18.5	26.0	27.1	14.1	8.6	27.9	38.6

Figure 2-6: Tax Revenue Sources 2013.
(Source: OECD Data, 2015)

Over the period 2007 – 2013, average government revenue fell by nearly 1 percentage point among participating Nations. As a point of reference, an approximate 1 percentage point decline in U.S. government revenue between 2007 and 2013 equates to a $99B (CY14US – Constant Year Fiscal Year 14 U.S. Dollars) cut, which is comparable to the combined 2013 defence spending of the United Kingdom and Germany.

From the onset of the Great Recession through 2009, seven of the ten participating Nations experienced revenue declines of at least 1.1 percentage points, and revenue shares of GDP remained at that level, or only slightly higher than pre-recession levels, through 2013. Figure 2-7 depicts tax revenues of the participating countries as a percent of GDP.

[2] Tax revenue refers to compulsory transfers to the central government for public purposes.



	2007	2008	2009	2010	2011	2012
Canada	13.37	12.45	12.26	11.81	11.71	11.65
Czech Republic	14.01	13.62	12.45	12.92	13.07	13.45
Estonia	16.20	14.70	16.80	15.70	15.60	16.30
France	21.22	20.99	19.30	20.68	20.60	21.39
Germany	11.10	11.20	11.50	11.10	11.40	11.50
Italy	22.10	21.60	22.12	21.88	21.63	22.37
Poland	18.20	18.30	16.10	16.50	16.70	16.00
Slovak Republic	13.88	13.25	12.24	12.21	12.48	12.17
United Kingdom	26.24	27.30	24.45	25.18	25.79	25.29
United States	11.49	10.03	8.21	8.82	9.70	10.21

Figure 2-7: Tax Revenue 2007 – 2013.
(Source: World Bank, 2014 [27])

Based on predicted continued GDP stagnation, tighter lending standards, and minimal reductions in unemployment rates, NATO Nations cannot expect substantial growth in tax revenues anytime soon. With substantial debts and flat revenues, NATO members' borrowing to fund public programs, notably defence, is likely to face increasing challenges. Forecasting future periods of constrained resources, NATO Member Nations need to develop innovative defence resource management strategies to preserve the effectiveness of the Alliance.

2.1.5 Increased Government Spending

Among the participating Nations, as tax revenues declined from the Great Recession, governments increased their spending on transfer payments and stimulus plans. For example, Canada implemented comprehensive fiscal packages to stimulate their economy, while the USA and UK chose to bail out several large corporations and financial institutions. Most study team Nations increased spending through fiscal policies to expand and extend funding for social welfare programs, such as unemployment and healthcare. The USA also adopted new monetary policy tools to stimulate the economy, including so-called "quantitative easing".

Beginning in 2009, Slovakia increased its state budgets for Ministries of Social Programs, Finance, Environment, Transportation, and Interior by an impressive 14%, 25%, 29%, 32%, and 98%, respectively. These spending increases were initially meant to act as short-term fiscal stimulus policies; however, the slow and painful economic recovery caused these policies to be extended. Continued stagnating GDP growth and stubbornly high unemployment rates, coupled with aging populations will place continued upward pressure on spending, and squeeze government revenues. This will challenge Member Nations to prioritize and develop new resource

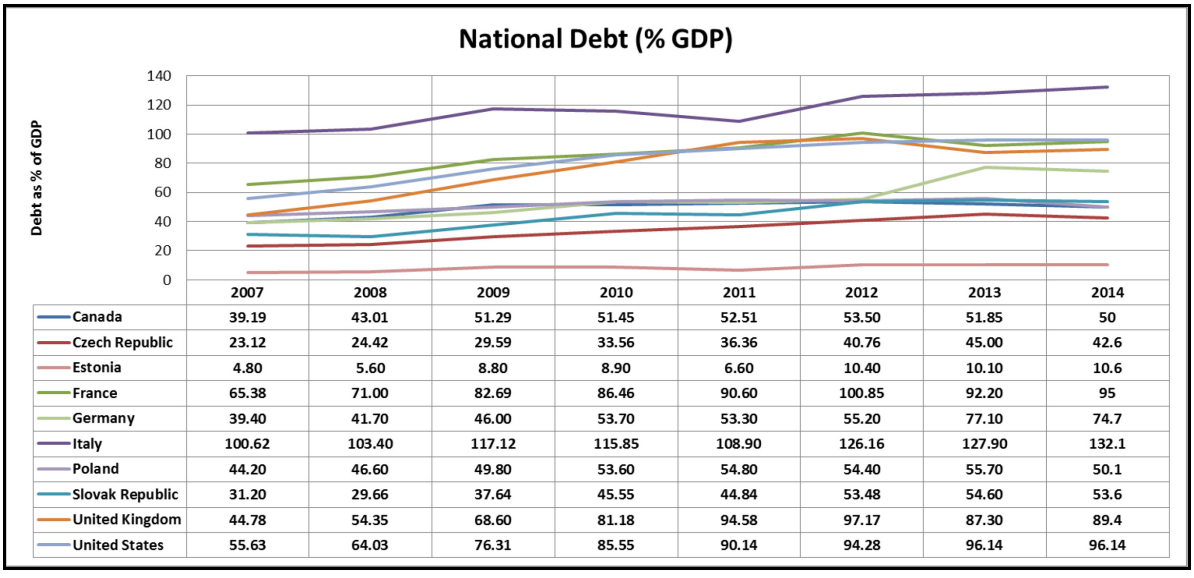
management strategies to maintain the delicate balance between mandatory and discretionary funding in order to preserve national and collective defence capabilities.

2.1.6 Increased National Debt

Increases in government spending coupled with reduced tax revenues result in deficits and debt. From 2007 – 2014, national debt among participating Member Nations increased by 24.5%, on average, with percentage increases as high as 44.6% in the UK, and 40.5% in the USA. Estonia and Poland account for the lowest growth in national debt at 5.8% and 5.9% respectively.

Despite a national debt of nearly 50% of its GDP, Canada's debt ratio actually ranks lowest among the seven largest developed economies [27]. As of 2014, the national debts held by France, Italy, the USA, and the UK approached or exceed 100% of GDP. In a warning to others, interest payments on France's national debt now makes up their second largest government expenditure.

Figure 2-8 records the growing national debt burdens of participating Nations over the period 2007 – 2014 (note that corresponding U.S. data was not available for 2014)[3]. The growth in national debt forced many Nations to consider spending cuts in discretionary programs, particularly in national defence. These measures contributed to decreased overall NATO defence spending, and are a direct result of the cascading effects of the Great Recession captured in Figure 2-1 above.



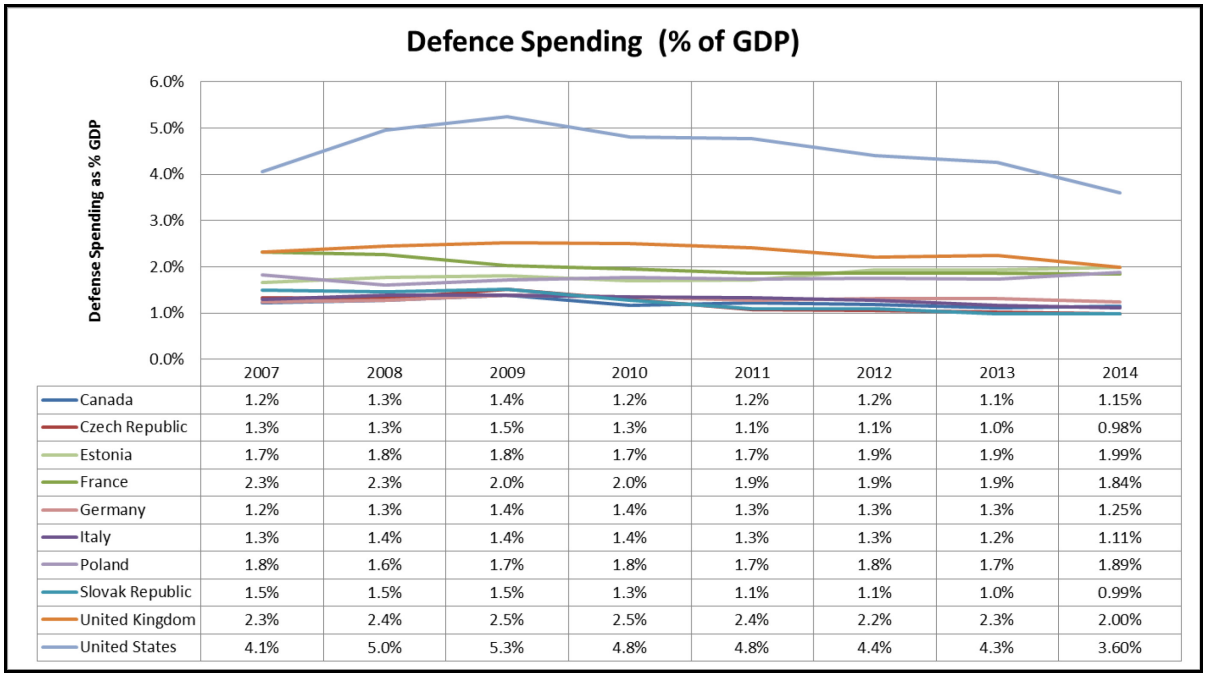
	2007	2008	2009	2010	2011	2012	2013	2014
Canada	39.19	43.01	51.29	51.45	52.51	53.50	51.85	50
Czech Republic	23.12	24.42	29.59	33.56	36.36	40.76	45.00	42.6
Estonia	4.80	5.60	8.80	8.90	6.60	10.40	10.10	10.6
France	65.38	71.00	82.69	86.46	90.60	100.85	92.20	95
Germany	39.40	41.70	46.00	53.70	53.30	55.20	77.10	74.7
Italy	100.62	103.40	117.12	115.85	108.90	126.16	127.90	132.1
Poland	44.20	46.60	49.80	53.60	54.80	54.40	55.70	50.1
Slovak Republic	31.20	29.66	37.64	45.55	44.84	53.48	54.60	53.6
United Kingdom	44.78	54.35	68.60	81.18	94.58	97.17	87.30	89.4
United States	55.63	64.03	76.31	85.55	90.14	94.28	96.14	96.14

Figure 2-8: National Debt 2007 – 2014.
(Source: World Bank, 2014 [27])

[3] National Debt is the entire stock of direct government fixed-term contractual obligations to others outstanding on a particular date. It includes domestic and foreign liabilities such as currency and money deposits, securities other than shares, and loans. It is the gross amount of government liabilities reduced by the amount of equity and financial derivatives held by the government [27].

2.1.7 Decreased Defence Spending

Only three of the ten study team Member Nations met NATO's 2% goal for defence expenditure as a share of GDP in 2014. Since the great recession, defence spending among participating Member Nations declined an average of 0.2 percentage points from pre-recession levels (Figure 2-9). Similarly, most participating countries struggled to meet the Alliance's goal to spend 20% of defence budgets on modernization (procurement of new equipment, etc.).



	2007	2008	2009	2010	2011	2012	2013	2014
Canada	1.2%	1.3%	1.4%	1.2%	1.2%	1.2%	1.1%	1.15%
Czech Republic	1.3%	1.3%	1.5%	1.3%	1.1%	1.1%	1.0%	0.98%
Estonia	1.7%	1.8%	1.8%	1.7%	1.7%	1.9%	1.9%	1.99%
France	2.3%	2.3%	2.0%	2.0%	1.9%	1.9%	1.9%	1.84%
Germany	1.2%	1.3%	1.4%	1.4%	1.3%	1.3%	1.3%	1.25%
Italy	1.3%	1.4%	1.4%	1.4%	1.3%	1.3%	1.2%	1.11%
Poland	1.8%	1.6%	1.7%	1.8%	1.7%	1.8%	1.7%	1.89%
Slovak Republic	1.5%	1.5%	1.5%	1.3%	1.1%	1.1%	1.0%	0.99%
United Kingdom	2.3%	2.4%	2.5%	2.5%	2.4%	2.2%	2.3%	2.00%
United States	4.1%	5.0%	5.3%	4.8%	4.8%	4.4%	4.3%	3.60%

Figure 2-9: Defence Spending 2007 – 2014.
(Source: NATO Semestrial Statistical Memo, 2015 [22])

From 2010 to 2012, Henius and McDonald [10] point out that "*defence spending by NATO member nations decreased by some $45 billion dollars – the equivalent of Germany's entire annual defence budget.*" Figure 2-10 illustrates average defence spending as shares of GDP by all NATO Member Nations, and the wide range of that spending from 2009 to 2013. The figure also points out that in the five years after the Great Recession, average defence spending as a share of GDP by all NATO Member Nations declined from 1.72% in 2009 to 1.46% in 2013[4]. According to Henius and McDonald [28], this decline and the likelihood of continued resource management austerity could last for the next two decades. ACT's Futures Division shares this belief as their 2013 Strategic Foresight Analysis identified decreasing defence expenditures as one of the top fifteen economics trends to continue to 2030 and beyond [19].

[4] During the same period, participating Nations experienced similar combined average decline in defence expenditures – 1.70% in 2009 to 1.49% in 2013 (this excludes the United States; a statistical outlier).

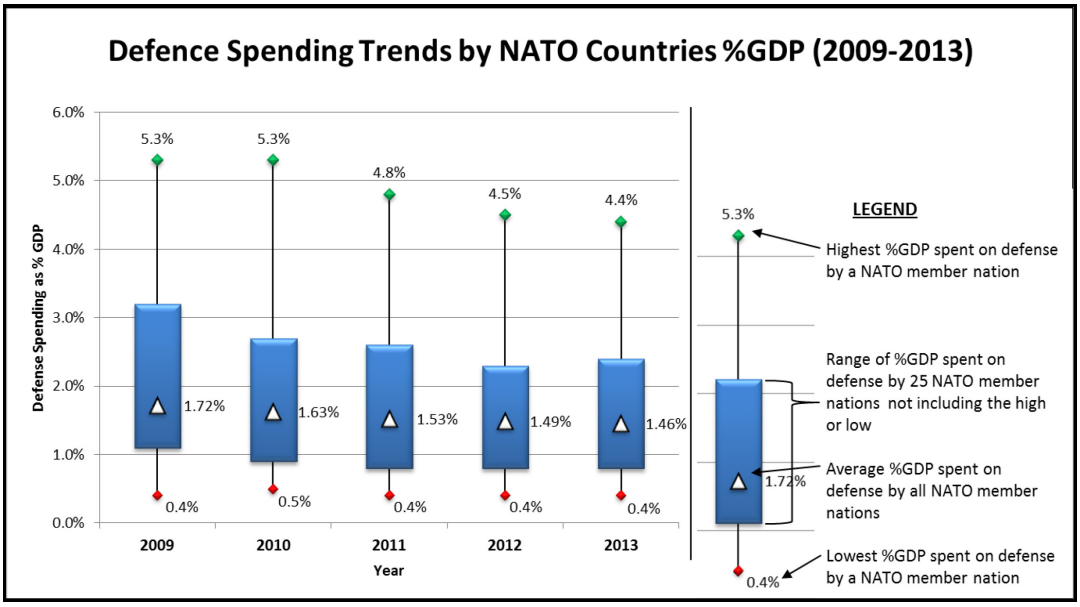


Figure 2-10: 2009 – 2013 Defence Spending by NATO Nations (% GDP).
(Source: NATO Financial and Economic Data, 2014)

2.2 NATIONAL RESPONSE

While many of the macroeconomic factors experienced as a result of the financial crisis are common among NATO Member Nations, the responses of participating Nations present varying reactions to the crisis. The diversity of these strategies can be attributed to a wide range of influences, such as national priorities, security strategies, fiscal policies, and politics. While some Nations coupled discretionary spending cuts with increased stimulus spending, others cut individual discretionary spending categories to fund other higher priority programs. Universal strategies adopted by participating Nations included heavy government involvement in attempts to counter the effects of the Great Recession and avoid economic collapse. The following sections discuss the three main national responses to the financial crisis.

2.2.1 Types of Responses

2.2.1.1 Economic Stimulus

This action refers to efforts by a government or its agencies to encourage economic growth by using monetary and fiscal policy to "jumpstart" the economy. These efforts include, but are not limited to, interest rate policies, including quantitative easing, and increased government spending. By the peak of the recession in 2009, Canada lost roughly 5% of its nearly $1.6 Trillion pre-recession GDP (CY14US$) [27]. Largely triggered by its comprehensive economic stimulus package, the economy quickly recovered, with 6% GDP growth in 2010, and averaged 2.3% growth through 2014. A partial aim of this stimulus package by the Canadian Department of Finance (DoF) was to keep inflation low, stable, and predictable. Forecasts indicate that inflation rates will remain stable and within targets of between 1 – 3% through 2019.

In the UK, stimulus strategies to mitigate the effects of the financial crisis focused on protecting large financial institutions and carrying out fiscal consolidation. For example, the UK government purchased Northern Rock

(a UK building society) to prevent the loss of depositors' savings; reducing the immediate impact of the crisis on consumers, albeit at the expense of a jump in deficit spending.

Meanwhile, the Bank of England reduced interest rates to record lows to stimulate economic growth and, in the absence of further monetary policy options, pursued a policy of quantitative easing to improve liquidity.

As the USA saw its GDP fall nearly 5% from pre-recession levels during 2009, the government determined that immediate intervention was necessary to prevent the economy from falling further. Aggressive fiscal stimulus measures were put in place to revitalize the economy. The most notable was the American Recovery and Reinvestment Act (ARRA) of 2009, which applied a combination of three strategies to stimulate the economy:

a) Reduce taxes for both families and businesses;

b) Increase spending on public benefit programs (e.g. unemployment benefits and healthcare programs); and

c) Increase discretionary spending in areas of individual subsidies, infrastructure, energy, and education investments [8].

Through 2014, the ARRA cost the USA approximately $1,686 Billion (CY14$US), or nearly 10 percent of 2014 GDP, with stimulus-related expenses expected to continue into at least 2019 [8]. Current estimates by the USA's Congressional Budget Office predict increases in the federal debt due to ARRA measures will total $890 Billion (CY14$US) through 2019 [3].

2.2.1.2 Budget Control Legislation

As a result of aggressive stimulus packages, many countries suffered unsustainable national debt burdens. This required countries to develop strict budgetary policy guidelines to control spending and avoid continued economic instability. Following the 2010 General Election, the UK developed its budget deficit reduction package, which was driven by spending cuts and increases in the collection of tax revenues.

In the USA, concerns of rising federal debt and long-term economic instability forced the government to develop legislation to restrain spending and avoid future financial crises, such as those experienced by Argentina, Ireland, and Greece between 2000 and 2010 [2]. The most notable legislation was the 2011 Budget Control Act (BCA). Designed to save an estimated $2.1 Trillion from 2012 – 2021[5], and to lower future federal deficits, the BCA imposed limits, or "caps", on discretionary spending, most notably on defence spending [2].

2.2.1.3 Targeted Defence Spending Reductions

From a discretionary spending perspective, the most common national response to the economic crisis among participating Nations was to reduce defence spending. Slovakia experienced the highest pre-recession GDP growth of any study team Nation at 10.7% in 2007; however, it also experienced the largest decline (nearly 16%) at the peak of the financial crisis in 2009. While current GDP growth rates have not recovered to pre-recession levels, Slovakia's economic growth remains strong, with a cumulative change in GDP of 7.7% during the period 2009 – 2014. Despite its growth since the financial crisis, Slovakia's strategy included cutting its Defence budget as a share of GDP by a total of 0.5 percentage points during the period from 2009 to 2014, while increasing the annual budgets of the Ministries of Social Affairs, Finance, Environment, Transportation, and Interior [16]. The result was to reduce defence spending to 1% of GDP, which also included the postponement of investment and acquisition projects, as well as the deferral of several modernization and sustainment programs.

[5] $2.1 T represents $0.9 B in spending caps and $1.2 in directed spending cuts by the Congressional Joint Select Committee.

The Canadian Department of Finance (DoF) targeted its decreases in defence spending through two initial programs. First, the Deficit Reduction Plan removed $2B in baseline (recurring) funding from the Department of National Defence's budget [7], [5]. Second, a major "capital re-profiling" deferred several key capital projects by five to seven years [4], [5], [6]. The result of these actions by the MoF reduced the defence budget by an average of 4% per year and an aggregate 20% during the period 2009 – 2014.

In the UK, public spending on programs such as education and the National Health Service traditionally hold higher political priority over defence, and therefore the MoD faced higher spending reductions than other programs. The 2010 Spending Review resulted in the MoD losing the fourth greatest share of total departmental expenditures during the period 2009 – 2014[6].

As a result of the conflict in Afghanistan, U.S. defence spending increased during the financial crisis (peaking at 4.7% of GDP in 2010), but under BCA the Department of Defense experienced a 1.2 percentage point decrease (defence as a % GDP) over the period 2010 – 2014, with the possibility of further cuts to come.

[6] While the 2010 SDSR cut defence spending, the 2015 SDSR protected the defence budget. While this paper only covers through 2014, it is important to point out that the UK government did not continue defence budget cuts.

Chapter 3 – LITERATURE REVIEW AND ANALYTICAL FRAMEWORK

This chapter reviews several strands of the relevant literature, and provides an analytical framework to organize participating Nation contributions. The literature review discusses the theory of alliances, and the supply of and demand for military goods and services. The analytical framework borrows from the defence financial and resource management literature to create a useful approach to collect and share defence resource management practices.

3.1 THEORETICAL FOUNDATION

This section places the NATO SAS study in the broader context of the academic literature on defence economics and defence resource management, and includes a review of both theoretical and empirical work[1]. The review is structured around three main areas. The first discusses various theories and insights about the economics of alliances, the second focuses on the production and supply of military goods and services, and the third outlines the demand side, including the main determinants of military spending.

3.1.1 Alliance Theory

The theory of alliances is based on classifying goods and services produced by a nation, or a collective group such as NATO, as either a private or a public good. A private good or service is characterized by a benefit that is both rival and excludable. For example, a private good is considered "rival" if its owner is the only beneficiary and no one else can partake in the benefits provided by that good. It is also excludable if anyone that wants the private good can be forced to pay for it.

In sharp contrast, a public good, such as nuclear deterrence, is non-rival and non-excludable. The U.S. nuclear deterrent during NATO's era of Mutual Assured Destruction (MAD) was non-rival in that it could protect additional Allies (NATO membership expanded from the original 12 to 14 in 1952) without diminishing the protection available to existing Allies. In addition, it was non-excludable since once nuclear deterrence is provided, it is available to all Allies at no additional charge. [24]

The main insight from this early work on Alliances involves a rather grim conclusion on burden sharing. It predicted that larger and richer members of an Alliance tend to bear a disproportionately greater share of the defence burden than smaller and poorer ones. Early applied (empirical) work supported this grim finding since this coincided with NATO's doctrine of Mutual Assured Destruction (MAD) of the 1950s and 1960s, which tended to increase the disproportionate sharing of defence burdens. However, the grim predications did not persist past the late 1960s as subsequent empirical work failed to show the exploitation of large Allies by the smaller ones.

Subsequent research in the theory of alliances extended the classification of goods from the stark private/public distinction, to a more nuanced classification that permitted defence goods and services to vary in their "degree of publicness." In this new classification, defence is considered a joint- or multi-product activity. For instance,

[1] This section is based on the work of D. Rowlands "Budget Restraint and Military Expenditures in NATO Nations: A Review of the Literature" Contract Report DRDC-RDDC-2015-C236; C.N. Young, J.J. Donohue, B.W. Taylor and A. Billyard (2012) The Analytical Process to Conduct the 2010 DND/CF Strategic Review: Comprehensive Review of Programs DRDC CORA: Ottawa DRDC CORA TR 2012-108.

a single Nation's defence spending may be used to protect a common border (which also helps Allies that share the border), patrol its own littoral waters (providing country-specific or private benefits), and strategic (nuclear) deterrence which as discussed earlier, provides Alliance-wide public benefits. The main insight from this more robust theoretical model is that the more country-specific benefits derived from defence spending, the more likely a nation is to fund such spending.

Under this more nuanced approach, burden sharing is less of an issue since the exploitation of rich Member Nations is less prevalent. Recent empirical results support this more robust interpretation of alliance theory. The theory successfully predicted that the burdens and benefits enjoyed by countries were closely matched during NATO's Flexible Response era. As Allies responded to the changing doctrine over this period by investing in more conventional deterrence, outputs/capabilities tended to include more country-specific benefits.

Returning to the principal theme of the NATO SAS study, the main insights from alliance theory include:

- Future budgetary constraints may spur the Alliance to redefine its strategy towards activities that increase the private benefits of members, such as investment in hardening targets, specialization in niche capabilities, and intelligence sharing. These activities can result in equalization of burdens and a more stable budgetary environment.[2]
- The constantly shifting and unstable security environment demands a level of cooperation that will induce Alliance members to cooperate and contribute to common defence measures.
- Faced with binding budget constraints, the search for more innovative and cost-effective defence goods and services can spur the pooling of resources or outright specialization, which increases the excludable (private) share of total benefits, and thus improves burden sharing.

3.1.2 Supply Side

The second area of research reviewed in this study analyzes the mechanics of what and how to procure defence goods and services. The majority of research papers that analyze the supply side tend to point to the unique market structures that exist for many defence goods and services, where there is often only one buyer, the government, and a few large defence companies as suppliers. This defence market structure is far from the ideal goal of perfect competition found in civilian markets with multiple buyers and sellers of fairly standard products, and includes additional distortions (such as governments specifying technical and legal standards for military equipment, and regulating the profitability of firms, etc.).[3] The supply side literature applies lessons learned from transaction cost economics to suggest solutions to the problems posed by imperfect competition. The primary focus of this strand of research is on reducing uncertainties related to future demand for defence products and incentivizing firms to lower costs and increase performance – both of which are important strategies for mitigating the negative impacts of future budget constraints.[4]

[2] The hardening of targets may include unintended consequences by shifting attacks to neighboring Allies; thus the design of such defensive capabilities needs to be carefully considered.

[3] Aside from its unique market structure, the uncertainties (evolving threats) and complexities (technological sophistication of military equipment and intricacies of government red-tape) associated with defence acquisition limit the number of firms willing and able to incur the risk of engaging in defence business. This limits competition and can lead to monopoly power.

[4] Uncertainties related to future demand for defence products can be reduced through multi-year contracts, which will also aid in building trust and collecting data regarding the firm's reputation in compliance with contractual agreements. Incentives can include sharing (public-private) investments in infrastructure and capital equipment, or partitioning tasks. Incentives to firms to lower costs and increase performance may also be coupled with credible penalties, including the threat of entry of foreign firms into the market.

Within the supply side literature, another strand of research examines the production of military capabilities. Based on the economics of the firm and resource management, the focus is on how military inputs such as military personnel, weapons systems, and infrastructure are combined in various ways into military outputs or outcomes (effective capabilities). This closely matches the research agenda articulated in SAS-113. One of the key deliverables of the SAS-113 study is the identification of valuable defence resource management practices to help respond to budgetary pressures.

The production function literature offers an ideal framework to assess and classify various strategies that SAS-113 Member Nations utilized in response to the financial crisis. It also offers insights into how these practices can be applied Alliance-wide. For example, some Nations may decide to "arm-the-man"; a strategy that is relatively labor or military personnel intensive. Others may invest more in labor-saving technologies or equipment, depending on relative prices.

A gap in this literature is the lack of a comprehensive analytical model to help choose between inputs, and/or to predict the overall effectiveness of military outputs vis-à-vis active opponents. Fortunately, the analytical structure presented in the military production function approach provides a workable platform for the SAS-113 study to organize participating Nation contributions of defence management practices.

The Analytical Framework developed in Section 3.2 below develops four categories to capture country contributions. The first three correspond closely to the production function approach:

1) Planning defence outputs (effectiveness);
2) Programming the best mixes of inputs to produce those outputs (efficiency); and
3) Budgeting to capture the full costs of all inputs, and executing those budgets through careful contracting to obtain the best possible costs, schedules and performance.

3.1.3 Demand Side

The third and final research area reviewed examines the demand side, including key determinants of military expenditures. The majority of these studies rely on the Alliance literature (discussed earlier) as the theoretical basis to develop the demand side of military activities. The models typically assume a central government that maximizes the social welfare of its citizens, subject to budgetary constraints.

For example, central governments face competing demands between civilian and military goods and services. Sometimes, due to relative price effects, civilian goods might be cheaper. Alternatively, the relative preferences of the electorate, revealed through elections, may favor health care over military spending. Other factors that explain demand for defence include threats to a nation's sovereignty, or the perceived obligations of a collective security arrangement. The main inference from these models is that while the financial crisis may limit available resources (spending) for defence, the impact can be mitigated by a Member Nation's recognition of threats, voter preferences, lowering the relative costs of military goods, and positive assessments of the value of an Alliance.

The literature on the demand side points to some common policy prescriptions. Specifically, lowering the relative costs of military goods, specialization, comparative advantage, pooling and sharing, and collaboration promote economies of scale and other advantages. These studies also stress that the search for efficiencies should be standard practice, just as they are in a competitive marketplace.

3.1.4 Gaps and Conclusions

In general, the literature on defence spending and alliance structures is well developed and there is a broad understanding of the many forces that shape defence spending generally and within the context of alliances[5]. There are, however, some gaps in the literature that the SAS-113 study is well positioned to fill.

First, the few analyses of the impact of the financial crisis on NATO lack an empirical basis; perhaps due to the fact that most of these studies were conducted shortly after the financial crisis, and lacked sufficient data to evaluate the impacts. One of the main deliverables of the SAS-113 study is the careful documentation of strategies employed by participating Member Nations to mitigate the effects of the financial crisis.

The demand side studies point to standard sources of efficiency gains to lower the relative costs of military goods. These opportunities mostly require closer collaboration between Alliance members at the strategic and tactical levels. However, there is also evidence that such policies can result in unintended consequences.[6] The organization of defence resource management practices discussed in Section 3.2 below offers a production function approach that can help address important gaps in the literature.[7]

3.2 ANALYTICAL FRAMEWORK

Facing severe budget cuts, NATO members are increasingly forced to make hard choices to safeguard national security, and contribute to the future capabilities (and credibility) of the Alliance. NATO's success critically depends on the widespread application of effective and efficient defence resource management practices. Secretary General Jens Stoltenberg highlighted this challenge in his 2014 keynote speech to NATO's 60th Parliamentary Assembly:

> "*It is not just [the amount] we spend on defence. It is also about* ***what*** *we spend the money on [Effectiveness] and* ***how*** *we spend it [Efficiency].*"
>
> (Stoltenberg [24], emphasis added)

This study offers an opportunity for countries to share and adopt valuable defence resource management practices to help make difficult budget decisions. This effort reinforces agreed security and defence objectives outlined in the 2010 NATO Strategic Concept [17], which stresses the need for:

> "*Reform towards a more effective [and] efficient…Alliance, so…taxpayers get the most security for the money they invest in defence.*"

[5] The applied or empirical work to validate the joint product model is somewhat complicated by the absence of precise definitions and measures of burdens and benefits of security. For example, policing, intelligence, etc., are often omitted in burden measures. There are also non-military measures to counter threats, such as diplomacy and development assistance.

[6] These unintended consequences can risk exacerbating inefficiencies or diluting gains from efficiency. For example, the adoption of more cooperative military structures may well pose serious challenges in terms of national sovereignty, and in terms of operational effectiveness.

[7] The SAS-113 study's emphasis on recording participating Member Nations' experiences (including limitations) can help countries draw valuable lessons learned for future design of efficiency measures, and identify and avoid negative unintended consequences.

In the face of binding budget constraints, two main strategies emerge:

a) Demand side strategies focus on reducing threats to the Alliance[8]; while

b) Supply side strategies focus on boosting capabilities to respond to those threats.

The second strategy is the focus of this report.

The global financial and economic crisis that began in 2008 compelled NATO Member Nations to implement cuts in the defence budget. A year-long effort was undertaken as part of this study to collect management practices from participating Member Nations to promote more effective and efficient use of defence resources. This chapter offers a useful analytical framework to organize participating Nation contributions.[9] The framework couples realities of the political and economic environment with the theoretical and empirical literature.

The analytical framework consists of four broad categories of defence resource management practices that are recommended in this study. These four categories of practices follow the logic of the production function discussed earlier, and the Planning, Programming, Budgeting and Execution (PPBE) System [14]:

1) Rationalize Capabilities and Programs (Planning);

2) Improve Transparency and Accountability of the Resource Management Process (Programming);

3) Generate Operating Efficiencies (Budgeting and Execution); and

4) Promote Assessment Mechanisms.

3.2.1 Planning

The first category of country contributions focuses on ensuring NATO's "*effectiveness*". This encourages members to rationalize capabilities and programs within fiscally constrained strategic plans that satisfy national security requirements and contribute to NATO's aims of:

- Collective defence;
- Crisis management;
- Cooperative security; and
- Threat deterrence.

NATO's agreed "level of ambition" drives its decisions on "minimum capability requirements." Related to NATO's "Connected Forces Initiative," the challenge is to harmonize national and NATO defence plans to ensure timely development and delivery of deployable, sustainable, and interoperable defence capabilities to successfully accomplish NATO missions.

[8] The previous section offers a brief discussion of strategies to reduce demand for NATO forces. These include efforts to: i) Deter current and future threats and stabilize risky environments; ii) Shape the intent/capability/capacity/readiness of potential adversaries; and iii) To invest in a comprehensive approach including peacekeeping and security assistance coordinating with other elements of national power – Diplomatic, Economic, Financial, Information, Intelligence, and Law Enforcement.

[9] Appendix D populates the framework with specific management reforms and recommendations made by participating NATO Member Nations.

3.2.2 Programming, Budgeting and Execution

The second and third categories of country contributions aim to improve the "*efficiency*" of Member and Partner Nations in building defence capabilities. This includes increasing transparency and accountability in force structure and investment decisions, and generating operating efficiencies in the management of personnel, equipment, logistics and supplies, and infrastructure.

To make best use of defence resources, nations are encouraged by NATO to employ a medium-term expenditure framework (e.g. a financial and resource management system similar to PPBE) that explicitly connects budgets to strategic plans. Fiscally constrained force structure and investment decisions to build capabilities expressed in national strategic plans benefit from the application of analytical tools such as military cost-benefit analysis (for example, see Ref. [15]), project management, inventory control systems, enterprise resource planning, etc. Applying more transparent planning, decision-making, and accounting tools and techniques can reduce corruption risks and contribute to better use of scarce defence resources.

3.2.3 Assessment

The fourth and final category of country contributions recognizes that critical assessments of current practices in the face of fiscal constraints frequently reveal opportunities for legal and administrative reforms. While new initiatives may be warranted, it may also be necessary to relax, modify, change or eliminate costly and unnecessary laws, rules or regulations that inhibit the efficiency and effectiveness of our forces. The application of cost-benefit analysis to streamline laws, rules and regulations, and "sunset clauses" that clearly specify their duration, can reduce costs and lead to better outcomes.

It is instructive to observe the distribution of participating Nation contributions of defence resource management practices across the four categories of the analytical framework. This exercise, accomplished in the next chapter, reveals how participating Nations responded to recent budgetary constraints, and where valuable opportunities might exist for future contributions to improve efficiency and effectiveness.

Located on NATO's website and updated in real time, this analytical framework *could* serve as a valuable organizing structure to collect and share future contributions from Alliance members and partners. Complementing the **NATO Defence Planning Symposium**, this framework could also serve as the foundation for an equivalent **NATO Defence Budgeting Symposium** to regularly collect and share defence resource management practices across the Alliance.

3.3 COMPONENTS OF THE ANALYTICAL FRAMEWORK

The remainder of this chapter describes each of the four components of the analytical framework in more detail. These four categories offer broad defence resource management recommendations that serve to organize participating Nation contributions.

3.3.1 Rationalize Capabilities and Programs (Planning)

Fiscal constraints create opportunities as well as challenges. NATO's fundamental challenge is to encourage Member and Partner Nations to make best use of their scarce defence resources. The goal is to maximize collective security in the face of budget pressures and other political realities. A valuable opportunity exists for shrinking budgets to serve as a catalyst for careful review of existing forces, and to trigger constructive rationalization of capabilities and programs. This first category of the analytical framework emphasizes country contributions to better rationalize defence capabilities and programs to preserve or increase force effectiveness.

The challenge is to harmonize national and NATO defence plans to identify affordable national capability portfolios that meet both domestic and collective security objectives. Following a fiscally informed review of strategic plans, NATO determines its "Level of Ambition" (i.e. the number, scale, and nature of operations in the short, medium, and long term). This results in a list of "minimum capability requirements" for the Alliance to undertake its full range of missions. Capability requirements are apportioned to countries as agreed "target packages." In turn this influences members' defence planning to build affordable and deployable national capability portfolios. NATO's "Defence Planning Capability Review" offers periodic assessments of member defence and financial plans. This includes the biennial "Defence Planning Capability Survey"[10]; a review of Allies' plans and policies, and includes both national and multi-national efforts to address capability targets.

According to one definition, the aim of defence planning is to, "*identify gaps…between strategy and capabilities, and produce objectives for [force structure and investment] programming to address them*" [14]. Ideally, this process is fiscally informed so Member Nations recognize the need to rationalize capabilities and programs to achieve cost savings, while continuing to meet national and collective security objectives.

NATO's "Smart Defence" initiative presented to nations to support planning efforts encourages:

a) **Prioritization:** Aligning national security priorities and jointly investing in common capability areas;

b) **Specialization:** Focusing and investing in capability areas in which countries have a comparative advantage; and

c) **Cooperation:** Coordinating efforts in R&D and other areas, sharing expenses and realizing savings from economies of scale.

In addition, NATO's "Framework Nations Concept" encourages smaller groups of Allies to work multi-nationally to engage in joint development of forces and capabilities, facilitated by a "framework nation"[11].

Unfortunately, opportunities for collaboration through Smart Defence, the Framework Nations Concept, etc., do not come without risks. To encourage Nations to specialize in areas in which they have a comparative advantage, and to depend on Member or Partner Nations for other critical capabilities, requires commitment, coordination and trust. Although budgetary constraints can motivate increased cooperation, incentive mechanisms may be required to overcome free riding and encourage greater commitment of national resources and capabilities[12]. Smart Defence remains an elusive ambition as opposed to a substantial reality.

The focus of this first category of resource management practices is to improve strategic planning, so as to recognize budgetary realities, prioritize and validate requirements, and rationalize national capabilities and programs to ensure timely development and delivery of deployable, sustainable, and interoperable capabilities. Today, this effort is facilitated by the "NATO Capabilities Report", which highlights individual and collective progress on capability development relative to NATO's Level of Ambition. This is supported by NATO's

[10] Data includes national financial plans, and inventory of forces and capabilities potentially available for Alliance operations. This also includes Allied contributions to: NATO's C3 (Consultation, Command and Control); Intel; Civil Emergency Response; Air and Missile Defence; Air Traffic Management; Military Medical Support; and Cyber Defence.

[11] Initially designed to concentrate on creating coherent sets of capabilities in the areas of logistics support; chemical, biological, radiological, and nuclear protection; delivering firepower from land, air, and sea; and deployable headquarters [21].

[12] The literature suggests the greater the ratio of perceived private (country-specific) to public (collective) benefits in contributions to the Alliance, the greater the willingness to commit, coordinate and trust. Members and partners may more easily be encouraged to invest in "quasi-public goods" such as medical, transport or logistics functions if they see potential private benefits in controlling those capabilities (say for local emergency response to catastrophes – floods, fires, disaster relief, etc.).

"Suitability and Risk Assessments" of national plans and capabilities, which provides force structure recommendations to redirect resources to address capability shortfalls, and safeguard the effectiveness of NATO forces.

The first category of country contributions reveals ways to rationalize capabilities and programs to increase NATO's *effectiveness*, focusing on "What to do?" The next category shares ways to increase the *efficiency* of building those capabilities, or "How to do it?"

3.3.2 Improve Transparency and Accountability of Resource Management Process (Programming)

The focus of the second category of resource management practices is on sharing more efficient ways to build desired defence capabilities. The objective for each Nation is to select an optimum mix of forces and investments that generate desired defence capabilities while maximizing national (and collective) security, subject to financial constraints.

Transparent and accountable defence resource management processes are necessary for countries to achieve this objective. This requires Nations to employ a medium-term expenditure framework that explicitly links budgets to strategic plans. One such framework is the familiar PPBE system, where "Programming" serves as a bridge between military-directed plans, and civilian-controlled budgets. Programming involves "*the allocation of resources among programs across a mid-range time horizon that achieves planning objectives*" [14].

A recurrent challenge is the failure to program realistically by taking account of future budget constraints. In evaluating alternative force structure and equipment investments, overly optimistic cost estimates and performance expectations can lead to cost overruns and capability shortfalls. This results in over-committed programs that can ultimately compromise future capabilities.

Applying standard analytical tools and techniques within a medium-term expenditure framework can help counter this risk, and contribute to more transparent, efficient, and effective programs. As noted earlier, financially constrained force structure and investment (programming) decisions can benefit from the transparency and accountability afforded by military cost-benefit analysis, project management, inventory control systems, enterprise resource planning, etc. Employing more transparent planning, decision-making, and accounting tools and techniques contributes to more efficient and effective forces. It also helps reduce corruption that wastes scarce resources.

Alliance members and partners have a special responsibility to the public to minimize corruption risks and ensure the best use of scarce defence resources. Corruption not only wastes resources, but places military personnel at greater risk, operating with inferior equipment, services, and supplies, leading to reduced national capabilities that weaken the Alliance. More importantly, pervasive and corrosive corruption undermines popular support for the military. This can undermine the case for significant defence spending, which will further damage the Alliance. Corruption can also shrink foreign investment, slow economic growth, and lead to greater poverty and social Instability that can potentially divert resources away from the defence sector.

NATO's new "Building Integrity Programme", introduced in 2007, is designed to increase transparency and accountability to reduce corruption risks in the military. The three pillars of the program include:

1) Diagnosis (a self-assessment questionnaire)[13];

[13] See: http://www.nato.int/nato_static/assets/pdf/pdf_publications/1402_BI-Self-Assess-Quest_en.pdf.

2) Prescription (a compendium of best practices)[14]; and

3) Treatment (education and training plans)[15].

Following a voluntary NATO-facilitated diagnosis of strengths and weaknesses, Allies and partners are offered treatments that include a mix of investments to build integrity, increase transparency, and improve accountability.

Options to increase transparency and improve accountability include:

- Clear and simple laws, rules, and regulations;
- Merit-based personnel systems;
- Medium-term expenditure frameworks that explicitly link budgets to strategic plans;
- Analytical tools and techniques to support resource management decisions;
- Management controls such as anti-corruption, anti-fraud, integrity-enhancing mechanisms, and the participation of civil society;
- Independent oversight of defence procurement decisions; and
- Active engagement in NATO's Building Integrity Programme.

Adopting good governance mechanisms along with helpful financial and analytical tools that increase transparency and accountability can produce better investment (programming) decisions, and more efficient and effective force structures.

Building and executing multi-year budgets that reflect decisions supported by analysis offers multiple opportunities to generate operating efficiencies. These are captured in the third category of defence resource management practices.

While the first category identified ways to rationalize capabilities and programs to increase NATO's *effectiveness*, focusing on "What to do?", the second category shared ways to increase the *efficiency* of force structure and investment decisions to obtain those capabilities, focusing on "How to do it?" The third category of country contributions reports ways to increase efficiency in building and executing budgets, focusing on "Just do it!"

3.3.3 Generate Operating Efficiencies

Multiple opportunities to generate operating efficiencies exist in building and in executing defence budgets. Defence budgets reflect force structure and investment (Programming) decisions that are presented to national governments for approval. The goal of budgeting is to "*justify… programming [force structure and investment] decisions in a format that serves the process of legitimization", while budget execution "implements the policy direction to create…desired capabilities*" [14]. The third category of country contributions of defence management practices focuses on generating efficiencies in budgeting, and the execution of those budgets. The focus is on four major accounts:

[14] See: http://www.nato.int/nato_static/assets/pdf/pdf_topics/20120607_BI_Compendium_EN.pdf.

[15] See NATO website for more information: http://buildingintegrity.hq.nato.int/.

- **Personnel (Military, Operations and Maintenance (O&M) – Civilians)**

  Controlling personnel expenses can involve a review of pay and benefits, and deferred compensation (retirement, health, etc.); a review of force strength requirements to meet national security objectives; and reassignment of excess or redundant personnel.

- **Equipment (Procurement and Research Development Testing and Evaluation)**

  Achieving targeted cost savings through procurement reforms can involve: encouraging competition; incentive contracts; joint/combined development of defence capabilities (to achieve economies of scale[16], and/or monopsony purchasing power, etc.); and public-private partnerships. Cooperative development and procurement programs among NATO members could provide sufficient political, economic and technological benefits to motivate countries to participate and contribute to these efforts.

- **Logistics and Supplies (O&M)**

  Cost savings can be achieved through careful evaluation of public versus private provision of: materials planning, order processing; transport/shipping, inventory management; and other components of the defence supply chain. Opportunities to cut costs of spare parts, ammunition, and other supplies can be revealed by reviewing current operations to seek ways to reduce demand; and in adopting procurement reforms and joint/combined buys to increase purchasing power. Operating efficiencies can arise from economies of scale (horizontal integration), and scope[17] (vertical integration). NATO may have some success in promoting operating efficiencies by encouraging members to pool and share support functions in which they have a comparative advantage.

- **Infrastructure (Military Construction)**

  Periodic review of bases and other facilities (e.g. base realignment and closure) can reveal candidates for consolidation (to achieve economies of scale or scope), or uncover obsolete, under-utilized, or excess infrastructure that are candidates for sale or closure.

3.4 PROMOTE ASSESSMENT MECHANISMS

The fourth and final category of defence management practices recognizes that implementing recommendations reported in the first three categories could require significant legal and administrative reforms. Careful assessment of alternative defence management practices in some cases may lead to new reforms, but may also require relaxation, modification, or elimination of costly and unnecessary laws, rules, or regulations that undermine efforts to improve efficiency or effectiveness. The application of cost-benefit analysis to streamline laws, rules and/or regulations, and "sunset clauses" that clearly specify their duration, can serve to reduce costs and achieve better outcomes.

National governments must be well-informed to:

- Approve defence budgets;
- Carefully assess outcomes; and
- Facilitate adoption of new defence management practices.

[16] Economies of scale involve consolidation (mergers) of like activities to cut costs. Examples include shared services in the USA provided by defence agencies such as DLA (Logistics) and DFAS (Accounting), etc.

[17] Economies of scope involve consolidation (mergers) of unlike activities, but which have opportunities to save on shared overhead, for example: cyber-security; intranet; HQ; etc.

Opportunities to communicate, coordinate, and cooperate with legislators, other government agencies, private companies, non-governmental organizations, the United Nations, and European Union to better leverage limited national defence budgets can be explored.

This final category of defence management practices should also aim to collect examples of opportunities to increase the efficiency of indirect (national) contributions – where members volunteer equipment, niche capabilities (cyber, etc.), or troops for military operations, as well as direct contributions – that involve either "common funding" (cost-sharing among members)[18] or "joint funding" arrangements among Allies, where NATO provides political and financial oversight. Since few countries meet the 2%/20% mandate, it may be helpful to explore ways to encourage contributions by increasing perceived (private) benefits, and to reduce the costs of Alliance membership.[19] Through this study, widespread dissemination of resource management strategies focused on promoting assessment mechanisms could offer Member Nations significant benefits and opportunities for cost savings that increase the perceived value of the Alliance.

3.5 SUMMARY

This chapter describes the four components of an analytical framework that captures the spirit of the well-known Planning, Programming, Budgeting, and Execution System. This framework is designed to organize country contributions of defence management practices into four broad categories that help Member and Partner Nations better shape their responses to future budget constraints, safeguard national security, and support the Alliance.

Organizing country contributions in these four categories reveals multiple options to increase the efficiency and effectiveness of our forces. The next chapter populates the framework with selected defence resource management practices shared by a representative sample of participating NATO Member Nations.

It is instructive to observe the distribution of participating Nation contributions across the four categories of the analytical framework. This exercise undertaken in the next chapter reveals how participating Nations responded to recent fiscal constraints and where there may remain valuable opportunities for future contributions and applications.

Located on NATO's website and updated in real time, this analytical framework could serve as a valuable organizing structure to collect and share future contributions from Alliance members and partners. The framework offers an ongoing opportunity to crowd-source defence resource management practices from Allies and others, to continuously improve the efficiency and effectiveness of the Alliance.

[18] NATO military common funding supports such theatre-level enabling capabilities as: airports, seaports and railroads; medical facilities; intelligence, surveillance and reconnaissance; engineering support; and fuel storage and supply.

[19] NATO members reaffirmed at the 2014 Wales Summit a Defence Investment Pledge to contribute a minimum of 2% of GDP to defence, and 20% of their defence budgets for investment; member states undertook to fulfil these targets by 2024. U.S. defence spending accounts for over 70% of total Alliance spending. The UK, France and Germany contribute more than half of the rest of Alliance spending. Combined, these four countries spend over 85% of the total of the 28-Nation Alliance. These four countries also contribute more than 50% of common funding for NATO's Civil Budget, Military Budget (which includes the sponsor of this report – the Science and Technology Organization), and the Security Investment Programme. This suggests that while the return on investment in implementing helpful defence management practices identified in this report could be significant as a percentage of defence budgets for the 24 smaller spenders, the greatest absolute benefit in terms of increasing efficiency and effectiveness could accrue to the four biggest spenders. It is possible that drawing lessons from smaller spenders across the four categories of this analytical framework that can be applied by the biggest spenders could have the most significant impact on the Alliance.

Chapter 4 – RESOURCE MANAGEMENT STRATEGIES

The focus of this chapter is to present selected defence resource management practices applied by participating NATO Member Nations to mitigate the effects of the financial crisis. The practices were evaluated using four main criteria:

1) The context in which they were employed (i.e. given the financial constraints, why did the country choose a particular initiative and how was it implemented?);
2) The results of implementing the practice (cost savings, key business changes, reprioritization of capabilities, etc.); and
3) The capability impact (ability to provide NATO defence capabilities); and
4) Any lessons learned.

Once evaluated, practices were assigned to one of the four categories of the analytical framework. This analysis provides a window for NATO and others to understand how participating Member Nations responded to the financial crisis. This study is intended to be part of an ongoing effort to develop a more collaborative process to identify and share defence resource management practices to benefit the Alliance.

4.1 KEY FINDINGS

Of the ten participating Nations involved in this study, nine submitted a combined total of 41 defence resource management practices[1]. These practices were carefully evaluated and then placed into one of the four broad categories of the analytical framework. For purposes of simplicity, the categories are labeled as:

1) Planning;
2) Programming;
3) Budgeting and Execution; and
4) Assessment.

Recall that the first three categories closely correspond to the production function approach:

1) Planning defence outputs (effectiveness);
2) Programming the best mixes of inputs to produce those outputs (efficiency); and
3) Budgeting to capture the full costs of all inputs, and executing those budgets through careful contracting to obtain the best possible costs, schedules and performance.

It is interesting to note that the first two categories encourage more proactive resource management practices, while the third represents more reactive responses to budget constraints.

It turns out most participating Nations' contributions fell in the third category. Partitioning Nation contributions through this lens is helpful since it reveals that while most responses were reactive, there exist opportunities for more pro-active efforts to address future budget constraints. Figure 4-1 shows that the third category, "generating

[1] While this certainly is not an all-inclusive list, participating Nations submitted a collection of exemplar practices they felt were best suitable for this report. Nations may have exercised defence resource strategies that were not submitted for inclusion in this report.

operating efficiencies" (Budgeting and Execution), accounted for 59% of all practices submitted, while only 15% were in the first category – better ways to plan defence outputs (Planning), and 18% in the second category – allocating the best mix of inputs to produce those outputs (Programming).

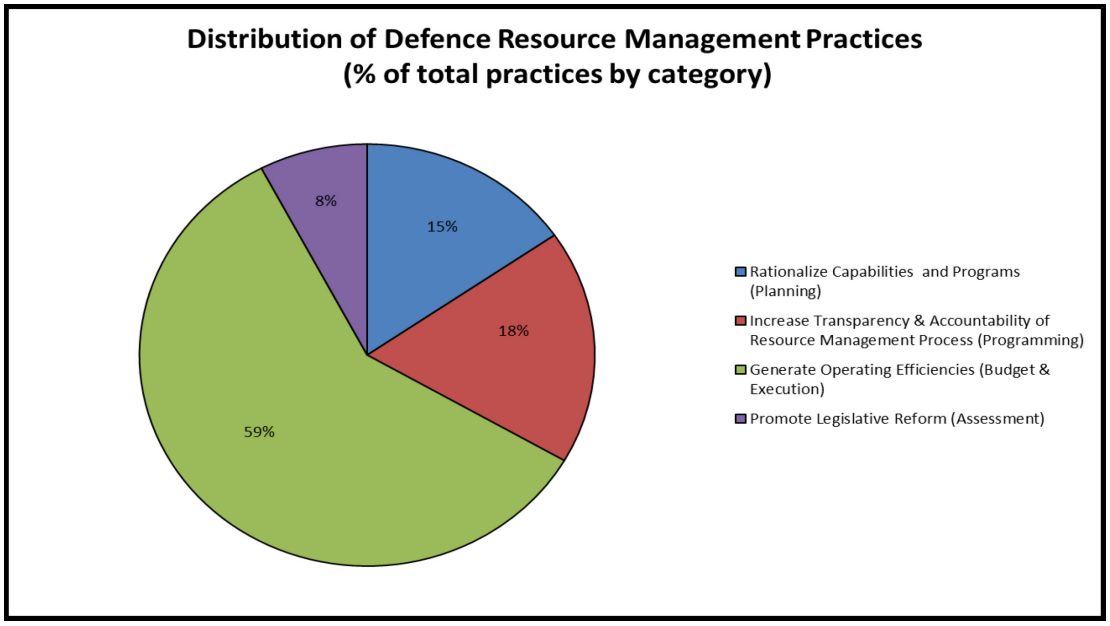


Figure 4-1: Classification of Participating Nations' Defence Resource Management Practices by Category.

Organized by country, Canada and the USA appeared to focus largely on planning and programming (proactive approaches), whereas the Czech Republic, France, Germany, Italy, and Slovakia focused more on generating operating efficiencies through budgeting and execution (reactive approaches) (see Figure 4-2). Despite implementing a key resource management practice to generate operating efficiencies, Poland's main strategy in response to budget constraints was to introduce new legislative reforms (Assessment Mechanism), which could be considered more pro-active. The UK took a balanced approach, divided evenly between proactive and reactive resource management practices (i.e. between improving its strategic planning and generating operating efficiencies).

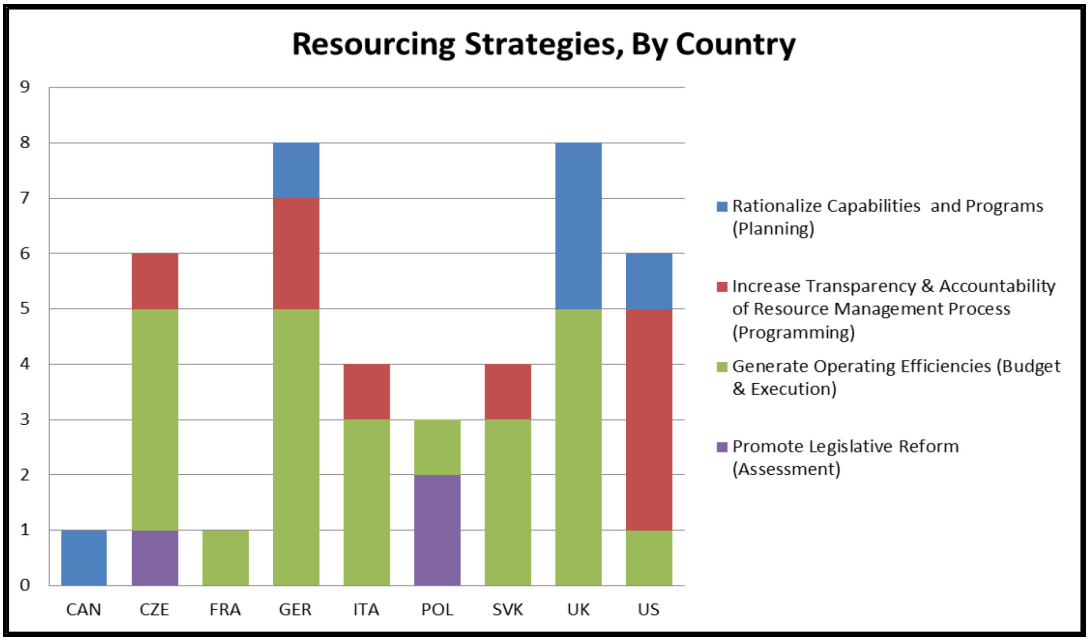


Figure 4-2: Classification of Defence Resource Management Practices by Participating Nation.

Among participating Nations, there does not appear to be a systematic effort to engage equally in defence resource management strategies across the four categories of planning, programming, budgeting and execution, and assessment. Given this finding, organizing national defence management practices in the four categories reveals some missed opportunities to adopt defence resource management strategies that could improve the efficiency and effectiveness of the Alliance.

4.2 ANALYTICAL FRAMEWORK EXAMPLES

This section provides selected examples of participating Nation contributions of defence resource management practices in each of the four categories. A detailed description of each of these broad categories appears in Chapter 3.

4.2.1 Rationalize Capabilities and Programs (Planning)

4.2.1.1 Canada

In direct response to financial constraints and a government-wide call to reduce the budget deficit, Canada conducted a comprehensive review of its defence programs to identify less important components for divestment. This proactive process links programs and activities to desired strategic outcomes using a multi-criteria decision tool, called CapDiM. This tool calls for all program components to be disaggregated from program activities in order to be assessed for relevance (to national defence strategy documents), and performance (ability to define and meet targets, based on internal performance indicators).

A system, known as Performance Alignment Architecture, used in conjunction with Capability-Based Planning provides the relevance and performance inputs for CapDiM to conduct comparative analysis. Individual program components are plotted according to their relevance and performance scores. From this analysis, the Canadian

Department of National Defence (DND) further scrutinizes program components below the 20% relevance for divestment.

Figure 4-3 shows a representative CapDiM output with a *notional* cut line (dotted red line) indicating the lowest acceptable relevance level. As a result of implementing this proactive resource management strategy, the Canadian DND achieved a 10% reduction in program components, equating to $2B in savings. The final set of divestments offered as a result of this exercise, were informed through an interpretation of the CapDiM results. As a result of this exercise, the program components retained were those deemed "optimal".

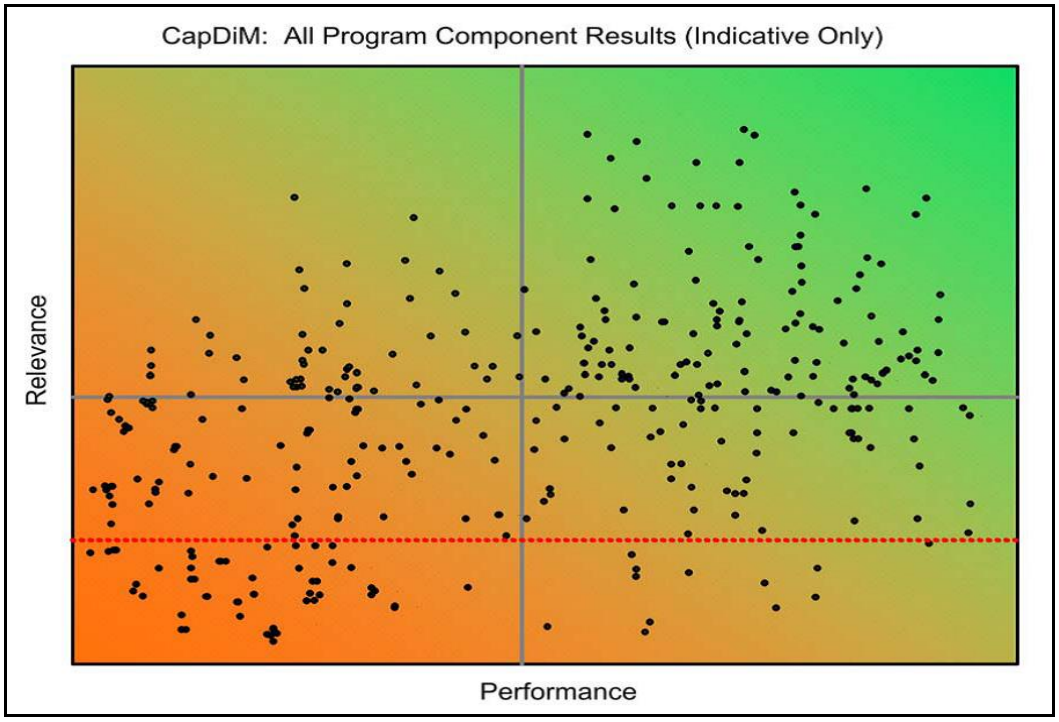


Figure 4-3: Representative CapDiM Output.

This plot is notional and does not include labels. Moreover, it does not represent the final results of the analysis conducted during the 2010 DND/CF Strategic Review.

4.2.1.2 United Kingdom

In the face of budget constraints and fueled by unsustainable costs associated with the Equipment Procurement Programme, the former UK Chief of Defence Procurement, Lord Levene, conducted an independent and fundamental review between 2010 and 2011 of the MoD's management and structure. The goal of the defence reform was to prevent the MoD from entering into an unsustainable future financial position, and instead, to generate increased savings/efficiencies across the MoD. The output of the review consisted of 53 recommendations. These included creating a new/similar defence board, clarifying senior leader responsibilities, and creating a 4-Star-led Joint Forces Command to realize benefits/savings of redundancy reductions across the Ministry. Despite the difficulty in proving a link between defence reforms and financial benefits/savings, recent evidence suggests that the many of the recommendations are being implemented, are embedded at the highest levels of the MoD, and are supporting other efficiency efforts throughout the MoD.

Seeking opportunities to protect capabilities from the effects of cost growth and budget reductions, the UK determined that searching for specific efficiencies was a strategically more sensible alternative to across-the-board cuts. One of the strategies employed was a comprehensive review of its defence capability ambition in response to budget constraints. Through a rigorous process that defined the Nation's core desired defence outputs, that subsequently identified key capabilities required to generate the desired outputs, the MoD prioritized its competencies against its national security assumptions.

Operations analysis underpinned evidence-based decision-making to delay, defer, de-scope, or delete those programs deemed to offer "lower priority" capabilities. Ultimately, the UK MoD balanced its budget and reconciled conflicts between lower budget targets and the previously committed equipment program.

Through strategic planning, risk assessment, and a ten-year outlook that prioritizes capability-based spending to core defence outputs first, the MoD eliminated the need for "across-the-board cuts"; entirely offsetting the effect of tighter budget constraints with efficiencies in specific areas. This provided the ability to program for the future force structure while protecting key existing defence capabilities.

4.2.1.3 United States

As the UK and Canadian Ministry/Department of Defence applied department-level strategic planning practices to mitigate budget constraints, the USA presented a defence management practice that focuses on analyzing specific capability portfolios prior to entering the acquisitions process. Capability Portfolio Review (CPR) is a two-part holistic analysis of a defined capability portfolio.

The first part focuses on requirements that drive capability development, acquisition, and sustainment within the portfolio. The second focuses on investigating the effect of alternative investment decisions. The purpose of the CPR is to provide portfolio-based strategic guidance, prioritize capabilities across DOTMLPF[2] and to ensure consistency with long-term U.S. Army objectives.

The four main CPR objectives are to:

1) Develop a portfolio strategy;
2) Establish portfolio priorities for capability development, resourcing, and force management;
3) Provide a holistic review of operation force capabilities across DOTMLPF; and
4) Approve and revalidate requirements.

The output of the CPR is a strategic vision that assists senior leaders in making future investment decisions that meet U.S. Army capability requirements.

[2] **DOTMLPF** is defined by**: Doctrine**: Fundamental principles by which the military forces or elements thereof guide their actions in support of national objectives. It is authoritative but requires judgment in application. "The way we fight;" **Organization**: The arrangement or grouping of personnel to form operational forces. "How we organize to fight;" **Training**: The activities of personnel preparing for and learning to employ Doctrine, Organization, and Material tactically. "How we prepare to fight tactically;" **Materiel**: All of the equipment necessary to equip forces that does not require new development efforts. "All the stuff we use to fight;" **Leadership and Education**: The development of leaders to prepare them to lead personnel in battle. "How we prepare our leaders to lead the fight;" **Personnel**: The availability of qualified people for peacetime, wartime, and various contingency operations. **Facilities**: Real property, installations, and industrial facilities.

NATO uses **DOTMLPFP-I**, which includes Policy and Interoperability; defined by **Policy**: DoD, NATO, interagency, or international policy that impacts the other eight non-material elements. **Interoperability**: The ability of forces of different NATO Member Nations to conduct operations together.

A specific example is the Precision Fires CPR which identified $500 M in savings when the planned procurement quantity of 155 millimeter Excalibur rounds was reduced from 30,000 to 6,264 due to an identified redundant capability resident in the U.S. Army.

4.2.1.4 Germany

In response to increased costs of procurement and maintenance and recognizing the defence industry's focus on profits, the German Bundeswehr (Federal Defence Force – FDF) introduced a strategy to control costs. This strategy incorporates four mechanisms:

a) To develop agreements based on market rates to prevent monopolies and increase the number of competitors;

b) To implement competitive bidding;

c) To perform organic maintenance at regular intervals; and

d) To conduct contract negotiations without political influence.

While this practice could be considered an improvement to transparency and accountability in the German procurement process, it was categorized under rationalize capabilities due to the strategic-level decision to implement cost controls in the defence industry.

The FDF was able to establish an external, independent, and non-political review of contracts for programs worth more than 200 M Euros; ensuring that contracts are awarded at the lowest possible price without political influence. This practice ensures that any new capabilities entering the acquisition process are strictly aimed at optimizing performance, cost and schedules, to improve the efficiency and effectiveness of the FDF. This particular practice highlighted the danger of "political influence" in the defence market. The research team noted that political influence can create risks, such as monopoly/market power that domestic companies can and will exploit to charge higher prices and to potentially offer lower performance. With tighter budget constraints, political influence of this kind is not sustainable as it can severely impact the efficiency and effectiveness of national defence forces. Strategies to counter and control damaging political influence could include opening domestic defence markets to international competition. The threat of entry of international or competing domestic firms can drive down costs and improve performance and schedules.[3]

4.2.2 Improve Transparency and Accountability of Resource Management Processes (Programming)

Three main themes emerge from participating Nation contributions that fall in the second category of defence resource management practices. These include:

1) Initiatives aimed at acquisitions/procurement reform;

2) Decreasing costs through resource allocation (programming); and

3) Multi-national cooperation in capability development.

[3] Additionally, encouraging the addition of firms that are motivated to find efficiencies provides independent negotiations and reviews to ensure that contracts are obtained at the lowest possible cost to the government.

4.2.2.1 Acquisitions and Procurement Practices

4.2.2.1.1 United States

In an effort to control an expensive and occasionally inefficient acquisition process, U.S. country representatives presented four defence management practices that aim to eliminate inefficiencies, link budgets more closely to planning goals, and reduce costs. These include the:

- "Should Cost" Initiative;
- Affordability Initiative – LIRA;
- Incentivize Performance Initiative; and
- Open System Architecture Initiative.

"Should Cost" Initiative

The first initiative, called "Should Cost", is a program that identifies and eliminates process inefficiencies and embraces cost saving opportunities. Instead of strictly relying on historical data as the basis for a program's cost estimate, U.S. military leadership recognized that there are multiple processes, technologies, and trade-offs that can increase efficiency, reduce unnecessary overhead, drive down costs, and create substantial savings over historical norms.

The goal is for cost management teams on major procurement programs to scrutinize every element of program cost, searching for savings in repetitive activities, challenging overhead and direct costs, and identifying incentive mechanisms to apply to contractors. Success of this initiative relies on solid analysis to uncover potential savings, and an understanding of possible unintended consequences and other risks.

The "Should Cost" defence management initiative demonstrates the U.S. government's willingness to invest in better business practices in the near term to realize savings in the long term. As a result of its implementation, fifteen major defence acquisition programs have collectively realized (or projected) savings in excess of $8 B [11]. "Should Cost" initiatives can enable program managers to develop and deploy systems with lower costs and better performance that increase national and NATO defence capabilities.

Affordability Initiative: Long-Range Investment Requirements Analysis (LIRA)

To improve the link between strategic plans and budgeting, the U.S. Army adopted an affordability initiative that utilizes a decision support tool called the Long-range Investment Requirements Analysis (LIRA). The tool analyzes current and emerging procurement requirements over a 30-year planning horizon. LIRA incorporates strategic visions developed in the Capability Performance Review (CPR) to develop a 30-year plan, which integrates investments in research, development, procurement, and equipment sustainment to maximize the service's capabilities over time, forecasting future budget constraints.

This affordability initiative enables service leadership to become aware of areas where planned spending exceeds budget projections and just as importantly, to ensure that capability development is synchronized with threat assessments and the CPR strategic vision. LIRA can help Ministries of Defence preserve key capabilities in the face of declining budgets.

By developing long-range plans with the support of LIRA, defence forces can foresee and avoid harmful investments in unaffordable capabilities. In addition to practices that eliminate procurement inefficiencies and

support strategic plans, the U.S. country team offered two defence management practices that targeted cost reductions:

a) Incentive Performance; and

b) Open Systems Architecture.

Incentivize Performance Initiative

"Incentivize performance" seeks to reward suppliers for adopting business practices and principles designed to reduce costs and cycle times while achieving performance expectations. Performance-based incentives can motivate industry to drive down unit costs and deliver products and services that exceed minimum capability requirements in key areas. Similar incentives have encouraged industry to invest in research and development, pursue business practices that decrease operating costs, and improve quality; resulting in the availability of cutting edge capabilities at a lower cost even during periods of constrained resources.

An example where performance incentives served to control cost growth is the U.S. Air Force (USAF) KC-46 Tanker Program. In 2011, the USAF awarded Boeing the KC-46 contract to build a new aerial refueling aircraft. To incentivize cost performance on this contract, the USAF structured the contract as a fixed-price contract, with stipulations to limit the USAF's liability during the program's engineering and manufacturing development phases.

The contract set a target cost for engineering and manufacturing development of $3.9 B, a cost ceiling of $4.9 B, and agreed to the following:

a) The USAF would be responsible for all costs at or below the target of $3.9 B;

b) The USAF would pay 60% and Boeing 40% for every dollar between $3.9 B, and $4.9 B; and finally

c) Boeing would be fully responsible for any costs exceeding $4.9 B.

This incentive contract saved the DoD an estimated $2.5 B[4].

Open Systems Architecture (OSA) Initiative

The Open Systems Architecture (OSA) initiative opens access to specific components of a modular system to encourage third party investors to improve and develop add-on capabilities. Promoting competition among vendors at the component level can reduce modernization costs since it allows new technologies, software, etc., to be assimilated without having to replace entire systems.

OSA is typically applied to computer-based products, where software can be designed using widely supported and consensus-based standards as key interfaces to meet specified modular design parameters. Additionally, OSA can be used in physical products developed as a system of sub-components linked by standardized interfaces. Although this can require more sophisticated design and systems integration, when applied correctly, OSA can increase competition; providing opportunities for niche companies to compete against larger companies. Implementing OSA offers the opportunity for nations to maintain and improve defence capabilities through strategic bundling and a systems integration approach that can lower costs and increases innovation.

[4] Savings were largely due to issues with the electrical wiring and the integrated fuel system on the tanker during the engineering and manufacturing development phase which resulted in the contract exceeding the cost ceiling by $1.2 B, which was absorbed by the contractor.

4.2.2.1.2 Germany

New planning processes and procurement procedures established in Germany in 2013 responded to a growing realization that, given current fiscal realities, in the event of cost overruns, major projects with long implementation timelines cannot be rescued, and therefore will fail to provide timely, required capabilities. An emphasis on internal cooperation and coordination throughout the entire lifecycle of a program was an important aspect of the new planning process and procurement guidelines. These guidelines link related elements across all planning domains to a maximum extent, ensuring that action is taken in a coordinated manner with a greater emphasis on possible long-term impacts. One of the innovations is the Medium-Term Objective, which contains specific guidelines for the further development of the Bundeswehr for a timeframe of up to 12 years. This forms a baseline for future planning across all domains by keeping its flexibility through regular updates.

To ensure that the new processes not only take everything into account but connect all elements in an enduring manner, integrative organizational changes had been introduced. Alongside the restructuring of the entire planning community as such, the introduction of a concept of Integrated Project Teams has been implemented.

These teams are comprised of all stakeholders involved in a specific (material) program, and are responsible for comprehensive oversight of a system/program throughout its entire lifecycle. The cross-functional and long-term make-up of the IPT helps increase transparency, and ensures accountability throughout the life cycle. While the new processes and procedures are still in its infancy, initial impressions by German country representatives indicate these initiatives can lead to more efficient and effective management of a system throughout its life cycle but that that this requires more refined definitions of key milestones and responsibilities.

4.2.2.2 Cost Savings Through Resource Allocation Practices

Within the U.S. acquisition process, there are practices where cost savings are achieved through resource allocation strategies. Economic Order Quantity (EOQ) and Economic Production Rate (EPR) are two examples of these types of strategies. EOQ is "*the most economical quantity of parts to order at one time, considering the applicable procurement and inventory costs*", and EPR is "*the most economically feasible rate at which an end item can be manufactured*" [4]. In both of these examples, the cost of an item is influenced by the quantity procured and/or the timing of procurement. Typically, program managers calculate EOQ and EPR in early planning phases of the acquisition process, in order to minimize procurement costs and determine acquisition program budget profiles. However, due to various unforeseen constraints, acquisition programs may not always be able to adhere to optimal profiles. Deviations from the EOQ and EPR will likely result in increased procurement costs as procurement profiles are no longer optimized.[5]

As a cost savings practice, program managers should determine EOQ and EPR for new acquisition programs and/or assess for application to existing, non-optimized procurement profiles. The application of EOQ and EPR in the acquisition procurement process is an opportunity to generate cost savings through resource allocation strategies.

[5] An example where deviations from optimal acquisition procurement profile is illustrated in the U.S. Marine Corps' LAV modification program. Originally the program manager planned to modify a specific quantity of vehicles over a period of time which minimized per unit cost. However, funding constraints forced a deviation from the optimal production plan, extending production by several years. Ultimately this resulted in increased per unit cost, an increase in total program cost, and a delay in fielding the capability.

4.2.2.3 Multi-National Cooperation Practices

4.2.2.3.1 Germany

To better leverage their comparative advantage, Allied Nations expressed interest in the joint development and procurement of weapon systems, with Germany as the lead "Framework Nation". The main goal was to jointly share one-time, non-recurring expenses that arise during the development, initial procurement, and deployment of weapon systems. Economies of scale from this collaboration can lead to further cost savings.

For some of NATO's smaller Nations, joint procurement and operations are the only feasible option to access and maintain specific capabilities. In addition to generating cost savings, multi-national cooperation allows NATO Nations that share jointly developed capabilities to increase their interoperability. Employing nearly identical weapon systems or major components provides a foundation for joint command and control of operations and for joint training.

Two examples of successful international partnerships in the procurement of capabilities are the Leopard Battle Tank User Group Programme (LEOBEN) and the U212A Project and are outlined below:

- **LEOBEN –** This project includes the LEOPARD 1 and 2 systems, all versions in the family of vehicles, and the anti-aircraft tank GEPARD. To date, LEOBEN is the most successful cooperation model for the common use of land-based systems, and includes 16 participating NATO Nations [29]. Most of the systems involved in this cooperation project were developed by Germany; however, some projects included Partner Nation collaboration for cost-purposes. The objective of the LEOBEN programme is to jointly enhance logistical support, maintenance, and post-design service for the LEOPARD 1, 2, and family of systems. Joint system configuration is the primary focus, with the objective of achieving and maintaining a common design and construction standard. The result is optimized logistical support and reduced cost across the family of vehicles. The joint execution of technical logistical services and software management has significantly reduced the financial contribution of each Nation.
- **U212A Submarine Program –** Originally a German-specific project to acquire four submarines focused on stealth capability, fuel-cell independent propulsion, and reduced noise emissions, Italy joined the project via a memorandum of understanding to acquire two of the U212-class submarines. The Italians modified the design to meet their requirements, renamed the project U212A, and would later order two more. The design of these vessels included improvements in communication, capacities, endurance, and sustainability. The benefits of this cooperative project were multi-faceted and included efficiencies in the areas of procurement, training, materiel support, and technical logistical support. As a result of the Italians joining the project, the cost of procurement decreased the per-unit cost by 10.6 M € for the first six vessels and by an additional 5.3 M € for subsequent vessels. Cooperation between the German and Italian MoDs succeeded in reducing costs and risks; increasing knowledge and experience; and enhancing capabilities, sustainability, and reliability. This level of multi-national cooperation requires intensive, clear communication and coordination, in addition to similar requirements/goals.

4.2.2.3.2 Slovakia and the Czech Republic

These two countries have attempted to increase their multi-national cooperation engagements through Smart Defence projects such as the Multi-national Aviation Training Centre (MATC). The establishment of a multi-national centre to conduct training on common platforms provides access to capabilities these Nations are incapable of shouldering individually. The Slovak MoD projects significant savings in training, maintenance, support and overhead costs. In June 2015 a memorandum of understanding concerning MATC was signed between Slovakia, the Czech Republic, Hungary and Croatia to initiate operations in January 2016.

As Lead Nation of the MATC, the Czech Republic aims to provide and share expert capabilities and experience for the benefit of NATO, the EU, and Partner Nations under the 'Smart Defence' initiative. Specific to the Mi-type helicopters, this project aims to:

- Improve, harmonize, and standardize training and education;
- Improve interoperability and helicopter capabilities;
- Take an active role in the development of training standards and concepts; and
- Support the deployment of Mi helicopter capabilities and trainers to theatres of operation via a comprehensive and standardized training scheme.

MATC is focused on "a renewed culture of cooperation that encourages Allies to cooperate in developing, acquiring, and maintaining military capabilities to undertake the Alliance's essential core tasks agreed to in the new NATO Strategic Concept [26]. This project has the potential to improve NATO's Security Force Assistance (SFA) program, specifically in the area of aviation. Likewise, MATC can address long-standing capability shortfalls in aviation standardization, aircrew qualifications, and special operation forces that could lead to future efficiencies, and increase operational effectiveness.

4.2.3 Generating Operating Efficiencies (Budgeting and Execution)

While the first two categories of defence management recommendations reflect more proactive strategies in response to tighter budget constraints, this study found that reactive strategies were by far the dominant response of most participating Nations to the financial crisis. Five common themes emerged from participating Nation contributions captured in this third category of defence resource management practices: "Generating Operating Efficiencies." These include actions on:

1) Personnel;
2) Equipment;
3) Infrastructure;
4) Supplies; and
5) Logistics.

Selected examples of efforts to generate operating efficiencies in each of these areas appear below.

4.2.3.1 Personnel

4.2.3.1.1 United Kingdom

For most countries, personnel costs are the single largest cost driver of the defence budget, and thus a natural target for quick cuts in response to fiscal stress. In the UK, directed military personnel reductions required the Armed Forces to apply a number of different strategies, including reductions in recruitment and retention. However, to maintain a balanced structure across ranks and specializations, a phased and targeted redundancy policy was required. Individual services ran decentralized workforce plans to determine the number of redundancies required and formed selection boards that assessed individuals using specific criteria.

Ultimately, the UK MoD achieved its targeted personnel reductions and associated cost savings while also ensuring that overall service manpower numbers matched capability requirements. That being said, the transition was not necessarily smooth as the services often found themselves above or below required manning levels as they moved towards their long-term goals.

For civilian personnel, similar to military reductions, the UK MoD decentralized the process, allowing each budget area to manage its own personnel reduction targets, and to decide how quickly to achieve those targets. Budget groups were incentivized by being allowed to capture some of the savings.

While some budget areas opted to reduce headcount quickly in order to re-invest the benefits and bring in new skills (incentivized reductions), others managed the transition over a long period to reduce the risk of capability gaps. Although some budget areas that reduced numbers quickly suffered temporary impacts on capability delivery, the realignment of responsibilities and subsequent changes in delivery processes suggest that carefully designed personnel reductions did not materially impact the delivery of defence outputs or capabilities. In the end, the required personnel reduction targets were met and were successful to the point they reduced future personnel reduction targets.

While these personnel reductions have generated cost savings, it is important to note that Member Nations can also experience negative effects of these strategies. In the UK, the principle challenge is matching manning levels with rank and specialization, which will likely take several years to be fully achieved. Slovakia experienced similar issues with their manpower reductions as the loss of experienced military /civilian personnel can have immediate negative effects on capabilities.[6]

4.2.3.1.2 Czech Republic

In direct response to the financial crisis, the Czech Republic took a temporary but aggressive approach to achieve quick cost savings by reducing personnel expenditures. The government proposed and directed a series of reductions, including a 10% across-the-board wage reduction for military and civilian employees, compensating overtime work with extra leave instead of salary, and imposing taxes on military housing benefits, taxing pensions of military retirees. As a result of these changes, and concurrent personnel cuts, the Czech Republic reduced its personnel expenses by 4% in 2009, and an additional 7.5% in 2010, totaling an estimated $50.6 M (CY14US$).

4.2.3.1.3 France and Germany

Germany experienced some unintended consequences in suspending compulsory service and drawing down the Federal Defence force to approximately 185 K military service members and 55 K civilians. The result of suspending compulsory service was a substantial increase in spending for recruitment and retention. Unexpectedly, this extra cost almost exactly offset the cost savings achieved by reducing personnel numbers. Another lesson learned from the drawdown is that hasty personnel reductions can affect weapon system readiness essential for national security, and for contributions to NATO, if not executed properly.

To reduce the costs of recruiting additional military and civilian defence personnel, both France and Germany pursued outsourcing strategies (including outsourcing tasks to other ministries). In Germany, other Federal Administrative agencies performed similar tasks to those in the MoD, including providing pay, allowances, and child care benefits. Since these tasks are not core to Defence, it offered an opportunity to outsource these activities to other federal agencies.

An important point to consider when outsourcing to other ministries within the federal government is that although costs are transferred, budgets are as well. The funding is taken out of the MoD budget in future years

[6] While the reorganization and reduction of personnel brought cost savings necessary for modernization of Slovakia's Armed Forces, recurring reductions to achieve additional cost savings, based on the current security environment, could increase the risk to some capabilities.

and assigned to those federal agencies now providing the services. However, savings can be realized in overhead costs and from scale economies if other federal agencies specialize in providing shared services for multiple government agencies.[7]

4.2.3.2 Equipment

Following personnel cost reductions, most participating Nations generated operating efficiencies through strategies focused on managing the cost of equipment. Achieving targeted cost savings through procurement reforms can involve:

- Competition;
- Incentive contracts;
- Joint/combined development of defence capabilities; and
- Public-private partnerships.

4.2.3.2.1 United States

In an effort to maintain capabilities in a cost-constrained environment, the USA designed a program called Total Ownership Cost (TOC). The program is designed to assess the costs to research, develop, acquire, own, operate, and dispose of weapon and support systems; other equipment; real property; and includes costs to recruit, train, retain, separate, and support military and civilian personnel; and all other costs of business operations. This is accomplished through two broad efforts:

a) Cost mitigation; and

b) Cost reduction.

Cost mitigation refers to early life cycle assessments to decrease operations and sustainment costs later in the life cycle. Cost reduction focuses on decreasing the overall TOC of fielded systems.

TOC has proven successful in reducing operating costs in two specific cases:

1) The Hybrid Electric Drive (HED) on the LHD ship – a cost mitigation strategy supporting greater fuel efficiency, longer range, and simplified fuel supply chains (compared to conventionally powered ships); and

2) The use of digital x-rays in aircraft maintenance – reducing maintenance labor costs, and improving safety.

The main benefit of TOC is its focus on total costs of ownership at the beginning of the acquisitions process to ensure procurement of a specified capability not only meets the strategic goal but is also affordable from "cradle to grave".

4.2.3.2.2 United Kingdom

The UK's Equipment Support Programme comprises a significant portion of the British defence budget and therefore, generating efficiencies in this program could result in significant cost avoidance and savings. To that

[7] Another alternative would have the MoD retain the budget for specific services outsourced and provided by another federal agency, and pay a "transfer" price to that agency for the service. This is the case of Revolving (or "Working Capital") Funds within the U.S. Department of Defense.

end, a comprehensive review of all contracts identified areas that could generate the greatest efficiencies. Examining both existing and pending/emerging contracts allowed the UK to find direct cost savings, to improve output for the same cost, and to build future savings into contract negotiations/agreements. The reviews included three phases:

1) Conduct analysis to determine the current value for money;
2) Assess negotiation leverage available with suppliers; and
3) Identify and execute levers to improve the value for money.

Due to the complex nature of contracting, this strategy requires detailed program management skills and continuity to ensure accountability throughout the life of the contract. While initial phases of this review have only recently been completed, significant savings have emerged (although specific data is not available for this study), such that the savings are believed to far exceed the costs of employing specialized external consultants to conduct the reviews. Moreover, savings were generated beyond the year of execution and demonstrated the ability to achieve efficiencies over a ten-year planning horizon.

The UK MoD notes that incentive mechanisms can succeed in creating a culture that actively seeks strategies for long-term efficiency. These incentives include both positive incentives, such as allowing resource managers to keep and reinvest a portion of savings, and negative incentives, such as threatening to cut budgets if savings are not achieved.

4.2.3.2.3 Germany

To generate further operating efficiencies, the German Federal Defence force chose to phase out older weapon systems. This became necessary for three reasons:

a) To reduce the cost of maintaining equipment close to obsolescence that requires increased maintenance and that experiences frequent breakdowns;
b) To reduce the number of personnel required to operate and maintain older systems; and
c) To fully meet current capability requirements (older systems are not as technologically advanced and cannot easily be modified to meet current capability requirements).

Savings realized from phasing out older materiel (including both personnel and funds) can be made available for other valuable uses.

Increasing the use of simulators is another strategy that was used to generate operating efficiencies. Less money was required for maintenance, personnel, and infrastructure costs associated with training; allowing savings to be re-allocated within the Federal Defence force. While the primary motivation for simulator use is cost savings, secondary benefits include reduced wear on equipment, conservation of natural resources, minimizing environmental impacts, and a reduction in operational risks. From a capability perspective, simulators can also have important positive effects on training and materiel costs.

NATO's current limit on simulation pilot hours per year raises interesting questions: What is the optimal number of pilot simulation hours to maintain an acceptable level of risk within NATO? Suppose Member Nations can generate significant efficiencies by increasing the NATO standard, how would that affect the ability of Allied Nations to maintain flight capabilities?[8]

[8] Using the German example where the Operations and Sustainment (O&S) cost of a flight hour are 75,000€, and each simulator hour O&S costs 5,000€, significant savings could be achieved by relaxing restrictions on simulators. Simply increasing the NATO simulation standard by ten hours creates savings of 700,000€ per year.

Answering these questions represents an important opportunity to generate operating efficiencies by making careful trade-offs. The goal is for Member Nations to realize cost savings through increased simulator training, while maintaining an acceptable level of risk to preserve the credibility and effectiveness of the Alliance.

4.2.3.2.4 Italy and Czech Republic

The remainder of practices collected from participating Nations to generate efficiencies in managing equipment are associated with selling or otherwise disposing of obsolete or excess inventories. Both Italy and the Czech Republic generated significant revenues for their respective Ministries of Defence by selling unneeded equipment that were subsequently used for modernization.

Between 2010 and 2011, the Czech Republic generated an estimated $74 M (CY14US$) from the sale of assets in direct savings, and in cost avoidance from lower maintenance and security activities. For example, the 2015 sale of fifteen L-159 ground attack aircraft, a redundant platform, generated approximately $44.3 M (CY14US$) including cost avoidance such as eliminating operations, maintenance, and storage costs.

In order to modernize their defence forces, the Italian MoD surveyed its defence installations to identify those that maintained obsolete and out-of-service equipment and supplies. These were cataloged, consolidated, and assessed for their marketability to parties outside the Italian MoD. The result of this action is not yet determined as this action represents a relatively recent strategy to generate operating efficiencies.

4.2.3.3 Infrastructure

Searching for operating efficiencies within infrastructure portfolios offers opportunities for base realignments, closures, and consolidation to achieve economies of scale, and outright sales of unneeded property and facilities.

4.2.3.3.1 Germany

Germany's Federal Defence identified numerous facilities, barracks, bases, apartment buildings, and firing ranges that require extensive maintenance and administration, but that are not core Bundeswehr tasks, and that could be outsourced. Infrastructure that is no longer needed and can be sold was turned over to the Institute for Federal Real Estate, which is responsible for administrating and selling unneeded assets. The German Federal Defence achieved two main results from this action:

a) Revenue earned from the sale of real estate was divided between the German Federal Defence and the Ministry of Finance; and

b) Operating costs (e.g. personnel) have been reduced for the MoD (surplus infrastructure is now administrated by the Institute for Federal Real Estate).

4.2.3.3.2 United Kingdom

Defence infrastructure in the UK was historically managed and funded by the military service using it (e.g. Navy, Army, Air Force). Since operational commitments took precedence over maintenance, military estates suffered from lack of upkeep and often required significant investments to restore, which increased financial risks faced by the MoD. As a result, the UK created a consolidated Defence Infrastructure Organization (DIO), provided it with a single infrastructure budget, and gave it the responsibility to maintain the entire estate.

This new organization is developing an infrastructure program based on the requirements of each service/ department. A long-term "Footprint Strategy" is intended to identify the most cost-effective approach to base all

the Armed Forces, given future force structure and organizational plans. The DIO will seek to ensure optimum utilization of estates and set footprints of the right size, quality, and location to support departmental requirements. Efficiencies generated through the DIO, and implemented through the Footprint Strategy, are meant to develop a sustainable defence infrastructure that delivers desired defence outputs and capabilities.

4.2.3.3.3 Italy

Similar to Germany, Italy's Defence Ministry evaluated its military property assets to determine if its infrastructure was properly maintained, sized and located. Installations no longer needed by the Italian MoD are intended to be returned to local communities. The remaining infrastructure will be modernized.[9]

While savings are expected to be achieved through the sale of unnecessary infrastructure, Italy acknowledges that land, sea, and air training areas are essential to maintaining the operational effectiveness of its forces. The sale of property assets will likely affect the ability of Italy to train its forces within its national territory and therefore, savings realized from the sale of property assets could be offset by higher training costs abroad. This example of near-term savings versus long-term costs illustrates an important point. It is as important for Member Nations to conduct careful military cost-benefit analyses for their divestment decisions, as it is for their investment decisions.

4.2.3.4 Supplies and Logistics

Cost savings have been achieved by generating efficiencies through centralizing logistics support and the procurement of supplies.

4.2.3.4.1 Poland

In an effort to save costs, Poland established a process of logistic and financial consolidation aimed at establishing highly specialized logistical units responsible for specific areas of logistic support, public procurement, infrastructure management, and financial issues. Although not directly the result of the financial crisis, implementation coincided with subsequent reductions in the defence budget. The consolidation strategy employed by Poland generated efficiencies in the procurement of common supplies and pooled resources; contributed to improved resource management; and increased logistical efficiency through specialization. Additionally, centralizing activities reduced the burden on operational units, and created opportunities to lower costs by reducing civilian personnel requirements.

4.2.3.4.2 United Kingdom

Interestingly, the UK took a similar approach to generate cost savings. The UK decided to centralize the procurement of common goods and services, including IT, office products, and general use transportation. The objective was to optimize the value of monies spent in government procurement by leveraging economies of scale.

To this end, a new government service was established to manage procurement; improve supplier and contract management, centralize buying requirements, and consolidate smaller projects; and to lead government procurement policy. Though still in its infancy, early indications suggest that by leveraging economies of scale and implementing best practices the British government is achieving savings for common goods and services.

[9] The assessment of actual property needs is derived from the coordinated planning of logistic and territorial bodies, influenced by the reorganization of forces and high commands.

4.2.4 Promote Assessment Mechanisms

While the first three categories of resource management strategies aim to improve defence planning, programming, and budgeting and execution, the final category assesses the need for legislative reforms that might be required to implement those strategies. While some new legislation might be needed to generate efficiencies and improve operational effectiveness, it might also be necessary to relax, modify, change or eliminate costly and unnecessary existing laws, rules, or regulations.

4.2.4.1 Poland

In 2001, Poland adopted new defence legislation that mandated defence expenditures at no less than 1.95% of the prior year's GDP, and that no less than 20% of those expenditures are allocated to capital investments. Polish defence forces are the only federal entity with legally guaranteed budgets independent of changes in government policies, strategies, or priorities. This new legislation is meant to guarantee stability in the defence sector, and provides Poland with the rare ability to plan and secure funding for long-term programs.[10]

However, in 2013, Poland's Parliament enacted a one-year law stating that the 1.95% rule would be temporarily amended, which has led to some uncertainty. Such interventions could lead to serious problems during budget execution if defence has committed to expenditures in accordance with the budgetary law, but in times of fiscal stress, fails to receive the expected funding. As an outgrowth of the 2014 Wales Summit, Poland recommitted to a NATO spending pledge of 2.0% of GDP on defence and internally added to spend no less than 2.5% to fund defence research and development.

Poland also passed another important piece of legislation, enacted in 2010, which attempts to increase financial discipline in government spending. The aim was to improve the transparency, efficiency, and effectiveness of the public sector by adopting:

- **Multi-Annual Financial Plans** – To carefully link allocated funds with long/medium-term priorities.
- **Performance Budgeting** – To clearly identify final objectives as well intermediate activities and resource inputs required to achieve government goals.
- **Management Controls** – To determine priorities, aims and tasks, to coordinate activities, assure balance between tasks and resources, adapt adequate procedures and structures, monitor activities, manage risks, identify obstacles, and determine and implement necessary improvements.
- **Organizational Changes** – To reduce redundant structures and activities.

The result of this legislation was to inject much needed discipline into the resource management processes of the entire government, including defence.

4.2.4.2 Czech Republic

The Czech Republic's practice of purchasing military equipment and security services through intermediaries and third parties significantly raised the total cost of purchases by an estimated $82.3 M (CY14US$) over the period 2005 – 2011. An amendment to the Czech Republic's law now allows the MoD, via the Czech National Armaments Office, to write contracts directly with the NATO Support and Procurement Organization (NSPA) – formerly NAMSA.

[10] Note, however that certain legal regulations can be temporarily modified.

NSPA integrates NATO's logistical and procurement support activities, offering comprehensive multi-national support solutions for Member and Partner Nations. Its aims are to improve efficiency and effectiveness in the delivery of capabilities including services, to achieve greater synergy between similar functions, and to increase transparency and accountability.

By enacting reforms that enabled its use of the NSPA, the Czech Republic was able to:

- Eliminate the cost of third-party intermediaries;
- De-scope and even cancel some existing support contracts; and
- Generate cost savings and other interoperability benefits through adoption of NATO-wide common maintenance and logistics packages.

Adoption of legislation to allow a country to work with NATO's NSPA offers a potentially valuable resource management strategy that could benefit many NATO Member and Partner Nations.

4.3 SUMMARY

This chapter focused on providing selected examples of defence management practices drawn from participating Nations in each of the four categories of the analytical framework: Planning, Programming, Budgeting and Execution, and Assessment. This familiar resources and financial management framework is designed to help organize country contributions to help Member and Partner Nations better shape their responses to future budget constraints, safeguard national security, and support the Alliance. Collecting country contributions in these four categories reveals multiple options to increase the efficiency and effectiveness of our forces.

It is instructive to observe the distribution of participating Nation contributions across the four categories of the framework. This study reveals how participating Nations responded to recent fiscal constraints and where there remain valuable opportunities for future contributions and applications.

The majority of resource management practices from participating Nations in response to the fiscal crisis were reactive, in the sense that they attempted to generate immediate operating efficiencies (Budgeting and Execution). Yet several contributions were offered by countries that were more proactive in that they focused on Planning defence outputs (effectiveness), and Programming the best mixes of inputs to produce those outputs (efficiency).

Using a common framework such as this to identify, organize and share defence resource management practices across the Alliance could help maximize national and collective security in the face of future budget constraints.

Chapter 5 – FINDINGS AND RECOMMENDATIONS

5.1 FINDINGS

5.1.1 Overall Macroeconomic Effects of the Great Recession

From a macroeconomic perspective, the Great Recession impacted NATO members in similar ways. Among Member Nations that participated in the study, drastic declines in GDP growth at the peak of the financial crisis soon shifted to significant growth, before settling into a period of relatively flat growth. With ten of twenty-eight NATO Member Nations participating, this study includes a representative sample of the Alliance.

Aggressive economic and monetary policy responses to the financial crisis led many Nations to experience unprecedented levels of deficits and debt. From the start of the recession in 2007 until today, unemployment, tax revenues, and national debt burdens followed similar patterns in terms of volatility across the participating Member Nations.

Negative impacts of the financial crisis forced NATO Nations to develop diverse strategies and policies to prevent economic collapse. As NATO Nations cut and reprioritized spending in an effort to stimulate their economies, they adopted a variety of defence management strategies to adapt to the new budgetary realities.

Similar to the diversity observed among national-level responses to the financial crisis, each country's national defence developed unique approaches to adapt to tightening defence budgets. The 2014 Wales Summit created specific guidance regarding future defence budgets, to include macro-level initiatives such as reversing the trend of declining defence budgets; recommitting to spending 2% of gross national GDP; increasing spending to halt declines in defence spending; and aiming to spend at least 20% of defence expenditures on new equipment as well as research and development. However, by the end of 2014, only three of the ten Nations included in this study met NATO's 2% goal. Recognizing these challenges, this study offers an opportunity to identify, organize, and share defence resource management practices adopted by some Member Nations to increase the overall efficiency and effectiveness of the Alliance.

5.1.2 The Need for an Analytical Framework

Currently, there is no generally accepted NATO-wide analytical framework to assist Member Nations to identify, organize, and share defence resource management practices. That being said, four general recommendations emerged from participating Nation contributions that offer a common framework to promote more effective and efficient use of defence resources:

1) Rationalize Capabilities and Programs;
2) Improve Transparency and Accountability of the Resource Management Process;
3) Generate Operating Efficiencies; and
4) Promote Assessment Mechanisms.

These four key components of the analytical framework closely correspond to the logic of the Planning, Programming, Budgeting and Execution, and Assessment system reflected in resource and financial management systems used by many in the Alliance.

The goal of this framework is to help Member and Partner Nations better shape their responses to future budget constraints, to safeguard national security, and to support the Alliance. The framework could serve as a valuable organizing structure to collect and share future contributions from NATO members and partners in order to continuously improve the efficiency and effectiveness of the Alliance.

5.1.3 Defence Resource Management Practices

Selected defence resource management practices from participating Member Nations were assigned to one of the four categories of the analytical framework. This offers a window for NATO and others to understand how participating Nations responded to the recent financial crisis.

Most resource management practices from participating Nations were reactive, in the sense they attempted to generate immediate operating efficiencies in the face of the financial crisis (i.e. in Budgeting and Execution). Yet several contributions offered by countries were more proactive in that they focused on better planning of defence outputs (effectiveness), and programming the best mixes of inputs to produce those outputs (efficiency).

Of the 41 defence resource management practices submitted by participating Nations and organized in the framework, 59% focused on generating operating efficiencies (Budgeting and Execution), 15% on rationalizing capabilities and programs (Planning), and 18% on improving transparency and accountability in resource management processes (Programming). These finding expose some gaps in defence resource management strategies used by participating Nations to respond to budget constraints.

The analysis suggests that Member Nations tend to focus more on *how* they spend their money (efficiency) rather than *what* capabilities in which to invest (effectiveness). Partitioning Nation contributions through the lens of this framework is helpful since it reveals that while responses were mostly reactive, there may be valuable opportunities for more pro-active efforts to address future budget constraints.

The discussion of NATO's three main initiatives to mitigate budgetary risks:

a) Smart Defence;

b) Connected Forces Initiative; and

c) Framework Nations Concept offers challenges and opportunities similar to those experienced by the participating Nations.

These initiatives encourage multi-national cooperation; interoperability; and the development of defence capabilities through prioritization, specialization, and cooperation. This study is part of an ongoing effort to develop a collaborative process to identify and share defence resource management practices to benefit the Alliance.

5.2 RECOMMENDATIONS

- Adopt and expand the proposed analytical framework to provide Alliance Nations a common foundation to achieve effective and efficient defence resource management.

- Create a Defence Resource Management Division to collect, analyze, and share crowd-sourced resource management practices. This division could be aligned to the Economics and Security Assessment Unit under Emerging Security Challenges Division and managed by the NATO Defence Economist.

- Develop an annual Defence Resource Management Symposium to assemble the Alliance's top defence resource managers in an effort to share successful resource management practices. Develop new and/or improve upon existing strategies, and collaborate to achieve improved efficiency and effectiveness across the Alliance.

5.3 AREAS FOR FUTURE RESEARCH

- Describe the determinants of military expenditure (economic and security) and identify disparities between NATO Member Nations to describe how a diverse economic environment affects military expenditure, as a percentage of GDP:
  - What are the circumstances surrounding why only a small group of NATO Nations fulfill the recommended 2%/20% of GDP expenditures/investment?
  - Hypothesis: The Alliance is not an economically homogenous body of individual economies therefore the allocation of disparate amounts of GDP for defence is dependent on political priorities of individual governments, public finances, or overall economic condition of national economies.
- Determine the best methods to gain greater efficiencies and cost effectiveness across defence industries:
  - Throughout this study, many Nations stated significant challenges in gaining the highest return on investment from a limited or monopolized industrial base; an area of considerable interest across NATO. Further study in this area could include the identification of best practice and how to best economize value for money spent. In addition, identifying genuine opportunities for improved collaboration strategically across NATO can drive improved competition while simultaneously increasing capability effectiveness. Such a study could define the scope and potential for a NATO Defence Industrial Strategy.
- Reducing globalization dependencies across NATO:
  - A common pushback to collaboration between Alliance Nations is infringement on national sovereignty. In reality and due to globalization, Nations are reliant on global markets for their defence industry. To what extent should NATO focus on ensuring that the Alliance dependence on global markets does not degrade its ability to provide collective defence, crisis response, and cooperative security?
- Specify the benefits and challenges associated with increasing dependencies between NATO Nations:
  - Areas of interest to explore the benefits and challenges to achieving increasing collaboration/ dependence were outlined throughout this report. A study of this nature could identify how multi-national cooperation could achieve greater dependency while ensuring that capabilities are coherently linked across NATO.
  - Investigate the ability to forecast future budgetary constraints across Member Nations of the Alliance.

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Annex A – SAS-113 STAKEHOLDER MAP

During the conduct of our study, SAS-113 collaborated with multiple stakeholders across NATO in order to better understand how defence resource management research could best contribute to the Alliance. With limited experience working with NATO, the lead team explored various components within NATO to gain essential background information. The purpose of this stakeholder map is to capture the knowledge gained from this experience for future researchers with limited NATO experience. The stakeholder map identifies the key organizations or divisions which SAS-113 collaborated with, their location, and overall mission within NATO.

Figure A-1: SAS-113 Stakeholder Map.

A.1 ALLIED COMMAND TRANSFORMATION (ACT) – NORFOLK, VA, USA

The overall mission of ACT is to contribute to preserving the peace, security and territorial integrity of Alliance member states by leading the transformation of NATO military structures, forces, capabilities and doctrines to improve the military effectiveness of the Alliance. This mission requires ACT to translate the political and military guidance into capability requirements in order to face emerging security challenges successfully.

ACT is organized around four functional areas. They are:

1) Strategic Plans and Policy;
2) Resource and Management;
3) Capability Development; and
4) Joint Force Training.

During the course of our project, SAS-113 sought to better understand how NATO performs capability development and the conduct of the NATO Defence Planning Process (NDPP) in order to identify how these processes relate to future defence budget constraints. SAS-113 coordinated with ACT's Operational Analysis Branch which resides within the Capability Development functional area.

A.2 INTERNATIONAL STAFF (IS)

The International Staff (IS) consists of approximately 1,000 civilians who work at NATO Headquarters in Brussels, Belgium. The primary role of the IS is to provide advice, guidance and administrative support to the national delegations at NATO Headquarters. It helps to implement decisions taken at different committee levels and, in doing so, supports the process of consensus-building and decision-making within the Alliance.

The International Staff includes the Office of the Secretary General, seven divisions, each headed by an Assistant Secretary General, and a number of independent offices headed by directors. SAS-113 collaborated with two of these divisions during the course of our research. They are the Defence Policy and Planning Division and the Defence Investment Division.

- **Defence Policy and Planning Division (DPP) –** This division develops and implements the defence policy and planning dimension of NATO's fundamental security tasks. This includes defence planning, the Alliance's nuclear policy, defence against weapons of mass destruction and certain aspects of operational planning. The division is organized into two Directorates, the Defence Policy and Capabilities Directorate and the Planning Directorate. SAS-113 met with the directors of both of these directorates to better understand how research into future defence budget constraints could best support NATO.
- **Defence Investment Division (DI) –** This division focuses on the development of military capabilities to enhance the Alliance's capacity, including armaments planning, integrated air defence, airspace and air traffic management, and command and control. It contributes to the Nations' ability to assign to the Alliance forces that are properly equipped and interoperable to undertake the full range of military missions. The division is organized into one program office, three directorates and an independent section. SAS-113 met with multiple personnel from this division to gain insight into multi-national efforts such as Smart Defence.

A.3 SCIENCE AND TECHNOLOGY ORGANIZATION (STO)

The mission of the STO is to help position both national and NATO science and technology investments as a strategic enabler of the knowledge and technology advantage for the defence and security posture of NATO Allies and partners. The organization aims to leverage and augment the science and technology capabilities and programs to contribute to NATO's ability to influence security and defence related development. It also supports decisions made at both national and NATO level by providing advice to the North Atlantic Council (NAC) and national leadership. The STO acts as NATO's principal organization for science and technology research.

The STO is composed of a Science and Technology Board (STB), Scientific and Technical Committees and three Executive Bodies; the Office of the Chief Scientist (OCS), the Collaboration Support Office (CSO), and the Centre for Maritime Research and Experimentation (CMRE).

The CSO supports the Collaborative business model whereby NATO Nations and Partner Nations contribute their national resources to define, conduct and promote cooperative research and information exchange. During

the conduct of this product SAS-113 has primarily worked with the CSO on all matters pertaining to the study. Additionally, SAS-113 has worked with the OCS in order to coordinate exploitation of the completed study report.

A.4 NATO DEFENCE COLLEGE (NDC)

The mission of NDC is to contribute to the effectiveness and cohesion of the Alliance, foster strategic-level thinking on political-military matters, and develop a major center of education, study, and research by:

- Preparing selected officers and officials for important NATO and NATO-related multi-national appointments;
- Conducting academic studies and research in support of the Alliance's wider goals; and
- Supporting an active outreach program with other educational institutions.

SAS-113 visited NDC and met with researchers and senior members of the school staff to determine what previous research the college had conducted in the area of future defence budget constraints. Researchers at NDC also provided input to SAS-113 on scope and methodology for the study.

Annex B – LITERATURE REVIEW

Budget Restraint and Military Expenditures in NATO Countries: A Review of the Literature

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Contract Report
DRDC-RDDC-2015-C236
October 2015

The Norman Paterson School of International Affairs

Carleton University

NPSIA WORKING PAPER SERIES

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Working Paper No. 04, October 2015

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Acknowledgements:

I would like to thank, without implicating in any errors, Mr. Decky Kipuka Kabongi for excellent research assistance on this project, Dr. Binyam Solomon for guidance and comments, and the participants in the NATO Science and Technology SAS-113 4th Meeting workshop in Ottawa, October 14-15, 2015 for discussion. This report was prepared for the workshop under the project working title of "Report on Future Budget Constraints: Challenges and Opportunities", and was commissioned by Defence Research and Development Canada, Department of National Defence, Government of Canada.

B.1 INTRODUCTION

The broad purpose of this report is to review the academic and scientific literature on the factors affecting the quantity and quality of expenditures on defence by members of a military alliance. The motivation for the study is the expectation that countries in the North Atlantic Treaty Organization (NATO) will be facing budget constraints that will impinge on their contributions to collective security. In addition there has been an increasing tendency to rely on "coalitions of the willing" as the dominant organizing framework for recent military missions undertaken by several NATO members outside the European theatre. This evolving strategic environment suggests that NATO member countries may face pressures to rebalance military force structure and procurement in order to meet changing priorities. Specifically, some countries may potentially wish to alter the relative emphasis that they place on national ("private") and alliance ("public") military objectives. In addition, engagement in relatively more offensive missions out of the traditional NATO theatres of operation may also generate pressure to rebalance military forces accordingly.

This literature review is structured in the following manner. Section B.2 will examine the literature on military alliances and identity insights relevant for the current review. Section B.3 will examine more specific examinations of the production and supply of military goods, while a fourth section focuses on the demand side. A concluding section will identify the key lessons that emerge from the review.

B.2 THEORIES OF ALLIANCES

The use of economics as a tool for the analysis of military alliances was pioneered by Olson and Zeckhauser (1966) [24], who examined security alliances as a form of public good. Security, once provided, can be enjoyed by all members without compromising the security of other members nor, presumably, can members be excluded from enjoying it. The key behavioural insight is that as a public good there is the opportunity for "free-riding", or the ability of some members to acquire the benefit of collective security while not paying their "fair share". Though predicated on a rather restrictive assumption that collective security is a pure public good, the analytical approach introduced by Olson and Zeckhauser [24], and subsequently extended by them and several others (for example Murdoch 1995 [19]), led to several key insights that are summarized in Ref. [33] as follows:

i) Larger and richer members of an alliance will tend to bear a disproportionately larger share of the defence burden than smaller and poorer ones (the "exploitation hypothesis").

ii) Total defence expenditure will tend to be allocated sub-optimally.

iii) To overcome allocation problems there needs to be a strong central authority or other means (such as threats or norms) to induce greater cooperation.

iv) Since deterrence benefits are non-rival, alliance size need not be restricted except for reasons of transactions costs (coordinating too many members) or to the extent that collective security is rival.

v) The benefits of deterrence may be disconnected from defence expenditures due to the possibility of free riding, leading some alliance members to reduce expenditure when (and because) others raise theirs.

vi) The extent of sub-optimal expenditures depends on the size of the alliance and the distribution of member size.

Sandler and Hartley (2001) [33], Sandler and Forbes (1980) [31] among many others develop or review the main extension to the standard public-goods analysis: the joint-products model. Under this alternative specification, alliance defence expenditures can yield pure public benefits to the alliance members (e.g. nuclear deterrence), but also private benefits acquired by each member specifically, as well as impurely public benefits associated

with limiting damage to a specific member (e.g. anti-ballistic missiles or protective shelters). Many of the behavioural problems predicted by the pure public goods model of alliances (such as free riding and the exploitation hypothesis) are mitigated or eliminated when military expenditures provide significant private advantages. The joint-products model thus became a standard analytical framework.[1] Essentially the joint-products framework (with more private benefits) predicts smaller defence spending burden asymmetries within the alliance than the pure public goods model.[2]

Estimating the degree of burden asymmetry as a test of the joint-products model is compromised by the absence of precise concepts and measures of country burdens and benefits. While we may be fairly confident that military expenditures (usually expressed as a percentage of GDP) are a reasonable proxy for the burden, the classification of some security related expenditures (intelligence, police, etc.) may be missed in some cases. In addition, security threats can also be dealt with by diplomatic means or possibly development assistance, so there is some ambiguity with respect to what ought to be included as elements of the burden.

Regarding benefits, standard analyses (as in Sandler and Hartley, 2001: 884-885, Table 1 [33]) measure country benefits as a weighted combination of variables such as population, GDP and exposed borders. Consequently, by virtue of its extensive maritime borders, Canada emerges as by far the largest free-rider in NATO. From a Canadian perspective this finding seems rather odd, given that for long periods of time Canadian military forces were committed to European defence and deployed in the European theatre, but not the reverse. One potential source of the imbalance is the conflating of the NATO alliance with other defence agreements such as NORAD for North American defence. A second possible source of asymmetry is more tactical: to what extent is an amphibious assault on Canada a serious security threat compared to a land-based assault on Europe? This apparent anomaly sparked a valuable exchange between Solomon (2004, 2005) [39], [40] and Sandler (2005) [30] regarding the most suitable measures of alliance benefits and the sensitivity of the extant empirical analyses of burden asymmetry. Solomon casts doubt on the robustness of past findings, pointing to both the maritime border measure and the inclusion of Canada (a clear outlier) as being key determinants of past results, throwing some doubt on the prior conclusions about the public-private balance in military expenditures.

Though Sandler and Hartley (1999) [5] acknowledge that the measures of burden asymmetry are sensitive to assumption choices that can be manipulated to emphasize one result over another, the standard approaches to measurement have remained largely unchanged. Sandler and Shimizu (2014) [36] return to the question of burden sharing and introduce exposure to terrorism as a fourth determinant of the benefits received from alliance membership, the inclusion of which is also theoretically problematic.[3] Despite these theoretical and empirical

[1] Another approach to theoretically classifying alliance expenditures and benefits has been suggested in Gates and Terasawa (2003) [3], though it maintains its focus on the degree of "publicness" or "privateness" of such expenditures. They provide some useful concepts such as internal burden (military expenditure) and external burden (increased threats arising from membership in the alliance) and alliance benefits (the reduced expenditures on the military arising from the spill-ins of security associated with the military expenditures of other alliance members). However they do not operationalize these concepts, nor do they test them empirically.

[2] There are alternative but similar economic approaches to modelling alliance behaviour. One strand of analysis examines whether alliance behavior is best explained as a Nash-Cournot equilibrium or a Lindahl equilibrium ([41], [34], [16]). These different strategic environments can best be regarded as competitive (or non-cooperative) and cooperative, respectively. Similarly Hilton and Vu (1991) [8] use the Stone-Geary functional form to measure alliance member welfare. They reject the naïve pure public goods model and instead find "competitive behaviour between allies or apparently selfless commitments to taking on more than a 'fair' burden of the response to increases in the threat" (from the abstract).

[3] The use of the actual incidence of terrorism in a country as one element of alliance benefits is understandable as an empirical necessity in the absence of available and superior proxies, but its inclusion crudely assumes that the diminution of terrorist threats (the true benefit) is both proportional to actual attack incidence and attributable to NATO. Its inclusion reduces but does not eliminate burden asymmetry measures, and there remains significant lack of cohesiveness within the alliance in terms of the distribution of benefits and burdens, which the authors identify as a potentially serious source of disunity and a significant challenge for NATO.

concerns, an extensive literature did develop that focused on measuring the burden asymmetry within NATO (for examples see Murdoch and Sandler 1982, 1984) [20], [22].

The extensive burden-sharing literature has identified several factors associated with changes in military spending patterns and the extent of intra-NATO spending asymmetry. These studies identify five structural factors that have been linked to changes in alliance member behavior: technology, membership expansion, changing strategic environments, changing military doctrine, and the focus on new missions.[4] While often identified separately, it is obvious that most of these factors, if not all, are related to one another, often quite closely, directly and causally. For example a new strategic environment may require the identification of new doctrine and NATO policy, which in turn will result in new missions.

Taking these factors in turn, technology is linked to alliance behavior and burden asymmetry initially through theoretical considerations tied to the public and private goods nature of military spending.[5] For example, Sandler and Forbes (1980) [31] look at the implications of military technology for the joint-products model, classifying systems as either purely deterrent (e.g. nuclear weapons for retaliation), purely protective (missile defence or shelters), or a mix of both. Multiple use technologies obviously complicate any assessment of "publicness" and "privateness" and hence our ability to specify the model that best reflects alliance behavior. Sandler and Forbes (1980) [31] and Hartley and Sandler (1999) [5], among others, also consider technology as a factor affecting burden sharing, while Gonzalez and Mehay (1990) [4] suggest that the nature of weapons systems, and presumably their greater sophistication and scale requirements, may induce more cooperative behavior by alliance members.

NATO's expanded membership is also linked to the technology discussion. The expansion of the NATO frontier and the inclusion of poorer members risked the "thinning" of NATO's military capacity, which has some coherence with Hirshleifer's concept of "weak-link" technology. Specifically, NATO's overall security may be compromised if some frontier states are seen as less well defended and subject to being overwhelmed. Hartley and Sandler (1999) [5] note both the likely "thinning" effect caused by NATO expansion, as well as the implications for more complicated decision-making ability within NATO. Sandler and Murdoch (2000) [35] also suggest that expanded membership may increase the burden asymmetry, a particular risk as expansion has increased the number of weaker and poorer states in the alliance, often with non-NATO frontiers.

The expansion of NATO is in turn linked to the new strategic environment faced by NATO after the collapse of the Soviet Union. The perceived diminution of the military threat from the East, and now specifically Russia, and the eagerness of many former Warsaw Pact countries to secure their new independence from Moscow through NATO security guarantees, allowed and required the alliance to reconsider its threat environment. It is difficult, however to separate the strategic environment from its direct effect on strategic doctrine. Sandler and Hartley (2001) [33] provide a useful review of the earlier empirical literature examining military expenditures in alliance frameworks. The earlier studies often found evidence of the exploitation hypothesis and the pure public goods model, at least for the period immediately after the Second World War when the public good of nuclear deterrence was the dominant strategic paradigm. The subsequent period of détente and arms control ushered in the strategic doctrine of "flexible response", which lasted from 1967 to about 1995. During these years military expenditures were seen as more "private" in nature, as predicted by the joint-products model, and with

[4] A sixth factor, budgetary pressure, is examined in more detail in Section B.4 below.

[5] Some of the original thinking about technology and its behavioural impacts emerge from Hirshleifer's work on conflict, which focused on fundamental problems of how to aggregate the different contributions to security. Hirshleifer (1983) [42], for example, identified the theoretical extremes of "best-shot" technology (where collective defence was a function only or primarily of the military capacity of the strongest contributor) and the "weakest- link" technology (where the strength of the alliance is effectively dependent on the military capacity of its weakest member).

concomitant diminution (but not elimination) of the burden asymmetries [10], [11], [35]. Sandler and Hartley (2001) [33] argue that NATO's mid-1990s adoption of a "new crisis-management doctrine paved the way for it to assume peacekeeping missions whenever its security interests were in jeopardy".

Sandler and Murdoch (1990) [34] and Khanna, Sandler and Shimizu (1998) [12] emphasize that these operations are associated with greater asymmetries of burdens that are to the disadvantage of richer NATO allies. This new strategic policy has arguably lasted for at least a decade and a half, though it may need to be revised to reflect the re-emergence of the traditional East-West fault lines that developed immediately after the Second World War, this time in the form of competition with Russia.

The post-Cold War strategic environment and associated revisions to NATO policies have been manifested in changes in the nature of NATO activity. Relieved from the preoccupation with the Soviet Union and its allies, NATO member countries have increasingly become involved in peacekeeping, peace enforcement, and other related activities. These new missions exhibited many differences in comparison to the era of flexible response, including an increasing focus on conflicts outside of the immediate European theatre (at least after the conflicts associated with the dissolution of Yugoslavia), often by only a sub-set NATO members, and often in the context of asymmetric warfare. Very early on, Sandler and Forbes (1980) [31] identified such missions as likely to yield private and excludable benefits as well as rivalry in consumption, which challenge to the public goods element of alliances. Sandler and Hartley (2001) [33] point out that while some of these missions may improve global security and thus constitute a non-excludable public good for all alliance (and presumably non-alliance) countries, other missions may be of primary interest to only a few members, and thus be partially if not extensively rival. Khanna, Sandler and Shimizu (1998) [12] suggest that the emphasis on such missions coincided with more disproportionate military expenditures within the alliance due the varying degrees of importance that different allied countries attached to specific missions. In contrast Ringsmose (2010) [28] suggests that these new missions can best be understood by regarding NATO as a "club good" that arises in part from the US role as a "security guarantor of last resort".[6] Ringsmose concludes that NATO will undertake more of these non-traditional missions, especially when US interests are engaged and that as a result the public goods-related collective action problems associated will dissipate and alliance cooperation will increase.

The preceding analyses have largely been undertaken within the dominant theoretical framework of the joint-products model. It should also be noted, however, that the data evaluated in the burden-sharing studies are often consistent with multiple theoretical explanations, including those derived from traditional international relations theory. For example Knorr (1985) [14] examines expenditure asymmetry from the perspective of norms of fairness. Oneal and Elrod (1989) [26] interpret unequal burden sharing using hegemonic stability theory.[7] Similarly Morrow (1991) [18] focuses on the implications for a military alliance of power asymmetries between members, using data to support the prediction that alliances with significant asymmetries are more stable. Palmer emphasizes the importance of domestic politics and the political orientation of parliaments in determining defence expenditures in Europe (1990) [27], and the dominance of long-term commitment over short-term expediency that emerges out of NATO's internal "bargaining". Amara (2007, 2008) [1], [2] finds that while the strategic environment plays some role in behaviour, military expenditures by alliance members primarily reflected their specific political, economic, and military exigencies (including regional circumstances). Consequently she discounts the importance of alliance-related phenomena such as incentives for free-riding or strategic doctrine. Oma (2012) [25] focuses on threats and security, but concludes that all system-level explanations fail to predict spending patterns, and that models must account for the actual policy-making

[6] Club goods are similar to public goods in that they are non-rivalrous, but unlike pure public goods are excludable.

[7] Oneal and Elrod's work provoked a debate with Murdoch and Sandler (1991) [21], and while there was no real resolution of differences, some interesting methodological issues emerged.

processes of member states, and specifically of their leader's abilities and incentives to affect spending patterns. Oma's analysis is consistent with the broader public policy literature that emphasizes the importance of perceived domestic interests, especially the political or electoral interests and calculations of democratic governments. As these authors illustrate, the empirical evidence is often consistent with, and often unable to distinguish between, several theoretical interpretations. Consequently these different theoretical traditions provide a valuable set of alternative approaches to understanding and analyzing the behavior alliance members.

Overall, the standard literature on military alliances establishes many of the core concerns about how member government behave within an alliance framework. Key insights such as the potential for free-riding and asymmetric burden sharing may appear to be theoretical, but do need to be understood in terms of alliance unity. The literature also points to the importance of strategic policy, geopolitical conditions, and technology as key factors affecting the extent to which member countries consider military expenditures as contributing to their private interests versus the extent to which they reflect their commitment to NATO and its needs. Understanding the reality of policy making with respect to defence policy, and the relative balance of "public" alliance interests and "private" domestic imperatives is important, especially for understanding the implications of budgetary pressures. How budgetary restraint is translated into defence expenditures, however, also depends on the supply conditions for weapons production.

B.3 THE SUPPLY OF MILITARY GOODS

The previous section focused on the literature that explores the relationship of spending patterns and behavior as it relates to alliance theory generally. In this section we examine in more detail those papers that analyze issues related more specifically to the supply side of military procurement and spending; we subsequently examine the demand side in more detail. Separating these literatures is a little artificial, as in many instances observations on supply and demand can always be interpreted in the context of alliance theory, and it is often necessary to examine both supply and demand simultaneously when examining the overall performance of the market.

The first paper we examine, Sandler and Hartley (1995) [32], has some elements of supply, demand and market behaviour despite its emphasis on military procurement. They identify several important features of the supply of military goods, specifically:

a) The size and structure of the defence industry is heavily influenced by government (which often acts as a monopsony, i.e. sole-buyer), which typically specifies the technical standards for military equipment.

b) Defense equipment is costly, especially modern weapons systems that contain high technology components.

c) Due to the need for weapons systems to be close to the technological frontier, defence industries have are relatively intensive in research and development (R&D) compared to many other industries.

d) Government regulation is a critical determinant of the openness, viability and profitability of the defence industry. Most importantly governments must determine how to structure procurement contracts so as to regulate the profitability of acquisition programs for suppliers.

Sandler and Hartley (1995) [32] illustrate the intimate connection between the government demand side of military procurement and the supply side, since governments make the critical choices about what weapons systems to purchase, and often choose which supplier to use and which type of contract structure to apply. These decisions ultimately help to shape the structure of the market. Not only is the military goods market typically monopsonistic on the demand side, but it is usually characterized by significant market power on the supply side as well. For some weapons systems there may be very few, possibly even just one, supplier. The markets

themselves generally exhibit high degrees of uncertainty, imperfect information, barriers to entry and exit, and are supplied by firms that Sandler and Hartley (1995) [32] among others identify as being "non-profit-maximizing". This latter characteristic is problematic from an economics perspective, but may reflect different technocratic goals, different discount rates, and in many instances are themselves simultaneously producers of military and civilian goods that have cross-market interdependencies. While the degree of competition ca be increased by permitting foreign firms to bid for defence contracts, it should be noted that "national security" is often used as a justification for market protection, especially where sensitive technologies are concerned.

It has long been noted in the literature that the presence of a "military-industrial complex" introduces both a market as well as a political distortion. With large contracts and profits at stake, supplier in the market have a strong incentive to lobby for preferential consideration on bids. I would further note that military production often occurs in large plants due to economies of scale, and thus provide a powerful basis for lobbying local politicians to influence defence procurement decisions. Sandler and Hartley (1995) [32] note that interest groups in the military-industrial-policy complex are the major source of waste, and that they constitute a significant obstacle to reforms that would introduce greater efficiencies. They argue that it is not necessarily desirable to reduce the influence of these groups, citing Lee (1991) who noted that "the result may be an increase in the general level of inefficiency in the economy as the composition of government spending becomes more distorted toward other civilian special- interest programs" [32].

Many of the findings in Sandler and Hartley (1995) [32] are also identified by Rogerson (1995) [29] in great detail. He also emphasizes the presence of market failures such as private information with imperfect monitoring, uncertainty, the inability to write and enforce complete long-term contracts in such an environment, the presence of market power by buyers and sellers who seek to maintain bargaining power over other players, the difficulty of measuring R&D quality and performance and, finally, that governments themselves are complex hierarchical institutions with complicated incentives and relationships (as opposed to a single rational actor). In some countries these deficiencies are made worse by the small size of the procurement market, though in turn these governments may be more likely to use offsetting policies that include opening the market to foreign firms, joint ventures, and other means of improving markets.

In particular Rogerson (1995) [29] details the nature and implications of uncertainty, which is present at the design, production, and deployment stages ("internal uncertainty") as well as well as uncertainty in demand due to changing threats, competing weapons systems, and political forces ("external uncertainty"). Because of these uncertainties it is often difficult or undesirable to write a long-term fixed-price contract, which are often also impossible to enforce and frequently susceptible to renegotiations.

Rogerson (1995) [29] also details the effect of economies of scale on the procurement market. He argues that at the early design stage of a weapons program there may be several firms capable of bidding for a contract, and consequently the U.S. Department of Defense will typically fund two designs to the prototype stage before selecting a winner. The presence of significant economies of scale at the production stage, however, governments must typically be satisfied by only one system and one producer rather than try and introduce some competition.

Finally, the monopsonistic status of government in the procurement market is also examined in some detail by Rogerson (1995) [29]. He notes three consequences of how government responds to the high degrees of uncertainty that affects investments in specific machinery or R&D too overcome the reticence of firms to make suitable investments. First governments themselves typically contract to purchase both intermediate and final goods emerging from R&D activity, thereby either paying directly or subsidizing R&D costs. Second, the government frequently purchases specific assets that the weapons suppliers will use. Third, governments

often maintain an administrative connection to firms outside of normal contracts, which essentially provides guarantees to the firms about the security of their investments.

The previous papers present the standard model and results for the defence industry from a microeconomic perspective, and highlight some of their important empirical implications and characteristics. Hildebrandt (1999) [7] takes a different approach to understanding supply in the defence sector. He estimates what he calls the "military production function" that relates military inputs into military effectiveness. His approach, grounded in cost-benefit analysis, is aimed more at a wider understanding of military efficiency. Specifically he asks whether national security objectives are being achieved by the efficient use of military assets.

Hildebrandt (1999) [7] examines specific production functions to establish the tradeoffs between achieving certain military outcomes using different military inputs, from which he can then determine whether the available assets are being used in the most efficient manner possible. He uses three methods in his analysis. He first estimates the "econometric military production function" using regression analysis of data from the Vietnam War. The dependent variable is the estimate of military effectiveness as measured by the difference between the personnel and material that the North Vietnamese were estimated as attempting to move into the South Vietnamese and Cambodian theatres, and what actually arrived after interdiction efforts. The explanatory variables were inputs into interdictions such as specific weapons systems deployed against specific targets (for example fighter sorties targeting trucks and storage areas). Thus, if it is possible to measure or categorize a specific military "output", and the set of military "inputs" deployed to achieve that output, then the regression analysis can identify the marginal effectiveness of each input in achieving this output.[8]

His second method, the "response-surface military production function" attempts to reproduce research models of large military operations. While there are similarities to the militant production function, this method constructs a predictive model (validated by empirical calibration) that can estimate output levels (sorties per aircraft per day, in Hildebrandt's example) based on inputs (maintenance personnel) and parts failure rates. This approach allows planners to undertake detailed trade-off analysis to minimize costs of achieving a specific output or efficiency level.

Finally, the technological military production function analysis illustrated by Hildebrandt (1999) [7] uses technological features of the combat environment to establish the tradeoffs between using different forces that vary with respect to quality, quantity, and type. These functions predict combat outcomes by assigning parameters to a model that estimates how military force interactions will be resolved by computing the expected rate of force attrition. These models are sophisticated versions of the simply Lanchester battle equations constructed for combat scenarios in the First World War. With increased computing power, such models have become increasingly sophisticated and now form the basis of the extensive computer simulation modelling of combat used for training by militaries, and indeed by computer games. There are two shortcomings to note, however. First, the parameterization of the models that capture the effectiveness of different force elements and combinations is often speculative, especially for new weapons systems. Therefore basing procurement decisions on the results of these models is highly problematic. Second, there is not much relevant literature that helps us to understand and evaluate how well these models perform in terms of predicting real combat outcomes, and related questions of model structure.

Kirkpatrick (2004) [13] begins his analysis by highlighting the fact that the effectiveness of a military is defined in large part by the capability of rival forces, a point that is linked to Rogerson's concept of external uncertainty

[8] Skogstad (2014) [38] uses a similar technique to examine the effectiveness of different configurations of North Atlantic convoy escorts in reducing shipping losses.

and Hildebrandt's approach to modelling force effectiveness. In this framework Kirkpatrick argues that the constant pressure for relative advantage increases the demand for new weapons system, driving a rapid pace of technological improvement and continuous price increases. He further concludes that these developments will increase the relative share of fixed costs in weapons systems and indeed in the structure of the military. His data review supports his arguments, and points to the consequent disadvantage these trends have for smaller and poorer nations. The increasing costs of sophisticated weapons systems will likely mean that the spending gap between the smaller NATO allies and their larger counterparts, and especially the United States, will continue to increase.

Setter and Tishler (2004) [37] reach similar conclusions after examining the increasing need for, and sophistication of, integrative technologies that connect different military assets for operational purposes. These technologies are advanced, requiring extensive R&D and having a high threshold for minimum efficient scale; only after considerable investment are such technologies likely to generate high returns. Therefore the authors conclude that only a few large militaries should opt for such systems from an efficiency perspective.

Three broad conclusions emerge from this review of the recent literature on the supply of military goods. The first is that there are multiple sources of market failure in the defence sector. These sources of potential inefficiency are present on the supply and demand side, can arise from a variety of pathologies of information and risk, and have technical, economic, and political root causes. Addressing these deficiencies is difficult, since the very nature of security is political, requires high levels of secrecy, and entails considerable risk.

The second theme emphasizes the critical nature of technology and R&D in the defence sector. The extremely competitive nature of security requires constant innovation and technological improvement, significant R&D expenditures, and increasingly sophisticated weapons and advanced capabilities to integrate them. This dimension of the supply problem means that efficient levels of investment, acquisition and deployment can only be obtained for very large military organizations. These technologies have not yet been "scaled down" in a way that makes them accessible to smaller countries in an affordable manner.

Third, there is not a lot of literature or specific analytical modelling that assists decision-making with respect to procurement decisions and force structures. The work of Hildebrandt (1999) [7] points us in possible directions, but these approaches do not seem to have been pursued systematically. Consequently we have little analytical basis for choosing one weapons system over another, choosing one structure of force inputs over another, identifying optimal combinations of military inputs or forces, or predicting the overall effectiveness of military capacity vis a vis opponents (especially when there are either new weapons systems employed, or new tactical innovations). This gap remains a potentially serious deficiency.

Some of these problems could theoretically be addressed by a more co-operative international security environment that reduced the need for both secrecy and rapid innovation. The existential nature of security, however, makes such a cooperative arrangement highly unlikely, which is an obvious constraint on addressing some of these supply side pathologies.

A second natural solution to some of the identified difficulties, especially those arising out of economies of scale and high fixed costs, is indeed to be found within an alliance structure. The cooperative nature of a security alliance such as NATO permits both greater information sharing as well as collaboration on weapons platforms that can allow smaller members to be part of a larger system in an efficient manner. The alliance structure also permits some opening up of the defence procurement market to firms in other NATO member countries. These options for improved effectiveness will be explored in more detail later in this report.

B.4 THE DEMAND FOR DEFENCE EXPENDITURES DURING PERIODS OF AUSTERITY

It is difficult to organize the literature according to the categories used in this review. Some studies look at the procurement market, thereby incorporating both supply and demand features. Alliance theory in general incorporates many of the studies focused on the demand side of the market since its theoretical implications deal with the expenditure behavior of alliance members. This section focuses on a few remaining papers of specific significance to the demand for military goods, and changes in that demand.

One strand of the defence demand literature deals with organizational and processes for the budgeting for and tendering of defence procurement. For example Melese, Blandin and O'Keefe (2005) [17] identify the specifics of US government processes for defence spending. As many of these studies are of bureaucratic procedures specific to individual countries, we will not review them here other than to note that these process and management-related studies do exist for some NATO members.

Turning to the more typical economic papers in this area, Murdoch and Sandler (1982, 1984) [20], [22] provide classic studies that examine alliance theory and the joint-products model hypotheses by estimating country defence expenditure functions. It follows in the tradition of the literature reviewed in Section B.2 of this review, and its results conform to the standard narrative described above. These models and estimating procedures have been applied in other circumstances such as Japanese and American defence spending [23]. In some of these studies the restrictions of alliance-driven hypotheses and interpretations are less pronounced and the findings often emphasize external threats as the key factor driving defence spending [1], [2].

This basic estimation structure is the basis for most demand-related studies. Of specific interest here are the conclusions that they generate related to the budgetary pressures faced by governments, as other structural and strategic factors have been reviewed in Section B.2 above. A few recent papers examine this question as a consequence of the recent financial crisis and its associated pressure on government expenditure. Hartley and Solomon (2009) [6] try to anticipate the implications of budget cuts for NATO member defence budgets, defence industrial policies, and contributions to NATO's budget by first reviewing the relevant economic forecasts for NATO member countries. They argue that defence budgets and contributions to NATO will be affected, but probably not severely, as these are determined by a much wider range of factors such as the threat environment and country-specific factors. They also highlight the fact that NATO's operations in terms of their strategic doctrine and missions can be modified to encourage more "private" benefits that are more resistant to cuts, though as they point out this shift may be at the expense of more "public" NATO activities. They also hold out some promise that budgetary pressures may help to reinforce the arguments for doing away with wasteful defence industrial programs that favour domestic defence producers over potentially more efficient international suppliers. They further suggest that alliance members may focus more on defence "outputs" rather than "inputs", and thus force a more serious consideration of alternative input combinations and opportunities for substitutions between different defence elements (e.g. reserves versus regular forces). They also identify additional potential sources of efficiency through closer collaborations between alliance members, for exploiting synergies provided by some weapons systems, and by taking more advantage of specialization and comparative advantage. While not embedded in direct empirical estimations, the paper draws out lessons from past studies to highlight the many sources of inefficiency that arise from the behavior of NATO allies, and raise the idea that the pressure for austerity arising from the global financial crisis should be taken advantage of to try and overcome some of these enduring, wasteful, practices. Since many of these studies appeared fairly quickly after the financial crisis, and thus lacked an empirical base for analysis, it might be a propitious time to address this shortcoming by examining the early responses of NATO countries to recent budget pressures.

Keller (2010) [9] also examines the effects of the economic crisis on NATO budgets, focusing on the European members. Like Hartley and Solomon (2009) [6] it is more an identification of potential policy options than a data-driven examination of actual practice. He similarly identifies options such as pooling, sharing and specialization as ways of raising the efficiency of defence expenditures. He defines pooling as the explicit identification of a joint force to which members will contribute specific components. He argues that pooling is the preliminary manifestation of the same logic that leads to sharing and specialization. Specialization allows NATO allies to focus on their comparative advantages in defence, thereby reaping economies of scale in procurement, training and operations. To be effective, however, allies must then share their military assets to permit the proper combination of capabilities to perform a specific task. Importantly, however, Keller goes on to identify the critical hurdle to such a program of integration: credible commitments to sharing. In Keller's words: "*So while such a specialization would greatly help to save costs, it requires a reliable political arrangement of shared sovereignty, command, and trust that is very tricky to establish*" (2010, [9]: 113). We will return to this problem at the end of this section.

The first examination of the actual effects of austerity on defence spending is provided by Larrabee et al. (2012) [15]. These authors review the planned defence cuts and changes in defence priorities for the United States and several key European NATO members. They first note that the planned cuts are significant, and driven primarily by budgetary pressures rather than any exogenous change in the security environment. They note that while the reduced and redirected US military spending will put pressure on the European NATO members to take on a greater share of military operations in that region, projected cuts will leave them ill-equipped to meet these obligations. Consequently NATO will be hard pressed to meet its primary security obligations, let alone conduct missions further afield with fewer direct benefits. As with several other papers, Larrabee et al. (2012) [15] identify several options for meeting the challenges of austerity. These include: pooling and sharing (as defined above); leapfrogging (the shifting of resources away from older capabilities and towards new types of capabilities, while cutting expenditures overall); the use of informal ad hoc coalitions (which avoids the need for consensus in NATO but still requires significant interoperability amongst coalitions of the willing and capable); pre-emptive crisis management (to prevent foreseeable crises from requiring subsequent large-scale intervention); and the increased use and formalization of bilateral and plurilateral cooperation agreements (such as the UK-France partnership, but also Germany and the Baltic states).

Finally, Sandler and Shimizu (2014) [36] extend their standard empirical analysis to consider the implications of pressures for budget cuts, which they consider to be extensive both in terms of the magnitude of necessary austerity and the number of key alliance members who will face it. They reach many of the same conclusions as Larrabee et al. (2012) [15]. The fact that fiscal deficits are particularly problematic for the core European NATO members and the Unites States is of particular concern in terms of NATO's military capacity. The so called "pivot" of the United States towards Asia, and the concomitant de-emphasis of Europe in American foreign policy priorities, is also identified as a potentially important impediment to NATO's effectiveness. The authors suggest that one policy response is for a two-tiered NATO framework with the United States responsible primarily for North American security, and the UK and France sharing the lead for defence in the European theatre. In this structure they suggest that European states may become more interested in building greater compatibility and complementarity in their military structures, including shared weapons platforms.

The literature examining the demand for defence expenditures under financial restraint, though not large, is fairly unified in its emphasis on where to find efficiencies in expenditure to sustain security at a lower cost. While the search for such efficiencies is always desirable, the global financial crisis adds immediacy and seriousness to the effort. Almost all of the proposed solutions point to standard economic source of efficiency: specialization, comparative advantage, pooling and sharing, and collaboration to promote economies of scale and synergy.

Unfortunately the empirical evidence about the success of these policy options is limited. The absence of a systematic empirical record and associated analysis is a serious gap in our knowledge. There are several missions from which lessons could be drawn, however, including the Balkan wars of the 1990s, Afghanistan, Libya, Somalia, Syria and Iraq. Arguably, however, there are relevant lessons about force cooperation from a long history of joint operations that stretch back to the First World War and beyond. Despite the relevance of these missions we are having to rely primarily on the theoretical identification of policy options rather than those arising from actual field experience.

Indeed the scant anecdotal evidence for some of these cooperative strategies at the tactical level are not encouraging, and relate directly to Keller's identification of the need for credible political commitment. Perhaps as important as political commitment is the need for integration at the command level that allows resource deployment to fit operational imperatives, rather than purely national ones. There are many longstanding grievances surrounding the alleged asymmetry of treatment of multiple national forces under the command of one nation's general. The deflection or withholding of resources from one national force to the advantage of another is not a new phenomenon, but despite its importance it has received scant attention in the empirical literature regarding its extent or cures. Key questions about the operational prioritization for the deployment of scare military resources (who will have helicopter support? Where will drones be sent for intelligence gathering?) need to be resolved to the satisfaction of multiple players. One consequence is that excessive specialization may actually be problematic, as it might facilitate actual or perceived asymmetry of treatment. By contrast closer integration may reduce these opportunities, though potentially at the expense of force effectiveness.

In addition to the problem of potential commander bias at the tactical and strategic levels is simply the absence of easy inter-operability. In modern warfare, forces operating with either different rules of engagement or different interpretations of the laws of war may be difficult to integrate. Ultimately one nation's rules will tend to dominate, which effectively subordinates the Armed Forces of another.

B.5 CONCLUSIONS

Briefly, the literature on defence spending in alliance frameworks generally, and NATO specifically, is fairly well developed. There is a broad understanding of the many forces that shape defence spending generally and within the context of alliances. There are, however, several gaps. For ease of reference the basic findings and gaps are identified in Table B-1 below.

Table B-1: Key Findings and Gaps.

Subject Area	Key Findings	Gaps or Criticisms
Alliance Theory	1) Military expenditures provide public as well as private benefits to alliance members, and the balance of these shapes defence spending patterns and levels of burden asymmetry. 2) While alliance theory is a powerful lens for examining military spending, there are alternative theories that also provide insight and which reflect more closely the realities of policy making.	1) The estimation of burden asymmetries is compromised by the imprecise definition and operationalization of alliance benefits. 2) There has been only limited efforts at reconciling different theoretical approaches to understanding defence spending.

Subject Area	Key Findings	Gaps or Criticisms
Supply	1) The market for military goods is far from "perfect' in the sense of suffering from demand side failures (monopsony) and supply side failures (imperfect and asymmetric information, limited competition, large economies of scale and barriers to entry and exit). 2) Weapons systems are under very strong pressure to deliver innovation to ensure superiority, and is consequently highly dependent on extensive research and development to deliver complex systems that very few militaries can afford. 3) There is limited understanding of how to identify efficiencies in the choice of military inputs and force structure, especially given the rapid rate of innovation for new weapons systems.	1) There is a serious gap in the modelling of efficient procurement policies given the extensive market failures in the defence sector. 2) There is a serious gap in our capacity to evaluate the trade-offs between different force structures and military inputs, and the effectiveness of these in terms of delivering victory over opposing forces.
Demand	1) Financial pressures will cause NATO members to adjust defence spending, probably in a negative way though the evidence remains sparse in terms of the current fiscal environment. 2) Pressures for more efficient spending may induce governments to compensate through greater pooling, sharing, specialization and other forms of collaboration. However there are serious impediments to pursuing these policy options due to the detailed problems of ensuring proper force integration and balance, especially access to resources that are not owned nationally and thus integrated fully in with a country's military.	1) There is a need to update models of defence spending under budgetary pressure using more recent data. 2) We need to identify how to take advantage of efficiency enhancing collaborative options in alliance procurement in a manner that both ensures military effectiveness and assures member countries that they will have proper access to the alliance-wide resources that are being coordinated.

The first key gap deals with the supply side of defence spending. Despite the likelihood of significant savings to be had from more open and pooled procurement policies, the practical lessons on how to achieve this greater integration and the consequent benefits of such programs remains relatively underdeveloped. There have been instances of joint weapons system acquisition: these need to be studied in some detail to learn from their successes and failures.

The second key gap is again on the operational side. The theory and policy literature on the demand for defence spending all point to the same sources of efficiency gains. These policies inevitably require closer collaboration amongst alliance members at the strategic and tactical levels. However there is ample evidence that such policies also contain their own pathologies, and these have not been systematically studied or widely acknowledged. While promising, the adoption of more cooperative military structures may well pose serious challenges in terms of national sovereignty, and in terms of operational effectiveness.

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Annex C – EXPERT TESTIMONY SESSION SUMMARY (LONDON)

Future Defence Budget Constraints: Challenges and Opportunities

NATO SAS-113

C.1 SUBJECT-MATTER EXPERT PRESENTATIONS

Meeting Date: 07/07/2015

Meeting Location: HMS President – London

Recorded by: Ms Lucy A. Finch, Defence Resources, UK MoD

C.1.1 Attendance

C.1.1.1 Subject-Matter Expert Presenters

Surname	First Name	Prefix	Organization
Brittain	Andy	Mr.	Dir, Defence Resources (UK MoD)
Chalmers	Malcolm	Prof.	Royal United Services Institute (RUSI)
Giegerich	Bastian	Dr.	International Institute for Strategic Studies (IISS)
Husniaux	Albert	Maj Gen (Belgian Air Force)	NATO Chief Scientist
Kendry	Adrian	Dr.	Former NATO Chief Economist
Mölling	Christian	Dr.	German Institute for International and Security Affairs (SWP)
Morin	Jamie	Dr.	Dir, Office of Cost Assessment and Program Evaluation, U.S. DoD (CAPE)
Tagrev	Todor	Dr.	Bulgarian Academy of Science

C.1.1.2 SAS-113 Team Members

Surname	First Name	Prefix	Organization
Calhoun	Todd	Dr.	Dir, Program Analysis and Evaluation (USMC, U.S. DoD)
Czarnecka	Anna	Ms.	Polish Ministry of Defence
Finch	Lucy	Ms.	Defence Resources (UK MoD)
Forbell	David	Maj	United States Marine Corps (U.S. DoD)

Surname	First Name	Prefix	Organization
Henderson	Stuart	Cdr	Royal Navy (UK MoD)
Jackson	Theodore W	Mr.	U.S. Army Training and Doctrine Command (U.S. DoD)
Jefferson	Toby	Cdr	Defence Resources (UK MoD)
Kendry	Adrian	Dr.	Former, NATO Chief Economist
Killian	Daniel	Mr.	U.S. Army Training and Doctrine Command (U.S. DoD)
Manuel	Julie	Ms.	Defence Science and Technology Laboratory (UK MoD)
Odehnal	Jakub	Mr.	Czech Republic Ministry of Defence
Skidmore	Kristofer	Capt	United States Marine Corps (U.S. DoD)
Solomon	Ben	Dr.	Defence Research and Development Canada (DND, Canadian Armed Forces)
Templeton	Jack	Maj	United States Marine Corps (U.S. DoD)
Webb	Chris	Mr.	Defence Resources (UK MoD)

C.1.2 Meeting Location

HMS President (Shore Establishment)
72 St Katherines Way
London E1W 1UQ
United Kingdom

C.1.3 Agenda

Dr. Todd Calhoun (Dir, Program Analysis and Evaluation USMC, U.S. DoD) – Introductions and Welcome

Mr. Andy Brittain (Dir, Defence Resources, UK MoD) – UK Introduction

As head of Defence Resources, Andy Brittain welcomed all subject-matter experts, study team members, and visitors to the UK and HMS President.

Since the recession, the UK has been through a challenging period: the recession has led to a reduction in public spending, and a well-publicised "over-committed" Defence budget. In 2010, the UK Government conducted the Strategic Defence and Security Review (SDSR) 10 which aimed to bring spending into line with budget, and in conjunction with targeted defence reform.

Though the goal of SDSR 10 was essentially to "balance the books", the UK MoD does not yet have all the answers on efficiency and there is certainly additional work to undertake: there remains pressure on public spending and therefore a continued need for efficiency within the UK's Defence budget. Doing so would enable

the UK to remain committed to a wide range of ongoing Defence activities and operations, combined with planning and investing for the uncertain strategic security environment that we all face. Considerable work has occurred post SDSR 2010 which continues to wring efficiencies from across all aspects of the defence budget as is evident in the current SDSR 15 undertaking.

Mr. Brittain praised the SAS-113 study providing the backdrop for this conference and said it was very encouraging to see so many NATO members working together to compare responses to budget challenges. He was not aware of a previous study of this nature and was interested to see the result. He said that he hopes the UK's past experience will be of use to others.

This conference provides a real opportunity to share and explore expertise on this subject and he said he was very grateful for the wide attendance. Mr. Brittain concluded by saying he was pleased the UK could host this event and expressed thanks to HMS President for providing the illustrious venue.

Dr. Todor Tagarev (Bulgarian Academy of Science)

What did they say?

Dr. Tagarev presented his previous work "Building Integrity and Reducing Corruption in Defence: A Compendium of Best Practices" for consumption by the assembled group. One of the key principles used to popularize transparency and integrity in defence decision-making was the use of strategic-level management rooted in Planning, Programming, Budgeting, and Execution System (PPBE). Dr. Tagarev pointed out that describing the rational decision-making process is much more palatable than outlining a set of "commandments".

Dr. Tagarev advised the SAS-113 group that a benchmarking exercise ought to have:

- Policy that is clear and well considered.
- Identify and explicitly state force planning risks.
- Multi-year planning.
- Discussions on outputs and their implications.
- Auditing.
- Transparency:
  - Validated information;
  - Cost factors and fiscal reports; and
  - Allow flexibility because the security environment is constantly changing.
- Validation.

The study team agreed that the benchmarking should be conducted through peer review and assessment of buy-in by other ministries of defence.

Implications/Relevance to SAS-113

Dr. Tagarev observed that it took too long to agree on a methodology for his study of corruption, causing it to eventually lose momentum. The 1-year mandate of SAS-113 should reduce this risk, but it must still be born in mind, especially as it applied to subsequent research efforts.

Dr. Tagarev also highlighted the risk of loss of political interest. This is a concern as SAS-113 is seen as a study primarily focused on the consequences of budget reductions in the wake of the recent financial crisis. SAS-113 must ensure it remains relevant and independent of the economic environment. The search for the optimal delivery of defence capabilities remains an ongoing challenge. Dr. Tagarev's study focused on the principles of PPBS as opposed to the blind application of specific methods. Similar considerations should be made by SAS-113 when compiling a list of resource management practices that will remain relevant and flexible in application.

MGen Albert Husniaux (NATO Chief Scientist)

What did they say?

As the NATO Chief Scientist, MGen Husniaux advises senior Alliance leaders on a wide range of science and technology issues. He indicated that the work of SAS-113 is relevant and timely; however the deadline for submissions to Warsaw is fast approaching. MGen Husniaux also commented on his own country's (Belgium) budget constraints, noting that specialisation has specific relevance for smaller Nations. MGen Husniaux expressed a need for Member Nations to have the tools to enable them to make sound resourcing decisions. He believes the S&T community can contribute to improved defence resource management in a number of ways. Planning for the Warsaw Summit is underway and the deadline for submissions must be made 6 months prior to the meeting. MGen Husniaux recommends that the SAS-113 report should be released in time to allow for Warsaw Summit parallel work as early as possible.

Implications/Relevance to SAS-113

MGen Husniaux advised the deliverables should consist of:

- Practicable, concise, and well understood outputs;
- Differing techniques/methodologies from SAS-090; and
- Provoke action by readers.

Dr. Malcolm Chalmers (Dir, UK Defence Policy, RUSI)

What did they say?

Dr. Chalmers' discussion focused on the demand side of defence economics and the important link between defence capabilities and outputs. He pointed out how the definition and distinction of strategic- and operational-level outputs and the consequences of long-term planning (related to demand side) ensure long-range affordability on the supply side.

Dr. Chalmers noted how the impacts of the 2008 financial crisis in the UK created a difference of approximately £5B (13%) between the current and previously forecasted (pre-financial crisis) defence spending. This point illuminated the need for defence reforms, within the UK, through the 2010 Security and Defence Spending Review (SDSR).

The 2010 SDSR attempted to confront the £75Bn funding gap that exists through 2020. Running in parallel with the Strategic Review, the SDSR is revisited every 5 years with a 10-year equipment plan for procurement and support. This action demonstrates a political awareness of the importance of long-term planning. Dr. Chalmers pointed out that reforms result in a cost of increased planning scrutiny, which should eliminate over-optimism in defence planning through achievable planning assumptions. Additionally, the practice of 'wedging' areas of

spending to incentivize efficiency gains can promote poor behaviour and does not necessarily lead to long-term savings. It is through clearly defining defence outputs that the service focus on defined targets while engaged in multi-front efforts.

Dr. Chalmers also pointed out the number of Nations failing to meet the 2% NATO target while explaining the elements of spending making up the UK-specific NATO spending of £39B. He suggested a realistic aim for Member Nations is to increase defence budgets in real terms alongside economic recovery, as some are currently doing. In the UK, defence spending positions, post-election, exceeds April 2015 predictions and resulted in a manifesto commitment of 1% real equipment growth. This resulted in the maintaining of Army personnel numbers and increasing the number of reserves. Dr. Chalmers discussed how this commitment could affect other governmental departments and the ongoing commitment to cut the deficit.

Dr. Jamie Morin (Dir, OSD Cost Assessment and Program Evaluation)

What did they say?

Dr. Morin's discussion focused on how CAPE approaches adjudicating competing claims for U.S. defence resources during times of budget constraints. Specifically, Dr. Morin addressed the following questions:

1) What are the U.S. DoD's critical budget issues?
2) Are there any emerging best resource management practices in the DoD?
3) What strategies does CAPE utilize to mitigate budgetary constraints among DoD services?
4) Are there any take-aways relating to cooperative resource management?

Question 1: What are DoDs Critical Budget Issues?

The critical budget issues facing the U.S. DoD are:

- Balancing the size of the defence force with the need to keep those forces highly trained and ready to respond to global contingencies; while also
- Modernizing that force for a technologically advanced fight; while also
- Facing protracted fiscal uncertainty.

The FY2016 budget submission reflects defence program seeking the proper balance between capacity, capabilities, and current and future readiness by rebalancing funding to emphasize the following key capability areas:

- Intelligence, surveillance/reconnaissance platforms, systems, and technologies;
- Space and counter-space capabilities;
- Counter Anti-Access/Area Denial (A2/AD) platforms, systems, and technologies; and
- Nuclear deterrence forces.

However, after two years of temporary budget stability, the DoD faces possible sequestration – automatic across-the-board cuts ($36B to defence), to federal spending specified in the Budget Control Act. Defense Secretary Carter stated that if sequestration-level budgets are imposed, incremental cuts would likely be

impossible. Instead, the U.S. DoD would have to reassess the strategic approach to addressing global threats (i.e. what we need the Armed Forces to do and to be prepared to do).

Question 2: Are there any Emerging Best Resource Management Practices in the U.S. DoD?

Dr. Morin explained that the Program, Planning, Budget, and Execution (PPBE) process is the DoD's method for allocating resources, projecting future expenses, building the budget, and executing funds. Instituted by Secretary of Defense McNamara in the 1960s, the PPBE system gives the Secretary of Defense oversight over Service budgets. Annually, the Services re-examine their requirements for forces and materiel, given the latest strategic guidance. Program Objective Memoranda (POMs) are subsequently submitted, detailing the resources and programs needed to best execute that strategy over the next 5 years. The Secretary then uses the Program Review process, run by the office of Cost Assessment and Program Evaluation (CAPE), to analyze the Services' resource requests for efficiency and alignment with the Nation's defence strategy.

During Program Review, CAPE leads both the intra-Departmental discussion on the current budget proposals and provides the Secretary of Defense with independent assessments. CAPE analysts spend the rest of the year conducting research studies on the cost and performance of the DoD's major programs. For example, CAPE conducts independent cost estimates for all of the DoD's major acquisition programs, using actual historic contractor performance data. This data-driven approach enabled CAPE to identify areas where the Department could negotiate more cost-effective contracts based on historical performance. Strategically, CAPE has conducted analyses of the survivability of our forward bases and aircraft in the face of evolving A2/AD, leading to recommendations for adjusting strategic plans.

Question 3: What Strategies Does CAPE Utilize to Mitigate Budgetary Constraints Among DoD Services?

Dr. Morin emphasized that no strategies exist to completely mitigate budget constraints. As defence budgets contract, hard choices with little to no good alternatives are often the reality. He argued that the traditional view to strategically focus your cuts rather than spreading those cuts indiscriminately across your portfolio can lead to divesting capabilities that are expensive in order to reconstitute, should the future turn out differently than expected. Similarly, given constrained resources, challenging organizations to challenging organizations to find efficiencies is just as important as recognizing the risk of over-stating the size of the efficiencies. If the assumptions are wrong, defence is over-extended in the year of execution, leading to sub-optimal budget cuts. Dr. Morin added that the U.S. DoD still struggles with finding the right balance, but is seeking mitigation through rigorous self-evaluation. He noted that where cuts are taken, data-driven analysis is applied to explore, expose, and mitigate uncertainty.

Question 4: Are there any Take Aways from CAPE's Perspective Relating to Cooperative Resource Management?

Overall, the key to effective resource management in the DoD is providing top decision-makers with impartial, evidence-based analysis and a transparent process through which to issue decisions. After decades of managing the Program Review, a transparent process for nominating and adjudicating issues is essential to stakeholder buy-in. Evidence-based analysis is integral to eliminating emotional responses often tied to national security policy and determining the appropriate level and type of capability needed to the Nation's strategic goals. Ultimately, cooperative resource management decisions are the product of negotiation and professional judgement. Organizations like CAPE ensure top decision-makers enter into negotiations with a clear understanding of the alternatives.

Dr. Christian Mölling (German Institute for International and Security Affairs)

What did they say?

During his discussion, Dr. Mölling focused on the demand for defence capabilities and the relation to defence inflation. He noted that the impacts of the financial crisis are still affecting all of Europe and NATO Member Nations are seeking successful fiscal mitigation change. Specific to the effects of the financial crisis, Dr. Mölling projected that the next two decades (assuming similar fiscal austerity) are the largest threat to defence. Similar to other speakers, Dr. Mölling believes that the NATO 2% target is not realistic, despite commitments by Member Nations to achieve the target. He highlighted the delta between projected and desired (or more appropriately, realistic) spending is the single largest barrier to achieving the target. Additionally, Dr. Mölling stated that 'defence inflation' is currently running at 5 – 10 %, thereby eroding defence purchasing power. The group debated the value of defence inflation and the defence inflation definition in addition to cost inflation versus defence inflation for applicability to the SAS-113 discussion. In the end, the SAS-113 team determined that considering defence inflation was outside of the scope of the study.

Dr. Mölling also discussed NATO-wide economic trends:

- How defence is becoming a social institution with higher spending on personnel;
- How defence outputs of Member Nations are more indicative of a contribution to NATO than pure inputs; and
- 'Fragmentations', where multiple countries are procuring similar equipment but not collaborating to capitalize on economies of scale.

Dr. Mölling pointed out the need for increased collaboration among Member Nations. He noted that interdependencies are common within NATO, but underutilized. As an example, Dr. Mölling pointed out that only 6 Member Nations within NATO have an 'air force', defined as containing fighter aircraft, tankers (refuelers), and airborne Electronic Warfare (EW) capability. If intentional and strategic, interdependency allows Nations with specific specializations (e.g. Fighters only) to collaborate among neighbouring Nations with complementary capabilities (refuelers and EW capabilities); resulting in regional air forces. Failure to capitalize on multi-national collaboration now could lead to fewer opportunities in the future.

Implications/Relevance to SAS-113

- Defence funding decisions are inherently political. Consideration must be given to political pushback of the study to national sovereignty.
- Consideration in using country names when outlining practices to improve palatability of recommendations.
- Future study opportunity looking into the sovereignty of NATO; considering examples like rare earth minerals, chiefly from China.

Dr. Bastian Giegerich (International Institute for Strategic Studies)

What did they say?

Dr. Giegerich opened by stating that the conventional and non-conventional security threats facing NATO Member Nations will present new challenges to the Alliance in the future. He noted that while the quantities of military equipment are decreasing, it is not yet clear if technological capability embedded in current equipment will overcome the decrease.

Dr. Giegerich also stressed the need for multi-national collaboration through specialization. He inferred that because every Nation cannot prepare for every contingency, and European-specific specialization is happening unintentionally, collaboration should be a simple solution. He did, however, acknowledge both the advantages and disadvantages associated with specialization. Dr. Giegerich acknowledged that while Nations may choose to be reactive, this approach limits their ability to shape the security environment. The overall aim would be for NATO and its Member Nations to proactively react to the changing security environment.

Implications/Relevance to SAS-113

Dr. Giegerich suggested three key initiatives leading to enhanced resource management:

- Design Freezes: Managing procurement projects to identify strategic times when freezing the design of a notional system may be beneficial during the procurement process in order to avoid costly errors. These times include:
  - After the government has analysed its requirements;
  - In order to finalize a specific contract; and
  - After the development stage is complete.
- Standards and certifications.
- End of year flexibility:
  - Relaxing government requirements to limit any carry over of funds to future years. The current situation can prompt poor decisions and inefficient spending in order to protect future funding.

Dr. Adrian Kendry (Former, NATO Chief Economist)

What did they say?

Dr. Kendry primarily outlined the global macro-economic situation within NATO prior to and as a result of, the Great Recession. Specifically, he noted that Global defence spending grew in 2014 for the first time since 2009; however, NATO spending was not a driver for this growth. Non-NATO defence spending is forecasted to overtake NATO spending for the first time in 2021. Dr. Kendry compared falling NATO defence budgets to the rising defence funding of emerging Chinese and former Russia powers and perennial conflict hotspots in Asia, Middle East, and Africa. The result of this rise in spending signals that the defence spending gap between the USA and the rest of the world is narrowing. As an example of the inevitable link between defence funding and the emerging threat environment, Dr. Kendry notes that defence spending is increasing faster in Eastern Europe than the rest of NATO, specifically as a result of the existential regional threat. In his conclusion, Dr. Kendry pointed out the current oversupply of defence industrial capabilities in NATO Europe and the opportunities for potential benefits from consolidation, cooperation, and specialization.

Implications/Relevance to SAS-113

- Dr. Kendry pointed out the benefits of multi-national cooperation and specialization.
- Dr. Kendry advocated improved resource sharing between Member Nations, especially the opportunity for consolidation of the European industrial base. This example could be an example of a strategic-level shift that would enhance Member Nation’s contribution to NATO.

Annex D – INDIVIDUAL COUNTRY PRACTICE SUBMISSIONS

D.1 CANADA

D.1.1 Conducting the Comprehensive Review of Programs[1]

This section provides detailed discussions on the process and tools used in the Canadian Department of National Defence (DND) in response to a government-wide call for an action plan to reduce the budget deficit. The impact of these action plans on DND was approximately 10% or $2B. Previous submission for research Objective #1 provides details on the impact of the $2B in specific capabilities. As such, this excerpt should be read in conjunction to Section 3 of the earlier Canadian submission.

The procedure to conduct the comprehensive review of programs at DND/CF is portrayed in Figure D-1. The process begins at Step 1.1 with the assignment of L1 Department Leaders (Assistant Deputy Ministers and their military equivalents) to become Program Activity Leaders (PALs). As stewards of their particular Program Activities, each PAL was charged to conduct the disaggregation of their associated program activities into Program Components in Step 1.2. Subsequently, they were to collect evidence pertaining to relevance and performance for each Program Component in Steps 2.1 and 2.2.

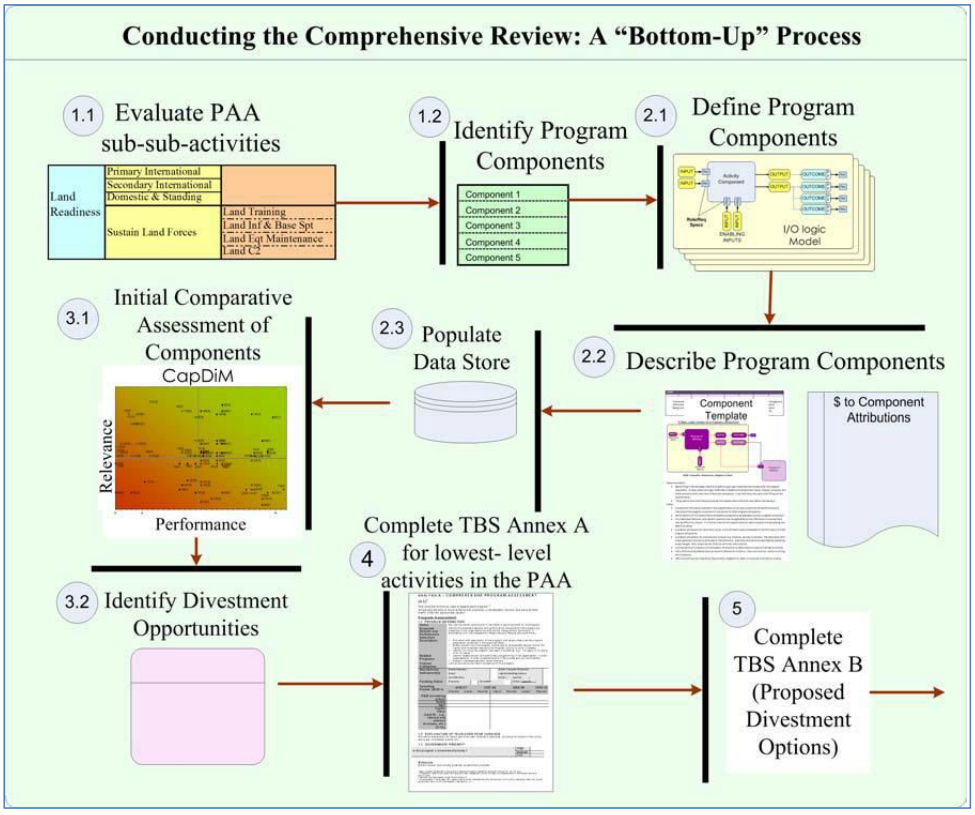


Figure D-1: An Overview of the Steps to Conduct Analysis A, the Comprehensive Review of Programs, Leading to Analysis B.

[1] This section is an excerpt of the report by Young et al. [1].

Evidence pertaining to relevance and performance was compiled in Step 2.3 by the DND/CF Strategic Review Secretariat. This facilitated a comparative evaluation of all Program Components in Step 3.1 using the analytical tool called CapDiM [2]. Evaluations facilitated using CapDiM formed the basis of discussion for the identification of opportunities for divestment in Step 3.2, and subsequently the completion of Analysis A in Step 4 that documented responses to the six Question Criteria for each of the lowest-level activities in the PAA. In Step 5, the information collected and synthesized in Steps 2 through 4 was used to formalize divestment proposals with departmental leadership including the Minister of National Defence (MND).

The process outlined in Figure D-1 was developed and facilitated by the DND/CF Strategic Review Secretariat. It is termed a "bottom-up" process because it focused on the collection of characterizing information about individual low-level programs and was not directly reliant on newly developing strategic directions until opportunities for the reallocation and divestments were realized in Step 3.2.

The process provided an objective evaluation framework and supporting data that would:

1) Prompt the collection of information by internal DND/CF organizations leading to an intelligent balance of potential divestment opportunities;
2) Account for the complexity of DND/CF where many programs in the PAA exist to support or enable other programs;
3) Make it easier to draw distinction between programs;
4) Ensure a common perspective is taken by participants during the program evaluation process;
5) Facilitate recognition of the unique role of DND/CF within the family of other Federal Departments;
6) Lead to improved management of performance in terms of platforms, personnel, infrastructure, programme and military capability at various degrees of size and scale across short- and long-term time horizons; and
7) Set the stage for improving the management of relevance and performance across the DND/CF in years to come.

Note, however, the implementation of an objective framework in one single step across an organization as large as DND/CF during the conduct of operations in three major theatres (i.e. Afghanistan, the Vancouver Olympics, the G8 summit, and later Haiti) was seen to be unrealistic.

Therefore, an iterative approach to development and implementation of the procedure to deliver the DND/CF Strategic Review was required.

For the sake of simplicity, the iterative aspects are not depicted in Figure D-1, but some specific examples are outlined below.

Step 1.2, the disaggregation of PAA sub-sub-activities into Program Components, was conducted several times by individual PALs to achieve a degree of fidelity in balance with the requirements of the Strategic Review and the ready availability of both programmatic and financial information.

The step sequence from 2 to 3, which involved the collection and evaluation of information for each Program Component, was completed three times. The first two iterations focused on compiling a complete data set for all Program Components. This required an adjustment in "organizational mind-set" to appreciate the objectivity of the "performance management approach" when defining and describing Program Components. In the last of the three iterations, the focus shifted from information gathering to information validation and assessment.

In each of the three iterations the methods and tools used to collect, evaluate and compare Program Components were progressively updated to reflect their different intents. Information on Program Components consolidated at the conclusion of the last iteration was less than perfect and not entirely complete. However, it represented a vast improvement over that gathered prior to the start of the Strategic Review and it provided a credible foundation upon which to converge on an objective formulation of divestment options.

D.1.2 Disaggregating the Program Activity Architecture (PAA)

The Program Activity Architecture[2] (PAA) developed by the DND/CF in consultation with TBS provided a hierarchical taxonomy of the departmental programs (or lines of service delivery). At the highest level in the hierarchy are strategic outcomes, which are delivered through activities which are composed of sub-activities and sub-sub-activities.

Strategic reviews are intended to be vertical in nature; in principal, horizontal reductions are to make up only a small portion of the divestment proposals delivered as part of a strategic review[3]. One expected result of the DND/CF Strategic Review was that a sub-set of programs with budgets summing to approximately 5% of the Minister's total budget would be identified for cancellation and the allocated resources reallocated to other priorities. As such, a question fundamental to the divestment portion of the DND/CF Strategic Review was "What programs would the department cease to deliver?"

It was evident early in the planning phase of the DND/CF Strategic Review that the greatest proportion of the lowest-level activities in the PAA (i.e. the sub-activities and sub-sub-activities) was far too large to be considered for total reallocation. Furthermore, none of these entities could be completely divested or ceased without having substantial adverse impacts on the delivery of other aspects of Defence and Security. It was determined that, unlike many other Federal Government departments, the majority of the Activities in the new PAA were not independent – rather, most activities had interdependent links. Moreover, it was found that many of the lowest-level activities did not provide products or services to Canadians directly, but existed to enable or support others within the National Defence's purview.

In simple terms, the new PAA breaks the CF and DND into component parts that are somewhat akin to a supply chain or an assembly line, where for example, the output of a recruiting program becomes the input to training and readiness programs that subsequently provide outputs to feed operational delivery programs. Cuts that affect recruiting have follow-on effects up the chain, and similarly, decisions to divest of certain operational capabilities can impact upon recruiting and training requirements. This simple example is not unique – in general, divestment decisions are known to have both present and future impacts on financial, human, material and infrastructure resources across the network or web of programs that compose the DND/CF.

To address the inability of DND/CF to divest of entire sub-sub activities and to facilitate a departmental-level understanding of the interrelationships among programs of the new PAA, the first substantial efforts during execution of the DND/CF Strategic Review were aimed at disaggregating the PAA's lowest-level activities into what were called Program Components. The rationale for disaggregation was further supported by the fact that other Federal Government departments are having budgets substantially smaller than DND/CF, typically had PAAs containing roughly the same number of sub-sub-activities and hence are conducting their strategic review with smaller activities.

[2] Effectively, the PAA could have been renamed as the "Program Alignment Architecture" since it remains well positioned for use in accordance with an overarching strategy to help manage the Department from fiscal, performance, and strategic perspectives.

[3] In this context, vertical measures mean those targeting an individual program, while horizontal measures are those applied across multiple programs without stopping any of them.

D.1.3 Elaboration of the Program Evaluation Criteria

Since their origin in 2007, strategic reviews have been founded on the evaluation of departmental programs based on six fundamental reporting factors, which as shown below, are manifest in six basic questions:

Q1. Is this program a Federal Government Priority?

Q2. To what extent is this program consistent with the Federal Government's core role?

Q3. To what extent does the societal need for which this program was designed still exist?

Q4. To what extent is this program achieving the expected results for which it was designed?

Q5. To what extent is this program achieving its expected results efficiently?

Q6. To what extent are the tools of results-based management used to manage the program to achieve results?

These questions align with two over-arching themes: relevance and performance. Relevance is an aggregate of the evidence about how well a program conforms to:

- The needs of current sitting government;
- Federal mandate or role; and
- The continuing needs of Canadians.

Performance is a combination of a program's ability to meet its expected results (i.e. outcomes) while making an efficient use of resources and operating within principled governance and management structure that supports continuous performance improvement.

These six questions needed to be clarified and expanded to support a consistent and transparent comparison of the programs across the entire DND/CF. This elaboration resulted in what are called the "Question Criteria for the DND/CF Strategic Review".

D.1.4 Question Criteria for the DND/CF Strategic Review

The Question Criteria developed for the DND/CF Strategic Review are presented below.

They were developed to maintain the original intent of the six TBS reporting factors and were used to frame the data collection requirements to provide a basis for how programs would be compared for the 2010 DND/CF Strategic Review.

1) **GOVERNMENT PRIORITY**: The provision of defence and security is a priority of the Government of Canada. How does this program relate to current Government of Canada priorities as evidenced through extant external DND documents, including those related to policy, legislation, regulations and legal obligations?

   i) [Direct Refs] Provide reference to extant external DND documents that make direct reference to this program, or its associated outputs and expected results. Make special mention of references in CFDS.

   ii) [Indirect Refs] Provide reference to extant external DND documents that implicate or make indirect reference to this program, or its associated outputs and expected results. Indicate the nature of the linkage. Make special mention of references in CFDS.

iii) [GOC Outcomes] Indicate how the expected results of this program are linked either directly or indirectly to Government of Canada's strategic outcomes.

iv) [Elimination] Indicate the degree to which the elimination of this program would result in the failure or degradation of outcomes associated with linkages described in Parts I, II and III.

2) **FEDERAL ROLE**: The prevailing security environment indicates that an integrated, whole-of-government approach is required meet foreign policy and national security and defence goals. Explain the nature of DND/CF mandate to deliver this program in relation to the role of the federal government. Consider whether other orders of government, the private sector, or other organizations within DND/CF are better positioned to deliver the outputs of this program.

i) [Purview] Is it within the mandate of the federal government and DND/CF to conduct this program exclusive of other stakeholders?

ii) [Duplication] Are stakeholders outside DND/CF or inside the DND/CF currently conducting a similar program or providing similar outputs and expected results?

iii) [Market] Outline the plans or intentions of stakeholders outside the DND/CF to conduct a similar program, or provide similar outputs or outcomes in the future.

iv) [Delivery] How would the delivery of this program, and its associated outputs and expected results, be impacted if it were provided in whole or in part by stakeholders outside of CF/DND or by another party within CF/DND?

v) [Mitigation] Describe the mitigation strategy that would need to be put in place before stakeholders outside the DND/CF could play a role in the delivery of this program.

3) **CONTINUED NEED FOR DEFENCE AND SECURITY**: The enduring missions of the Canadian Forces, supported by the Department of National Defence, are to provide: the security and defence of Canada; the defence of North America in partnership with the United States; and contributions toward international peace and security. Is this program still relevant in the context of these missions and associated international agreements?

i) [Original Relevance] Describe the importance of this program's expected results toward the contribution of these enduring missions at either the time of its inception or most recent transformation. Where applicable make reference to any applicable international agreements.

ii) [Current Relevance] Describe the importance of this program's expected results toward the contribution of these enduring missions today and in the foreseeable future. Where applicable make reference to any applicable international agreements.

iii) [Internal References] Indicate those extant internal DND policy/strategy documents that make direct or indirect reference to this program, or its associated outputs and expected results.

iv) [Elimination] Indicate the degree to which the elimination of this program would result in the failure or degradation of expected results associated with linkages described in Parts II and III.

4) **EFFECTIVENESS**: To what extent is this program, and supporting activities, effectively delivering the results for which it was designed? Detail the outputs (tangible products, services) and outcomes (expected results) that are delivered by this program.

i) [Outputs] Define the outputs (tangible products, services or effects) that are delivered by this program. For each specify:

- The quantity and/or frequency of delivered output over the past 4 years.
- The high-level process logic by which outputs are generated.
- Inputs from other programs on which this program relies.
- The beneficiaries of each output (who uses or is serviced by program outputs?).
- Performance indicators, performance targets and performance thresholds.
- Achieved performance and impact of failure to meet targets.

ii) [Outcomes (Expected Results)] Define the expected results from the program. For each specify:

- Rationale by which expected results follow from the outputs.
- Performance indicators, performance targets and performance thresholds.
- Achieved performance and impact of failure to meet targets.

5) **EFFICIENCY**: Provide evidence of this programs efficiency as it is related to the production targets for its primary outputs and outcomes.

i) [Inputs] Define and quantify the primary resources required and allocated to directly enable the production of outputs (e.g. monetary, human, materiel, infrastructure, systems, technologies).

ii) [Efficiency] Evaluate the financial efficiency[4] of the program. Provide indicators, targets and thresholds related to efficiency.

iii) [Benchmarks] Provide evidence as to the resources consumed by comparator programs producing similar outputs. Where possible provide evidence as to the financial efficiency of comparator programs producing similar outputs.

iv) [Efficiency Trend] Where possible, describe how the efficiency of the program has changed over the last 4 years. Where applicable explain those factors that have affected the efficiency trend.

6) **MANAGEMENT OF PERFORMANCE**: Provide evidence of the degree to which a formalized Performance Measurement Framework (PMF) has been developed and is used as it pertains to the attainment of outputs and outcomes of this program.

i) [PMF] Provide evidence of the degree to which a formalized Performance Measurement Framework (PMF) has been developed and approved as it pertains to the attainment of outputs and expected results of this program.

ii) [Data Collection] Describe the process by which data is collected in support of the PMF.

iii) [Exploitation] Provide evidence and examples of how the PMF has been used to adjust execution of this program.

iv) [Inputs] Provide evidence as to how a PMF and/or standardized practices are being used to track inputs of resources into a program.

v) [Other Stakeholders] Provide evidence about any governance structure in place to solicit feedback from internal and external stakeholders that are reliant upon, use, or are otherwise affected by the outputs and expected results of this program.

[4] Efficiency is essentially the cost of resources consumed to produce a unit of output. It is recognized that some outputs are inherently more expensive than others to generate, so absolute comparisons are of little meaning. However, organisations should create measures of their own efficiency.

vi) [Improvement] Provide evidence of activities undertaken to seek improvement to program performance and the implementation of their recommendations.

D.1.5 Defining Program Components: The Logic Model

The Question Criteria developed for the 2010 DND/CF Strategic Review facilitated a broad understanding of the concepts that were to be employed throughout the comprehensive review of programs. However, whereas the 2010 DND/CF Strategic Review was facilitated by a central secretariat, this secretariat did not conduct the review in isolation. Moreover, for the majority of the many programs under the portfolio of the MND, the information required to execute the 2010 Strategic Review was not readily available; rather, it needed to be collected and from individual program activity leaders. Therefore, a common framework and a consistent language built on top of the Question Criteria for the DND/CF Strategic Review were required to facilitate a collegial approach towards a comprehensive and objective review of programs. This framework, and its associated concepts and language, was composed of two primary artifacts:

- An Input/Output (I/O) logic model; and
- A Program Component data collection template.

Among other objectives, the I/O model and the data collection template were devised to help elicit the value chains between "supported" and "supporting" programs, and to enable a common format for the collection and evaluation of data during the 2010 DND/CF Strategic Review.

A diagram devised to instruct Program Activity Leaders (PALs) on how to define each of their Program Components is shown in Figure D-2. This illustration is equally applicable to large and small programs. It is an I/O model, and presents the individual elements of a component that require description.

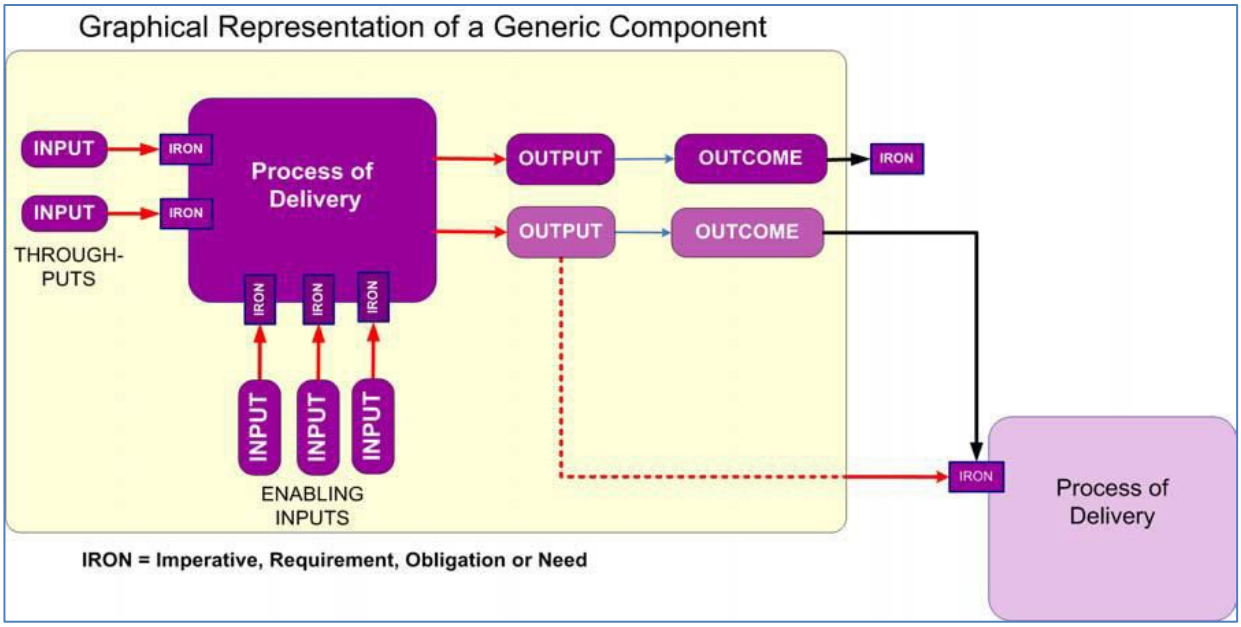


Figure D-2: The I/O Model for Program Components – The Building Blocks for the Comprehensive Review of Programs.

The logical components of the I/O model are as follows:

- **INPUTS**: Inputs are obtained based on a program's input requirements to facilitate a process which is enabled by resources, technologies and infrastructure to produce outputs.
- **OUTPUTS**: Outputs are tangible products, services, entities, or platforms that are delivered by a program.
- **OUTCOMES**: The outputs produced by a program are expected to contribute toward one or more outcomes or expected results. In military parlance outcomes are sometimes called "actions", "effects" or "capabilities".
- **IRONs**: When an effective performance management framework is in place the delivery of outputs and the attainment of outcomes can be measured using deliberate indicators against predetermined targets in relation to one or more Imperatives, Requirements, Obligations or Needs (IRONs)[5]. Whereas outcomes are typically defined by a program's internal leadership, IRONs are usually set or stated by entities outside the purview of the program. For example the National Defence Act (NDA) and CFDS, two documents of paramount strategic importance to DND/CF, describe many IRONs that are not set by those who manage or lead a particular program. In other cases, IRONs are set by central organizational authorities or the direct beneficiaries of program's outputs. Ideally there should be alignment between a program's outcomes and its IRONs, however the expression of these can be different. For example, a Government policy announcement may create an imperative for DND/CF action, but may do so in high-level terms without naming specific programs that will be impacted or specific measurable outcomes required.

D.1.6 Describing Program Components: The Strategic Review Data Collection Template

The DND/CF Program Component Data Collection Template prompts for a common set of information for each Program Component and allows the capture of data pertaining to each Program Component's delivery logic (i.e. all parts of the I/O model), and by extension, the evidence to answer the six DND/CF Question Criteria. A snapshot of the first page of the template is shown in Figure D-3.

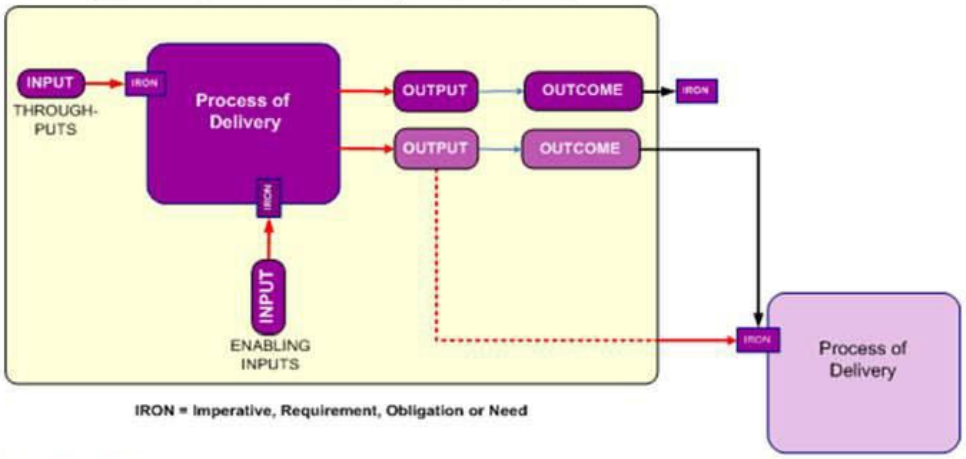
[5] The acronym IRON was one of the few coined specifically for the 2010 DND/CF Strategic Review.

NAVIGATION PAGE

Use this page to navigate to different areas of this template

STEPS			
1	2	3	4
Tombstone References Background	IRON Outcome Output Delivery	Process Input Financial Efficiency	Performance Management Alternatives Reallocation Review

A Basic Logic Model for a Program Component



IRON = Imperative, Requirement, Obligation or Need

Recommendation:

- Before filling in this template, sketch and label a rough logic model like the one above for this program component. (A basic sketch of a logic model that is labeled with all pertinent inputs, outputs, outcomes, and IRONs provide a useful overview of the entire component. It can help focus the users when filling out this questionnaire.)
- The guidance document that accompanies this questionnaire should be read before completing it.

Notes:

- Answers and information provided in this questionnaire will be used to examine the performance and relevance of this program component in comparison to other program components.
- Not all sections of this questionnaire template are expected to be applicable to every program component.
- It is understood that even when certain questions may be applicable but the information to answer them may be difficult to uncover. It is not the intent of this questionnaire for users to spend time developing new data or evidence.
- A program component can have many Inputs. Some of these Inputs are expected to be the Outputs of other program components.
- A program component can produce many Outputs (e.g. products, services or entities). The description of an Output generally includes its attributes or characteristics. Quantities of Outputs are described by specifying Output targets. Each output can be linked to more than one Outcome.
- In simple terms an Outcome is an articulation of the action or effect that an Output is intended to provide.
- Many of the existing defence tasks can be articulated as an Outcome. There can be short, medium and long term Outcomes.
- IRON is an acronym for Imperative, Requirement, Obligation or Need. An example of an IRON is a policy statement.
- Outcomes are usually linked to IRONs. An Outcome typically provides detail about how an IRON is satisfied. In cases where the description of an IRON is very explicit, the Outcome and the IRON will be very similiar.
- Further notes can be found in the first section of the accompanying guidance document.

Figure D-3: A Snapshot of the Front Matter on the DND/CF Program Component Data Collection Template.

The Component Template contained 12 sections with information prompts as described below. The first 11 sections were designed to directly support the conduct of the comprehensive review of programs. Where necessary, users of the Component Template were able to create additional "sub-sections" to account for the fact that not all component programs have the same number of inputs, outputs, outcomes or IRONs. The last section of the Component Template was designed to prompt for crude information and first estimates pertaining to potential divestment opportunities:

1) *Tombstone and Background:* This section prompts for information on the history of the component and establish evidence for the mandate, authority, budget or initiative under which the component was created. It also provides an indication of when this component was most recently transformed or reformed to provide a context for subsequent information.

2) *References*: Considering that creating an evidence trail to justify claims made is an important aspect of all Strategic Reviews, this section creates a bibliography to support evidence offered in all other sections of the template. Each reference is classified by the user as either an impetus reference, a substantiating reference, or a data source reference[6]. Of these, the most important were the impetus references, which by definition, make direct reference to, or closely implicate, the inputs, process, outputs, outcomes and IRONs of a Program Component.

3) *Financial Data*: This section is taken directly from the TBS Annex A reporting template for Strategic Review. It prompts for financial and related information pertaining to anticipated and actual expenditures, as well as differences between these, where applicable.

4) *Imperatives, Requirements, Obligations and Needs (IRONs)*: The relevance of a Program Component is typically evidenced by the IRONs that it is intended to fulfill. A component may exist to fulfill a single IRON or several irons concurrently. Individual IRONs were classified by each PAL in relation to a current need of the current federal government, a federal role or mandate, a requirement of a beneficiary internal to the department, or other.

5) *Outcomes*: Outcomes provide the link between the tangible outputs of a component and the IRONs that is it is meant to satisfy. This section of the Component Template provides a prescriptive method to define a program's outcomes in terms of: a list of actions/effects, the horizon for delivery, the list of other partnering contributors, conditions for success, risks, and the conditions/constraints on delivery. It also provides space for inputting outcome indicators, targets and recent performance evaluations conducted using these.

6) *Outputs*: This section provides a prescriptive method by which to outline the products and services provided by a Program Component. It also provides space for inputting the definition of output indicators, targets and recent performance evaluations conducted using these.

7) *Federal Role and General Delivery*: This section prompts for direct responses regarding the connection between this Program Component's outputs and outcomes and the Federal Government mandates, as well as the degree to which this Program Component is coordinated with other programs both inside and outside of the DND/CF.

8) *Processes, Technology and System*s: This section prompts for high-level information about the main steps, stages or cycles by which outputs are produced as well as the requirements for systems, technology and infrastructure that support their production.

9) *Inputs*: All Program Components require inputs of some type. This section records what they are, why they are needed, where they come from, and the relative importance of each.

[6] An impetus reference provides the rationale for the component's existence, substantiating references amplify the rationale or provide justification for the current implementation and data references provide financial, performance or other data.

10) *Managing for Results*: This section prompts for information on formal performance management frameworks where they exist. In particular this section elicits info on: performance measures, performance monitoring, performance reporting, performance governance, performance assurance, and any informal methods that may currently exist as surrogates for a formal performance management framework.

11) *Efficiency*: This section prompts for information specifically concerning indicators, targets and recent performance evaluations concerning the ratio of inputs to outputs.

12) *Reallocation*: This section provides initial indications of the implications and potential savings that would result if this Program Component were to be eliminated, canceled or entirely transformed. Only rough financial estimates were required here.

While data collected using the Component Templates was intended to be used primarily for the DND/CF Strategic Review, these data were also meant to provide a baseline to support management over the longer term.

D.1.7 CapDiM and Horizontal Evaluation

The evaluation and comparison of Program Components was conducted by consolidating information provided by PALs on the Program Component Templates, evaluating this information based on a set of consistent criteria, and comparing individual evaluations using a multi-criteria decision aid called CapDiM (Capability Discussion Matrix).

In essence, CapDiM reduces all of the criteria that contribute to a divestment or reallocation decision into two principal factors. For the DND/CF Strategic Review these principal factors were deemed to be "relevance" and "performance" in accordance with TBS guidance. As demarcated in Step 3.1 in Figure D-1 and shown with greater clarity in Figure D-4, CapDiM produces a two-dimensional scatter plot of relevance versus performance.[7] Each Program Component is represented by a single point on the plot. In its most basic interpretation, Program Components which are observed in the top right hand portion of the plot have been deemed highly relevant and high performing relative to those in the bottom left-hand corner of the plot.

[7] Comments about CapDiM, which has wide functionality, are limited in this report to its specific application in the 2010 DND/CF Strategic Review.

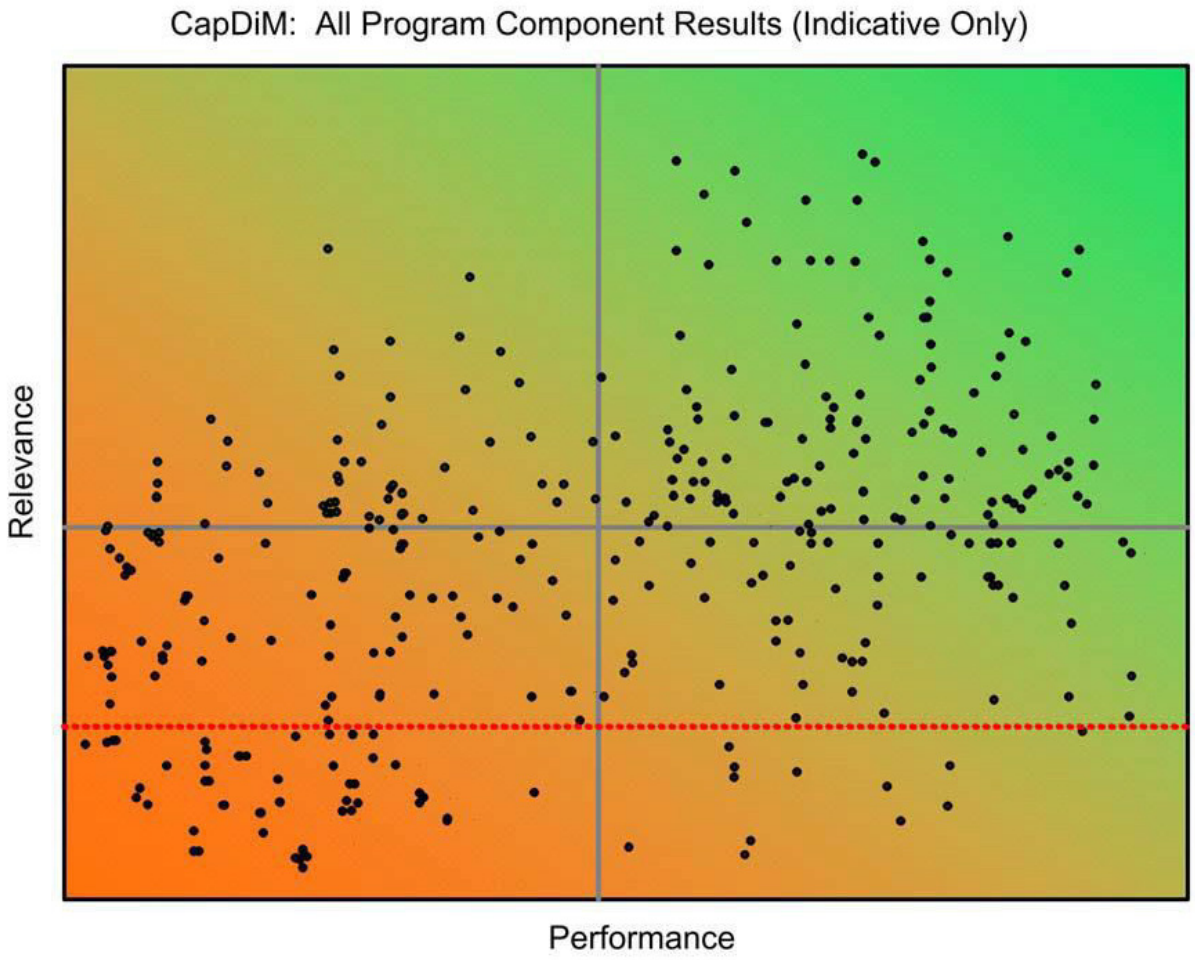


Figure D-4: Representative CapDiM Output. Individual program components were plotted and labeled according to their aggregated performance and relevance scores. This plot is notional only and does not include labels. Moreover, it does not represent the final results of the analysis conducted during the 2010 DND/CF Strategic Review.

It is understood that the CapDiM results are only one input to a decision on what to divest. Rather, CapDiM was so named because the result produced by this decision aid was intended to be a springboard for divestment discussions. An advantage of CapDiM is that results are derived from data supplied by owner organizations using a consistent approach that is traceable. For the DND/CF Strategic Review the results of CapDiM were used to inform divestment discussions held by L1A[8] representatives within the DND/CF.

A myriad of techniques exist to support multi-criteria decision-making. A common approach is to first determine a closed set of items for assessment and then develop a set of criteria upon which to base their assessment.

CapDiM is based on this approach. In the context of the DND/CF Strategic Review, the closed sets of items for assessment were Program Components and the evaluation criteria were derived from: the set of six Question Criteria outlined earlier and information prompts on the Component Template.

[8] An L1A is typically chief-of-staff to an Assistant Deputy Minister or Military Equivalent.

Within CapDiM, each criterion is first assigned a weight value in proportion to its relative importance – the higher the weight, the more important the criterion. Then each Program Component is scored against the individual criterion. An aggregated score for each Program Component is computed by summing the product of individual scores with the criterion weights. Program Components with aggregated scores that are high are more desirable than those with low scores – and the rationale to determine why some Program Components score higher than others can be traced back to their performance against each criteria.

The main difference between CapDiM and other methods is the way that criteria weights are determined. Rather than define weights directly, CapDiM requires that criteria are sorted in rank order. In other words, CapDiM takes as input the list of individual criterion sorted in terms of their relative importance. The most important criteria appear at the top of the list and therefore have the highest rank value. Criteria with lesser importance fall toward the bottom of the list and therefore lower rank values. Criteria with the same relative importance can be assigned the same rank.

The algorithms within CapDiM use the rankings assigned to the criteria to compute the criteria weights. These weights ensure that a Program Component which scores even minimally against one or more highly ranked criteria cannot be trumped by another Program Component that does not score against highly ranked criteria but does score well against a multitude of criteria with lesser importance.

As noted above, the implementation of CapDiM for the DND/CF Strategic Review involves the computation of two aggregated scores for each component – one for relevance and one for performance. The relevance score assigned to each Program Component is derived from scores against a family of criteria pertaining to Government Priority, Federal Role, and Continued Need to Defence and Security. Similarly, each component's performance score is derived from the criteria related to Effectiveness, Efficiency, and Managing for Performance.

D.1.8 Scoring Program Components

Two software tools, Nike and a PDF Generator, were developed and used within the DND/CF Strategic Review Secretariat to conduct the evaluation of Program Components:

- ***Nike***: This tool was developed as an MS Access database application, and was used to assess the validity and quality of information in the component reporting templates submitted by each PAL. In brief, this tool provided a convenient graphical user interface to facilitate the evaluation process, and a relational database to store evaluation data.
- ***PDF Generator***: This tool was implemented using a combination of software tools including Perl 6.0 (Practical Extraction and Report Language) and Latex (a document typesetting application). Customized algorithms were written using these tools to: extract information from the component reporting templates; populate a series of Berkeley databases; and produce an easily navigable .pdf file (portable document format) for each Program Component. These "Component Summaries" were easily read using Adobe Acrobat — an application commonly available across DND's Defence Wide Area Network (DWAN). Used in parallel with Nike, the Component Summaries were used by analysts within the Strategic Review Secretariat to validate Program Component information submitted by PALs on the Component Templates. Subsequent to the evaluation of Program Components, the underlying software was used to produce the easy-to-read PDF files was used reassemble Program Component information and facilitate the writing of evaluation documents required by TBS for all activities on the lowest level of the PAA.

Analysts within the DND/CF Strategic Review Secretariat used Nike to answer a series of questions to assess information provided on individual sections of the Program Component reporting template. Most evaluation questions prompted the evaluator to provide a binary response in the form of a "yes" or "no" answer. A few questions required the reviewing analyst to respond with a rating on a 5-point scale. Examples of evaluation questions for the assessment of component outputs are provided in Table D-1.

Table D-1: Extract from the Nike Component Evaluation Tool – Evaluation of Outputs.

In this table is an extract of the evaluation criteria used to assess information provided about Program Components by analysts within the Strategic Review Secretariat. This particular extract indicates criteria used to assess a Program Component's outputs.

This reference document which describes the Output . . .

Yes / No	SUFFICIENT INFO?] contains suitable information for evaluation.
Yes / No	[VALID?] represents a valid Output product or specific service (i.e. is NOT a misclassified IRON or Outcome).
Yes / No	[PRIORITY?] includes a reasonable argument to justify the PAL's rating of this output's relative priority compared to other outputs produced by this Program Component.
Yes / No	[ALTERNATIVES INFERIOR?] includes descriptions of reasonable alternatives that have been deemed inferior to the described Output.
Yes / No	[ALTERNATIVES VIABLE?] includes descriptions of viable alternatives to the present output that have been presented for future consideration.
Output	Indicator/Target Info.
Yes / No	[SUFFICIENT INFO?] There is sufficient information provided to make an assessment of performance via indicators and targets.
Yes / No	[BENCHMARKING?] There is some indication of benchmarking (references have been given and briefly explained). Output – Indicators Yes / No.
Yes / No	[DATA SOURCES?] Data sources for the evaluation of Output indicators are identified.

The desire for objectivity during the execution of the Strategic Review, and in particular the comprehensive review of programs, placed great emphasis on the provision and evaluation of "evidence" as opposed to providing an amalgamation of subjective intuition and potentially biased logic.

Of course, there is no single best approach upon which to elicit the relevance of a Program Component. Good approaches draw a thread through political direction, strategic guidance, assessments of programmatic risk and organizational capacity, economic and fiscal forecasts, policy, and capability assessments against perceived threats to defence and security.

Good approaches also benefit from aligned guidance obtained from leaders at top levels in an organization as well as the consolidated involvement of program owners and subject-matter experts at lower organizational levels who have a corporate viewpoint. In light of this, evaluating the importance and discretion attributes of reference documents during the assessment of a Program Component's overall relevance was seen to provide the most robust way to conduct the comprehensive review of programs.

D.1.9 Defence Management Committee Rankings

The question of a document's importance is subjective to some extent, and will be assessed differently by individuals depending on their background, experiences and cognitive style. The TBS guidelines were used to provide a degree of clarity in this regard.

Assuming that each Program Component could meet criteria pertaining to federal role and mandate, there were two fundamental viewpoints upon which the relevance was assessed – one view was from the vantage point of the Federal Government, and the second view was from the vantage point of meeting the current and future needs for Defence and Security. Mindful of these two views, the Defence Management Committee (DMC) engaged in two separate but related exercises that shaped the final assessment of relevance for each Program Component:

1) The first exercise in which DMC played a direct role was conducted based on a preliminary categorization of cited documents collected from the Program Component Templates. Document categories were derived by the DND/CF Strategic Review Secretariat and cited documents were binned accordingly. In some cases documents were partitioned into sections and each section was placed into a different category. Each bin was labeled and members of the DMC were asked to rate the relative importance of each bin with respect to:

    a) The viewpoint of the Federal Government; and

    b) The continued needs of Defence and Security.

    Indicative results of these ratings are shown in Figure D-5 and Figure D-6.

2) In the second exercise, DMC members individually assessed the relative importance of the six Question Criteria for the DND/CF Strategic Review[9].

[9] The first and third of these criteria correspond to relevance from the viewpoints of the Federal Government and the continuing need for defence and security, respectively.

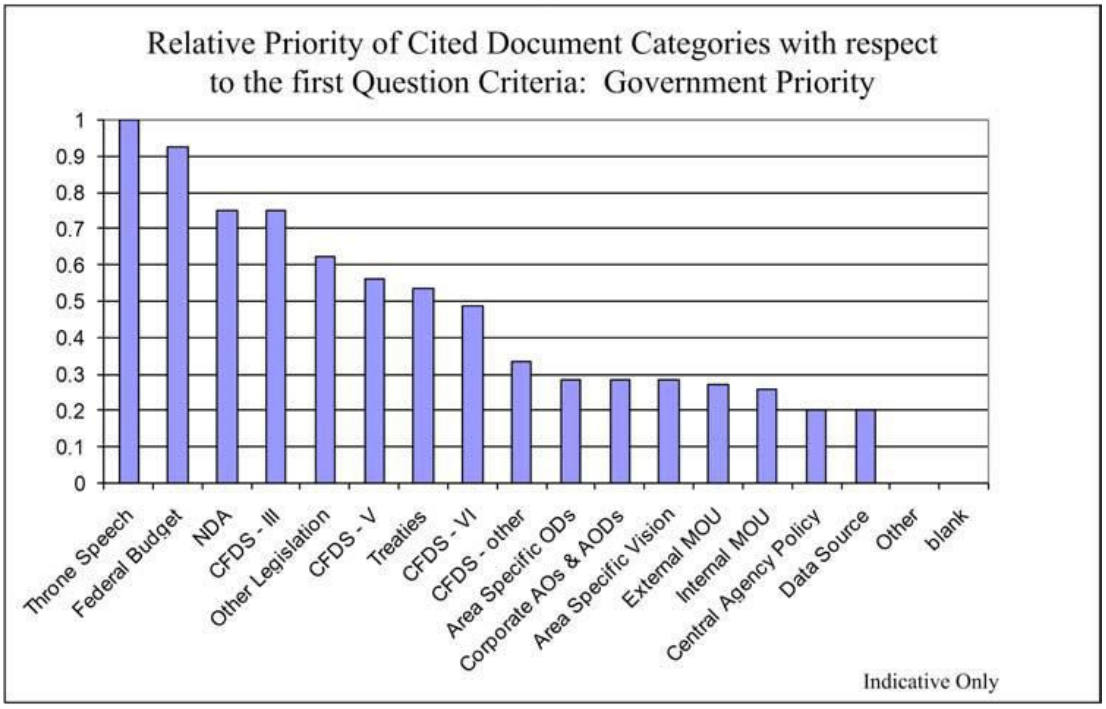


Figure D-5: Relative Priority of Cited Document Categories with Respect to the First of the DND/CF Question Criteria: Government Priority (1 is High, 0 is Low).

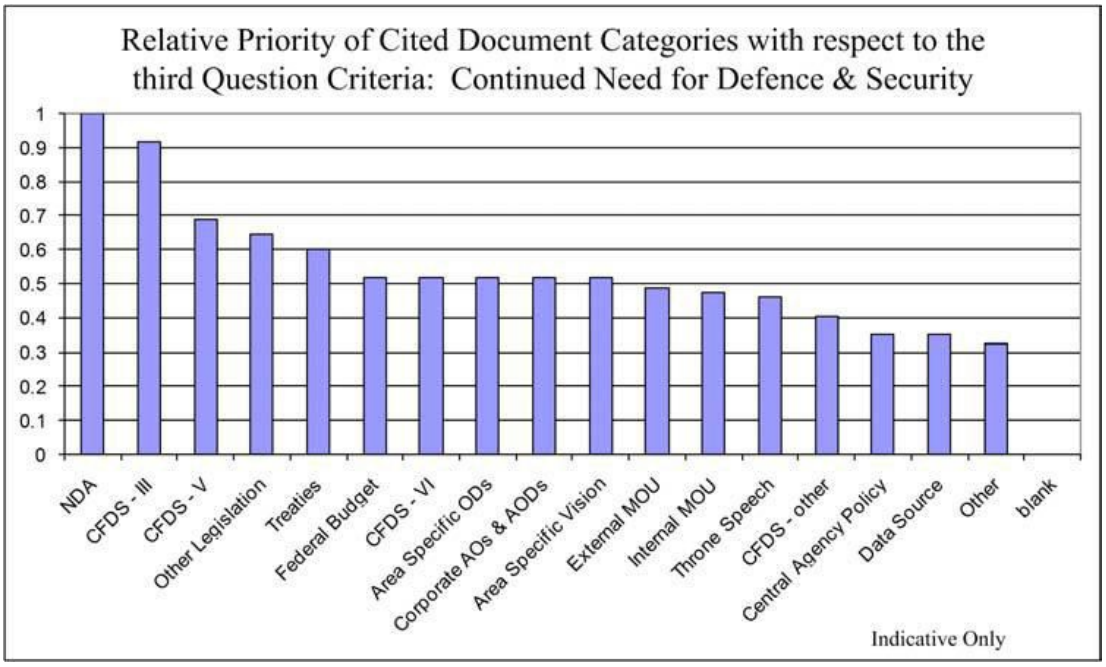


Figure D-6: Relative Priority of Cited Document Categories with Respect to the Third of the DND/CF Question Criteria: Continued Need for Defence and Security (1 is High, 0 is Low).

With ratings from DMC in hand, these were mathematically processed with results from the Program Component assessments done with Nike, before being sent to CapDiM to produce a score for each Program Component's performance and relevance.

The grey lines that run horizontally and vertically through the CapDiM scatter plot are used to segment the set of Program Components into four quadrants. Half of all Program Components fall below the horizontal line and half appear above this line. Likewise, half of all Program Components appear on the left side of the vertical line and half appear on the right side of the vertical line. These lines are simply an aid to understanding the distribution of relevance and performance. They do not indicate any kind of cut-off in terms of the value of Program Components.

D.1.10 Evaluating CapDiM Results

As it was originally intended, the results produced by CapDiM provided a first indication of those Program Components to be further scrutinized as candidates for potential divestment. The attribution of expenditures to Program Components was used in combination with these results to demarcate those Program Components which composed the least relevant 20% of department (note red dotted line on the CapDiM plot on Figure D-1).

These results were augmented by a variety of additional views which highlighted particular aspects of the data. For example, separate plots were produced to highlight the relative scatter of only those Program Components under the purview of particular subordinate organizations.

As was foreseen at the outset of the Strategic Review, several significant issues were not fully addressed before completion of the final iteration of mechanistic data collection and evaluation during the DND/CF Strategic Review. In brief, these remaining issues concerned the consistency and completeness of collected data, as well as the "best ways" to efficiently prompt a unified view of tenable divestment options, while at the same time providing a consolidated information base from which to grow an integrated performance management framework.

For example, even though the interconnectedness of programs on the PAA was fully recognized at the outset of the DND/CF Strategic Review, there remained deficiencies in the information about the enabled/enabling relationships between the program activities, and by extension the Program Components. In the end, due to these deficiencies, the relevance of each Program Component had to be determined in isolation from the others. As a result, some programs known to directly enable others received lower relevance scores than might have otherwise been the case. This was necessary in order to ensure all Program Components were treated equally within the assessments.

Another example of a potential shortfall pertains to how Program Components were disaggregated and the submission of related information pertaining to the required quantities of resources assigned to these. Note that a common principled approach by which to disaggregate activities across the PAA was not implemented. This afforded the potential for superfluous programs (or aspects thereof) to be reported under the umbrella of a Program Component that was highly relevant. On the flip-side, CapDiM sometimes made it difficult to identify those Program Components that were perceived to be highly relevant but also had credible opportunities to reduce the quantity or frequency of outputs and thereby achieve a better balance across an entire suite of program activities. The requirement to enumerate a Program Component's outputs, outcomes and IRONs within the component reporting template helped to guard against these aspects; however, the relative dearth of credible performance information, and emphasis on relevance over performance in the initial search for divestment options, made it necessary to inject a degree of informed interpretation to the CapDiM results.

These two examples are illustrative of some of the many reasons why CapDiM produces what is referred to as a "discussion matrix" and not a "decision matrix". The final set of divestments offered as a result of the DND/CF Strategic Review represents a cohesive family of items. The items in this family are connected by a set of common themes and are expected to be "optimal" in the sense that their loss can be accommodated by the defence portfolio as a whole. That is a different, and very much preferable, outcome than mechanistically accepting the divestment of the lowest-rated programs.

Future incarnations of data collection and evaluation procedures leading up to the next Strategic Review may well strive to shorten the gap between "discussion" and "decision" when attempting to isolate families of divestment options. However, in the limit of improved data accuracy and enhanced analysis, a gap will ultimately remain. Not because it is technically infeasible to derive integrated families of divestment options, but because senior leadership will always need to be able to inject additional perspectives and to make decisions based upon factors outside of those considered in a mechanistic process.

D.2 CZECH REPUBLIC

20150818 – SAS-113

18 Aug 15

NATO STUDY SAS-113 FUTURE BUDGETARY CONSTRAINTS: CHALLENGES AND OPPORTUNITIES

CZE CONTRIBUTION TO PHASE 2 RE-ATTACK

Phase Guidance: *This phase of the paper is focussed* ***solely*** *on the resource management strategies applied by your country. There is no need to repeat previous context. We are after both breadth (variety of strategies) and depth (what the strategies involved). Actual submissions are encouraged to include more detail if said information enhances otherwise nuanced content.*

D.2.1 Introduction

Section guidance: Just list the headings.

General principles and recommendations usable for the Department of Defence and dealing with the effects of the economic crisis were formulated in 2011 in a key document called The White Paper on Defence. The paper was created upon a request that was influenced by many factors (dynamic development of security environment, economic crisis impacts, new NATO strategic conception, etc.):

> "*From a comparison of ambitions, a detailed analysis of currently available resources and of the outlook for the next ten years in all three resource areas (i.e. human, financial, and material), the following results emerge: a) The Czech population is ageing and the MoD's competitive capabilities in the labour market are weakening. Thus, as a consequence of these trends, the armed forces will encounter more difficulties in recruiting new candidates for military service; b) As a consequence of ad hoc budget cuts resulting in postponed investments, non-systemic investments and overpriced contracts, the defence sector has accumulated internal debt in armament, equipment, materials and unmovable infrastructure. As a result, the estimated amount of internal debt accrued over the last decade is roughly 80 to 90 billion CZK; and c) The demand for huge investments into the renewal and modernisation of technical aspects of many crucial military capabilities will be concentrated within two relatively short periods around the years 2015 and 2020 (e.g. this period is burdened with the leasing deadline for JAS-39 Gripen supersonics and the end of the service life of both the 2K12 KUB surface- to-air missiles and the air defence radar equipment, the artillery will need modernisation and the service life of a part of the BMP-2). A number of general conclusions have been attained from analyses performed during the process of elaborating the White Paper. To begin, the following courses of action are unacceptable: tolerate the absence of efficient tools for the management of the Ministry of Defence; tolerate mismanagement in the defence sector; continue with across the board downsizing of the armed forces, although their basic structure still shows features of a much larger army from the beginning of 1990s; maintain an oversized bureaucracy and other inefficient components to the detriment of the productive parts of the Ministry of Defence, including the armed forces command and control system, and subsidize activities, infrastructure and other material assets that are not directly related to the primary missions of*

the defence sector. Therefore, for the sake of consolidating the defence sector, it is absolutely necessary to: apply a programmatic approach in the planning and strategic management of the Ministry of Defence; generate internal savings through optimized processes and the C2 organisational structures within the entire MoD Sector; clear the Ministry of Defence of duplicated and other activities that are not directly related to its core functions and do not support the development of military capabilities; strictly prioritise investments into the development of military capabilities according to their contribution to roles, functions and international commitments of the Czech Armed Forces; stop investing into non-essential capabilities, and terminate or cease to restore their operation; introduce a transparent and effective acquisition process; increase the defence spending on the basis of specific and justified investment requirements and projects." [3]

The resource strategies employed by the Czech Republic in response to budget constraint were:

1) Reducing Mandatory Expenses[10] – Reducing the Number of Employees (Civilian Employees, Soldiers):

   Within solving the impacts of the economic crisis on the Czech economy, the government approved of medium-term expense government frameworks for 2010 to 2012 by passing a resolution no. 715 from 8 July 2009. At the same time, individual members of the government were set a task to reduce the number of functional posts within individual chapters of the state budget of the Czech Republic and the connected measures for reducing finances for salaries and other payments for work (government resolution no. 436 from 25 April 2007 to the proposal of reducing the number of functional posts in the state administration until 2010 by at least 3%). In order to ensure sustainability of the Ministry of Defence development and ACR abilities and skills, the MoD management adopted measures for reduction of 4,459 posts in the table of organization in 2009, while part of the posts in the table of organization were not staffed. At the end of 2009 there was a gradual staff reduction and at the end of the year, 1,350 soldiers and 1,381 civilian employees were made redundant. At the same time, 1,728 vacant posts in the table of organization were excessed. Following the amount of budget sources in the following year, when the approved budget of the Ministry of Defence for 2010 was 7.1 billion CZK lower than in 2009, it was necessary to adopt measures that would deal especially with the mandatory expenses and that would mean reducing staff expenses above all. In spite of the fact that there were other government measures projected in the MoD budget – e.g. reducing salary finances and connected expenses by 4% and other adjustments from the "Package of measures by the Ministry of Finance", there was an effort to ensure the basic mandatory rights of people and main tasks required within the MoD activity in 2010. Reducing the number of employees as opposed to 2009 meant 2,542 people. As opposed to 2009, there was a reduction in mandatory expenses of 1,223,893 thousand CZK, i.e. 7.47%, especially by reducing wage expenses by 743,301 thousand CZK, other payments for work by 210,602 thousands CZK, compulsory insurance by 255,141 thousand CZK, allotment for the Culture and social services fund by 4,849 thousand CZK. Also, in connection with getting mandatory expenses through up to the maximum of 50% of the total chapter expenses in 2011, it was necessary to reduce staff by 1,518. Reducing the number of employees was done in connection with reducing wage finances by 10%; another reaction was reducing wage rates of civilian employees by 3 wage rates and reducing salary brackets of soldiers by 10%. Reducing the volume of salary finances concerned, apart from exceptions, all state budget chapters and formed a part of anti-crisis decisions approved by the government in order to reduce the state budget deficit. Reducing mandatory expenses via reducing the number of employees in the department was realized also in 2012 by 303 persons and in 2013 by 402.

[10] Mandatory expenses were formed by salary finances and other payments for work, compulsory insurance paid by the employer, share for the cultural and social services fund, pensions and other social benefits, housing benefit.

As to the number of employees, there was a reduction in the number of employees by 15,004 persons, i.e. by 33.18% before and during the economic crisis in the Czech Republic (between 2002 and 2012).

2) Reducing Mandatory Expenses – Proposals for Personal Expenses Reduction:

- Government proposal for 10% reduction of the wage rates for civilian employees and soldiers (estimated saving ca. 891 million CZK).
- Cancellation of the bonus for standby duty with 120 minutes accessibility because of combat and mobilization readiness.
- Compensating overtime work with compensatory leave (estimated saving ca. 68 million CZK).
- Proposal for changing the collective agreement (reducing the pay for standby duty from 15% to 10%, reducing the sick benefit for civilian employees from 80% to 60%.
- Taxation of the housing benefit for soldiers.
- Taxation of pensions for military pensioners.
- Proposal for a change in the veteran status[11] and classification of missions to an armed conflict location, mission in a region with a deteriorated security situation and other missions.
- The veteran status for the first category mission would be gained after 90 days, and for the second category mission it would be gained after 360 days.

3) Handling Needless Material – Movable and Immovable Assets Sell-Off:

With creating professional Armed Forces, gradual reduction of garrisons, military vehicles and material, the ACR has put a lot of movable and immovable assets out of operation. The needless material sell-off generated an income to the MoD budget which is consequently spent on modernization of perspective garrisons and assets. At the same time, it has brought savings needed for maintenance and security:

- Competitive tendering – announced by the Agency for handling needless material (natural persons or corporate bodies may be interested); the total needless movable and immovable assets sell-off income was 1.31 billion CZK in 2010 and 2011.
- Auction – a method of auctioning the needless material was put into practice in April 2015, prices of movable material are based on an expert's opinion who determines the minimal price, the person interested must pay the auction fee. In case of a repeated auction, the price may, for example, be reduced and thus correspond with the real demand for immovable assets.

4) Handling Needless Material – L-159 Ground Attack Aircrafts Sell-Off:

The MoD sells off 15 pieces via Aero Vodochody Aerospace (4 pieces used by the ACR and 11 pieces stored) of needless L-159 ground attack aircrafts to Iraq (estimated income of 780 million CZK, saving tens of millions CZK for storing the L-159 ground attack aircrafts, at the same time, new working positions will be created and the volume of company supplies is about 600 million CZK).

[11] Apart from the participants of WW2, all men and women who were in constant service during armed conflicts and peace operations for at least 30 days are considered veterans.

5) Acquisitions:

The MoD has carried through a significant change in the process of purchasing Army vehicles and gear. According to the amended act no. 38/1994 of the Collection of Laws, on foreign trade with military material, it is possible to purchase equipment for the Army and security services straight from the producers. The practice of purchasing from abroad could be done otherwise than via Czech mediatory companies, which increased the costs of military purchases by more than 1.5 billion CZK in the last six years. The amendment of the Act came into practice 1.9.2011, and on 30.6.2012 in full.

- 2013 – The National Armaments Office with the aim to ensure transparent and effective purchases of military and security material for the Army, police and other Armed Forces (the office was formed by the transformation of the Armaments section – saving 69 prescribed positions, ca. 48 million CZK), the office was closed in 2015 (merged with the central purchasing agency).
- Common purchases with other NATO Member Nations, on the 16 May 2012 the government debated the possibility to purchase material between 2012 and 2015 via the NAMSA Alliance agency. Even though the Czech Republic has been a NATO member since 2002, the first purchase of military material (14 types of hand gun rounds) via the NAMSA agency was carried out in 2011 (saving 33%) with the intention to realize the invitation to tender military material in the form of spare parts for the IVECO armoured vehicle, ammunition purchase and purchase of the MINIMI machine gun.
- Revising contracts that had been signed before 2014 – pilot training, electricity purchase (saving 165 million CZK), Since 2009 purchasing energy on the stock market – purchasing electricity and natural gas on the Czech-Moravian commodity market in Kladno reduced the unit prize generating savings over 100 million CZK – energies purchased for 2015 for the MoD, AS-PO (the Army service state-funded institution), military hospital in Prague, Brno, and Olomouc and for the Institute of aviation medicine in Prague, purchase of bullet-proof vests (saving 100 million CZK).
- Invalidating selected projects (2014 – building a pipeline for transporting fuel – 430 million CZK).

6) Co-operation between the Czech Republic and Slovakia:

- 2012 signing the Declaration of co-operation in the area of defence.
- Economic savings presumed especially in co-operation the area of risk management, international acquisition projects generating savings according to their extent, common use of the NAMSA agency, airspace protection.

7) Department Restructuring, Agenda Reduction, Sharing Agenda Within Public Administration:

- The intention was to save up to 1 billion CZK via reduction of some agenda or its sharing within the public administration (2012).
- Transformation of the section of armament into the National Armaments Office (invalidated in 2015).
- Proposal to invalidate the military trailer office.
- Centralization of utility activities – founding the logistics agency (savings of several hundred millions CZK).
- Reorganization of regional military headquarters – part of the agenda will be taken over by other elements (saving tens of millions CZK).

- Proposal for unifying military institutions with their civilian equivalents (saving 500 million CZK), e.g. National Armament Office – purchasing military material (e.g. ammunition) for other Ministries.

8) Using EU Structural Funds Within the MoD:
   - Organization sector grant recipient, state-funded institutions, state enterprises.
   - Projects aimed at education, research and development, energetic saving realization, improving the state of nature and countryside.

D.2.2 Resource Strategies

***Section Guidance**: In this section please complete one copy of the template below for each resource management strategy adopted by your country. **Please include a good variety of examples with sufficient depth to be collated prior to the Canada meeting so that the final report can be reviewed then. This input is critical, and without it the final report will not be a viable product**. The target audience is a NATO Member Nation facing similar challenges, and considering adopting your strategy – hence please include why/how did you did it; what were the results/consequences; what advice you can offer based on your experience. Please refer to Annex A for a list of possible themes to consider; and Annex B for a worked example.*

Resource Management Theme: Rationalization of the Process of Purchasing Military Material (Example of Economies of Scale)	
Initiative/Strategy Title: International Armaments Cooperation	
Context	*[Guidance: Background information leading to initiative and affecting its implementation. **Why did you do it?**]* The consequence of the economic crisis in the form of an increased public finances deficit raised a requirement for saving measures in the form of, for example, reducing military expenses in the Czech Republic. This trend of a long-term reduction of the budget limit might fundamentally influence the MoD's ability to fulfil its tasks in the Czech Republic as well as fulfilling tasks following from international contracts and participation in international organizations and operations. Reaction in the form of the White Paper on Defence determines specific recommendations for reacting to consequences of the MoD budget reductions during the economic crisis in the Czech Republic. As to acquisition and assets handling, which is an area criticized by the politicians and public for not being transparent and effective in purchasing military material, the White Paper on Defence advises to use the services of NATO Maintenance and Supply Agency NAMSA (today NSPA) and thus realize potential savings from its extent (as opposed to Czech mediators, via whom the Army realized the most important arms purchases, the agency does not charge any extra provisions, the customer only pays the administration fees. These are approximately 0.5 to 1 percent of the total price with huge order volumes and usually do to exceed six percent) for purchasing military material.
Implementation	*[Guidance: A description of the key actions that you took to execute this strategy? **How did you do it?**]* NATO Maintenance and Supply Agency was founded in 1958. It offers the NATO member countries complete logistic support.The Czech Republic has been a NAMSO member country since June 1999, it regularly pays fees to the administrative agency budget and it is thus entitled to contact this organization and require mediation of purchases or services for its military forces.

Resource Management Theme: Rationalization of the Process of Purchasing Military Material (Example of Economies of Scale)	
Initiative/Strategy Title: International Armaments Cooperation	
Implementation (cont'd)	*[Guidance: A description of the key actions that you took to execute this strategy? **How did you do it?**]* The Czech Republic has used these services minimally so far, it purchased weapon via mediators (disadvantage in the form of higher provision). Act no. 38/1994 of the Collection of Laws on foreign trade with military material has protected the Czech Republic from using the NAMSA services more as it did not allow to sign a contract for military material supply directly between the Czech MoD and NAMSA. The MoD has put through a fundamental change in the process of military vehicles purchases and gear and according to the amended Act no. 38/1994 of the Collection of Laws on foreign trade with military material; it is now possible to purchase equipment for the Army and security forces directly from the manufacturers. When purchasing via the Alliance agency, the Czech Republic specifies the type and amount of material and NAMSA finds out if there is a NATO Member Nation planning a similar purchase. If there is one, the agency combines the order and gets, for example, a bulk discount. The agency membership brings advantages to the Czech Republic and its Armed Forces as well as to the local defence industry (with 190 registered companies) which may participate on the orders since the Czech Republic became a NATO member in 1999.
Results	*[Guidance: Establishment of cost savings / cost avoidance; key business changes; re-prioritisation of capabilities; savings profile (as a high-level narrative, or by Financial Year – if able to share) etc. **What was the result?**]* Purchasing ammunition (NAMSA) – the MoD first used the NAMSA Alliance agency in 2011 to purchase 14 types of hand gun rounds (especially for the new assault rifles) in the total volume of 207 million CZK. Although it was a first purchase via the NAMSA agency, the Czech MoD evaluated this experience as thoroughly positive. When comparing expenses for purchasing the same types of ammunition within the last few Army supplies it was found out that about 33% of expenses were saved, while with some commodities the ammunition price was up to 50% lower than with the purchases in the past. Purchasing mortars (NSPA) – the MoD has purchased 19 mortars for 64 million CZK from a Spanish company called Expal. The competition price is about 64 million CZK which is 16 million less than expected.
Capability Impact	*[Guidance: Projected/actual impact on high-priority capabilities? Impact of resourcing strategy on ability to provide NATO defence capabilities?]* Purchasing military material via the NAMSA (NSPA) agency was one of the new strategies to be used during the economic crisis. It contributed to putting cost-saving measures into practice and at the same time it broadened the potential to purchase military material in the times of budget reductions.
Lessons Identified	*[Guidance: What worked? What didn't? If another country were to adopt this strategy, what advice would you give them?]* Using the NAMSA (NSPA) agency shows an example of rationalization of the process of purchasing military material via the gained economic advantage in the form of economies of scale. An integral part is a potential advantage for the local industry to participate in the acquisition programme (currently, the orders of Czech companies form less than a half of the realized acquisitions volume). In case there is a preference for purchasing outside the local producers, there is a potential disadvantage of loss in VAT or the income tax of the corporate bodies.

D.2.3 Suggested Areas for Future Study

Section guidance: *SAS-113 is both novel and time limited. As such, we have encountered a number of topics that would benefit from further study which we are unable to bring into the scope of SAS-113. Please outline any suggestions that you would like to make or are aware of.*

1) Investigation of Disparities Between NATO Member Nations

Describe the determinants of military expenditure (economic and security) and identify disparities between NATO Member Nations (or countries included in SAS-113?), and thus to describe diverse economic environment affecting the amount of military expenditure as a percentage of the respective countries' gross domestic product:

- Only small group of NATO Nations fulfills the recommended 2% of GDP investment in military expenditure – why?

Hypothesis:

Alliance is not an economically homogenous body and individual economies thus allocate a significantly different amount of GDP for the needs of the Armed Forces in dependence on political priorities of individual governments, public finances or overall economic condition of national economies.

Methods of verification: multi-variate statistical methods Time period: 200x – present:

i) Identification of determinants of MILEX (theory: demands for MILEX).

ii) Quantification of determinants (macroeconomic variables, security risks variables, etc.).

iii) Creating a Classification Model.

iv) Interpretation of Results.

2) Investigation of Future Budgetary Constraints

The developments in the NATO Nations suffering from deficit in public finances intensify pressures for cutting military expenditure, which is noticeable in the NATO Nations as well where only a small group of countries fulfills the recommended 2% of GDP investment in military expenditure. The growing deficit of national budgets, as well as the consequences of the economic crisis, belongs to significant economic determinants of the European countries' military expenditure. The future macroeconomic challenges which can affect military expenditure in the Czech Republic are:

- Pensions reform;
- EU enlargement; and
- Single currency (EURO).

3) Suggested Area of Study

Identification and investigation of future budgetary constraints in NATO Member Nations.

D.3 FRANCE

Future Defence Budget Constraints: Challenges and Opportunities

Study Plan of SAS-113 / RST-009

London, 7-9 July 2015

French Contribution

French Ministry of Defence has been undergoing reform for the last 20 years. Since the great recession in 2009, the lack of money is the main concern while international situation is going worst. New solutions have been implemented in order to meet strategic objectives with fewer resources.

The defence budget balance is always a complex process, with many actors, with different objectives, different tempo. Moreover, the main parameters could change radically. So the solution is always a compromise, taking into account a part of uncertainty. This compromise is also very difficult to assess because it depends of the chosen point of view. Another reason is that there are not always figures, marks or references; sometimes it is only the feeling that what has been done is a good solution.

The intent of this paper is to present the main reforms, how they impacted the MoD, what were their consequences, and either the solutions or what could have been done to mitigate their impacts. It is divided in five parts.

D.3.1 Outsourcing

Outsourcing is a way the administration gives a private company full responsibility for single or complex task. Then this process is evaluated according to several criteria as service quality, cost, delay, etc. One danger could be the loose of competency, in particular for highly technical task. As a consequence, before outsourcing, it is necessary to have a better knowledge of service's core missions in order to keep them. The second danger, more brutal, could be the bankruptcy of the outsourcing company. Now, it is well evaluated and taken into account.

Outsourcing results are not bad. First, outsourcing hasn't decrease military capability and in a sense, it is necessary to achieve missions. As an example, the French services need strategic airlift in order to fulfill their missions, but Air Force does not have large planes like the C17. For multi-national operations, French Armed Forces rely on U.S. or UK planes, but it is also possible to get those through a multi-year contract with a private company, with options for over use.

Nevertheless, it is very difficult to assess results. The very first reason is the fact that there is no accountancy like in the private sector. So the cost of a single task is not evaluated (equipment, spare part, personnel, pension, etc.). The French MoD outsourced missions in the sense that they could be outsourced, that the performance seemed bad, but without real and solid figures. Finally, French MoD has to be more accurate on gains due to outsourcing; it has to make clear the gains due to reorganization as an outsourcing consequence and the ones that would have resulted from a reorganization, without outsourcing.

When we focus on human resource performance, results look good; civilian people are more available to do a specific task (no military training, no Operational Commitment Overseas – OCO), they do the same activity every day. Without surprise performance is better.

Nevertheless, after outsourcing, the servicemen were not systematically fired, but more often assigned to another mission, in another place. From this point of view, outsourcing could be a solution to reorganize a mission, taking soldiers on one side and putting them on another one. Finally, it is possible that there are no human resource gains for the MoD and only more cost.

From an economic point of view, results are highly contrasted. When there is a real competition with several different companies for the same contract, there is economic gain for the MoD (but the contract has to describe precisely the tasks; otherwise the needs are not matched). On the other side, when it is a quasi-monopolistic environment (nuclear activities are the most relevant) the gain is either very small or null.

As a conclusion, there is still a lot of job to do in order to optimize outsourcing. The two main tasks are:

- Have a better understanding of task, with accurate definition, with cost, with clear perimeters; and
- Know more precisely what can be outsourced and what can't be.

D.3.2 Maintenance and Supply Chain

Over the last years, more money has been put in order to improve maintenance (+20% over 10 years). Moreover, a joint organization has been settled, for planes helicopters, tactical vehicles, etc., and 3 joint offices have been created (one for Navy equipment, one for land equipment and the last one for planes and helicopters). For example the same office is in charge of Rafale jet fighter and Army helicopter Tigre. These three offices are in charge of day-to-day maintenance, the initial one is now under the responsibility of the procurement agency. Some others changed occurred in order to rationalize industrials assets. Nevertheless, all these changes underperformed.

They are several reasons for this. First, the relation between the services, joint offices and industrials is complex – multi-year contracts, monopolistic position or one single company for several key elements. So the services are not able to challenge their suppliers and the level of performance is poor.

Moreover, the maintenance and supply chain organization is not optimized. There are too many types of equipment, old and new, spread in several locations – which is actually the opposite of an industrial model, but one that fits military and historical background and political constraints. It could be improved by:

- Reducing the number of type of equipment: procurement action; no impact before 10 years (?).
- Reducing the number of location: political action; no impact on very short term.
- Renegotiating contract with suppliers: immediate impact but weak leverage on military industries.

Another challenge is the human resource dedicated to maintenance missions – young civilians or servicemen under-perform compare to skilled and trained people. Hiring new young technicians/soldiers is not a short-term solution and today the recruitment stream is weak. Special attention has to be paid to skilled and experienced mechanics; they have to trust in the MoD otherwise they quit and do the same job, better paid, for industries. Reorganization, move and transfer on very short notice have always bad impacts but it is often the consequences of political decisions.

The last bad mark is related to spare parts and logistics flux. The stocks are always costly and consequently sized at the minimum level. In the French MoD, some equipment are old (air-to- air refueling tanker are over 50 years old) and need a lot of spare part. Another reason for this huge need is operational commitment – the 3 services were committed in Afghanistan and now in Africa in several countries. All these equipment, old and brand new, are more and more solicited and need to be fixed. The amount of spare part wasn't design for such consumption and the lack is more and more obvious. Moreover, the fluxes are not optimized – too many players, old procedures, too many locations (OCO emphasized again the difficulties).

Finally, the organization settled can't perform correctly – small stock (lack of money), huge needs (old equipment, operations), too many small flux (too many locations) and in spite of lot of money, results are poor. Since 2014 a new organization is designed, much more industrial, involving logistics specialists but it has not been assessed.

D.3.3 Procurement

Procurement is a challenging process – it cost a lot of money since the very beginning and has consequences for 30 to 50 years. It is also a very constrained process, with political (all the critical industrial sectors that make industrial and technological base an instrument for preserving France's strategic autonomy and its sovereignty are preserved) and industrial inputs, in order to meet operational requirements.

It is very difficult to assess results because there are several points of view, which are not synchronized. The one of the industry is market is difficult, more and more competitive, with new international players. Nevertheless, these companies continue to sell their product to the service and even if there is less equipment, price/unit increase and finally, the global cost of a project don't change. The results from the services point of view are also balanced. They have state-of-the-art equipment, they are able to perform a lot of mission (which they do), but with less equipment, so it is more challenging than before to meet operational contract. At the very end, it is always a compromise between operational and industry needs.

Once the program is validated, there is one main difficulty – cancelation or postponement. Such decision on future equipment could imply economic gains on this new equipment, but the previous one will be kept in service longer. Doing so, the services adapt theirs procedures, but no one evaluates the economic consequence – using more costly equipment versus buying a new one, more efficient and cheaper on medium term.

Finally, design and choice of new equipment does not fully take into account maintenance consequences. As a rule it is underestimated, in particular during the 2 – 8 years, before people are able to use it correctly.

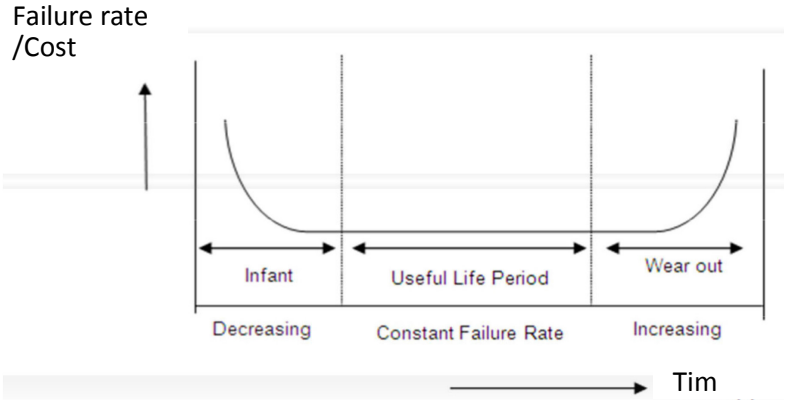


Figure D-7: Bathtub Curve – Hypothetical Failure Rate vs. Time.

So when new equipment arrives, it is possible to see the accumulation of two bad tendencies:

- First, the older one is getting more and more costly with bad performance; and
- Secondly, the new one is not able to meet its standards in term of cost and performance.

D.3.4 Operational

The main operational contracts are a broad spectrum of engagements and include permanent missions on the one hand, and non-permanent missions entailing intervention outside France borders, on the other:

- "Threats related to power": The risk of a resurgence of conflicts.
- "Risks related to weakness": Certain weak or failed States can become a threat.

In order to assess their operational capacities, several indicators are checked each year.

Table D-2: Service Indicators.

	2011	2012	2013	2015 (Goal)
Army	281	278	278	300
Navy	250	200	225	400
Air Force	283	222	235	400

The indicator is not good, but not so bad – 2013 was presidential elections and a new white paper on defence so there was a status quo in 2012 and 2013. It is also possible to notice that now it goes up.

The main reform is a more centralized command, decisions moving from Army, Navy and Air Force staffs to joint staff. In order to preserve it, joint dedicated offices were created or strengthened. Those offices have wider responsibilities than before. On the other side, Army, Navy and Air Force staffs are focused on training and availability of forces for operational commitment. Finally, the result is positive – the Armed Forces are committed with successes in many places all over the world.

Overseas commitment operations are also costly and for years they were underestimated. So it was decided to increase the OCO funding to 630M€.

Table D-3: Overseas Operations' Cost.

M€	2007	2008	2009	2010	2011	2012	2013
Voted	360	460	510	570	630	630	630
Done	681	852	873	861	4246	873	1250
Difference	321	392	363	291	616	243	620

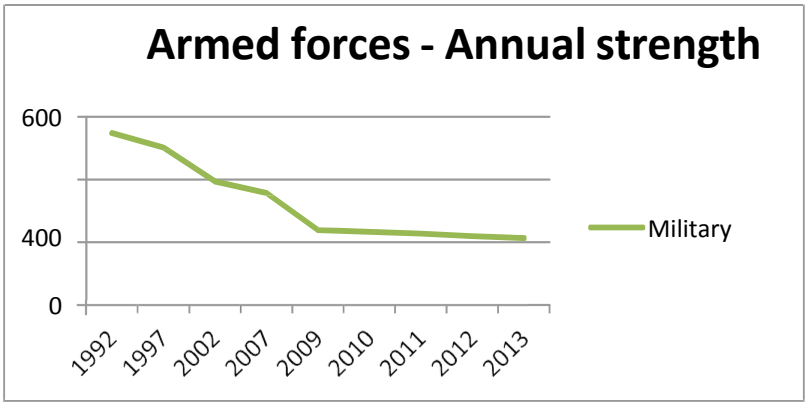
The Armed Forces had to pay a part of the difference, around 20% of it. There are two consequences:

- OCO cost each year $140 million to the MoD, which means cancellations of military programs, procurement or training activities.
- The equipment is broken when it comes back and it needs a lot of money to be fixed, which is not included in the $140 million.

The result was not perfect but far better than before – less money was required to close the fiscal year. Unfortunately, due to the financial crisis, the funding went down in 2015, while French forces are still engaged in Mali and in France, following the terrorist attacks in January.

D.3.5 Human Resource

The decisions made in 2008 and the Military Programme Act passed in 2009 settled for elimination of 55,000 positions between 2009 and 2015, of which over 10,000 in 2014 –2015. The MoD will be implementing these decisions and will embark on further downsizing, albeit much more moderate, in accordance with the new operational contracts, to comply with the requirement to reduce public spending and meet commitments to rationalize public administration. This second reduction will concern approximately 24,000 personnel. All in all, between 2014 and 2019, the Ministry of Defence must therefore reduce its workforce by around 34,000, excluding outsourcing.



2009	2010	2011	2012	2013
307 284	298 999	291 844	282 446	274 772

Figure D-8: Armed Forces – Annual Strength.

Nevertheless, the result of this politic is not good – there was no economic gain, only a stabilization of manpower cost. This is the mechanical consequence of the increase of retirement soldiers, of special HR measures and problems link to the payment software. When we focus on servicemen salaries, there is no economic gain; it is also possible to see +1% increase salary over the last 2 years.

As a consequence, an office, outside the services and subordinate to the Ministry of Defence got more responsibilities and now manage human resource for the whole MoD. Since this decision, in 2013, results are better – there is now a real decrease of global cost – 268M€, – 2.28% compared to a + 140M€ in 2012.

D.4 GERMANY

D.4.1 Resource Strategies

***Section Guidance**: In this section please complete one copy of the template below for each resource management strategy adopted by your country. **Please include a good variety of examples with sufficient depth to be collated prior to the Canada meeting so that the final report can be reviewed then. This input is critical, and without it the final report will not be a viable product**. The target audience is a NATO Member Nation facing similar challenges, and considering adopting your strategy – hence please include why/how did you did it; what were the results/consequences; what advice you can offer based on your experience. Please refer to Annex A for a list of possible themes to consider; and Annex B for a worked example.*

Resource Management Theme:	
Initiative/Strategy Title: Use of Simulators	
Context	*[Guidance: Background information leading to initiative and affecting its implementation. **Why did you do it?**]* The primary motivation for using simulators is to save money. Simulators can be employed in many different ways. This ranges from practicing simple sequences at mechanical simulators to weapon system simulators to highly-complex simulators that entire units can use for exercises. This reduces wear on materiel, preserves natural resources, minimizes the impact on the environment, and reduces risks. Also, less money is required for maintenance, personnel and infrastructure.
Implementation	*[Guidance: A description of the **key actions** that you took to execute this strategy? **How did you do it?**]* In the Bundeswehr, simulators are widely employed. Already when materiel is introduced, the cost benefits of acquiring simulators for training and testing are analysed.
Results	*[Guidance: Establishment of cost savings / cost avoidance; key business changes; re-prioritisation of capabilities; savings profile (as a high-level narrative, or by Financial Year – if able to share) etc. **What was the result?**]* Precise costs savings cannot be determined. However, a cost comparison can identify roughly what savings can be achieved in specific cases.
Capability Impact	*[Guidance: Projected/actual impact on high-priority capabilities? Impact of resourcing strategy on ability to provide NATO defence capabilities?]* The use of simulators has a direct and positive effect on capabilities with regard to training and materiel. During training, service members learn in a simulated stressful environment, yet under controlled conditions. They receive instruction that ranges from simple mechanical sequences to complex scenarios. Reaching the same level of training with real materiel would cost much more (wear and tear, energy). The money that would need to be invested in “real” training devices would no longer be available for the necessary capabilities.

Resource Management Theme:	
Initiative/Strategy Title: Adaptation of Bundeswehr Regulations in Connection with Procurement	
Context	*[Guidance: Background information leading to initiative and affecting its implementation. **Why did you do it?**]* In the past, the Bundeswehr established a set of binding regulations for the technical and administrative aspects of military procurement. Applying these regulations indiscriminately increases procurement costs, because these provisions are not standard and force the Bundeswehr to diverge from civilian regulations.
Implementation	*[Guidance: A description of the **key actions** that you took to execute this strategy? **How did you do it?**]* Each of these regulations must be re-examined to determine if it is actually necessary from a military point of view. Specifications must be adapted so that cost drivers can be identified and, if possible, substituted by Commercial-Off- The-Shelf (COTS) products. Also, requirements must be described in a purely functional way, to give industry sufficient leeway to develop cost-efficient solutions.
Results	*[Guidance: Establishment of cost savings / cost avoidance; key business changes; re-prioritisation of capabilities; savings profile (as a high-level narrative, or by Financial Year – if able to share) etc. **What was the result?**]* Armed forces materiel can be divided into different categories, ranging from exclusively military to commercially available materiel. Right from the start, savings can be achieved by carefully formulating – i.e. not exaggerating – the respective requirements.
Capability Impact	*[Guidance: Projected/actual impact on high-priority capabilities? Impact of resourcing strategy on ability to provide NATO defence capabilities?]* No impact.
Lessons Identified	*[Guidance: What worked? What didn't? If another country were to adopt this strategy, what advice would you give them?]* • This rule is particularly suitable for commercially available and similar materiel. Here, cost savings can be achieved. • However, for materiel that is to be used for the employment of weapons, or for materiel that is exposed to ordnance effects, diverging from Bundeswehr-specific regulations is not recommended.

Resource Management Theme:	
Initiative/Strategy Title: Optimizing Processes • **Portfolio analysis/management practice.** • **Increase transparency of the resource management process.**	
Context	*[Guidance: Background information leading to initiative and affecting its implementation. **Why did you do it?**]* Dependence of desired capabilities on available budgetary funds, together with the realization that large projects have long implementation timelines and will not provide the required capabilities in the event of cost overruns, have led to the establishment of new planning processes and procurement procedures. Another aim was to significantly increase the efficiency of internal cooperation. To this end, responsibilities for materiel and operations have been reassigned. The planning process for all capabilities is now called the *Integrated Planning Process (IPP)* and the procedure for procurement and employment of material is called *Customer, Product, Management, revised (CPM, Rev.)*.
Implementation	*[Guidance: A description of the **key actions** that you took to execute this strategy? **How did you do it?**]* The new procedures described above are based on an intensive detailed analysis of the procedures and processes that were employed at the time. This was conducted by an interdisciplinary working group that reported directly to DEU MoD leadership.
Results	*[Guidance: Establishment of cost savings / cost avoidance; key business changes; re-prioritisation of capabilities; savings profile (as a high-level narrative, or by Financial Year – if able to share) etc. **What was the result?**]* Ultimately, a completely new planning process and a revised procurement procedure were introduced. However, DEU MoD structures were reorganized at the same time. For the IPP, for example, a new planning organization was set up at the ministry, and a new planning office was established. Responsibilities for materiel were reassigned. The Project Head (at AIN, the Federal Office of Bundeswehr Equipment, Information Technology and In-Service Support) now has "cradle-to-grave" responsibility for the employability of materiel (i.e. from initial analysis to end of use). Operation-related responsibility, however, lies with the Armed Forces.
Capability Impact	*[Guidance: Projected/actual impact on high-priority capabilities? Impact of resourcing strategy on ability to provide NATO defence capabilities?]* The reorganized planning process and the reassignment of responsibilities should strengthen the availability of those capabilities that are required by NATO.
Lessons Identified	*[Guidance: What worked? What didn't? If another country were to adopt this strategy, what advice would you give them?]* Introduction of IPP, with the associated performance processes, has significantly improved the ability to assess the status of capabilities and serves as a basis for resource management.

Resource Management Theme:	
Initiative/Strategy Title: Phasing Out Older Weapon Systems	
Context	*[Guidance: Background information leading to initiative and affecting its implementation. **Why did you do it?**]* Phasing out older weapon systems became necessary for three reasons: 1) To reduce the cost of maintaining materiel: Due to obsolescence, as well as increased maintenance and breakdowns, older weapon systems are generally more expensive than modern ones. 2) To reduce the number of personnel: When systems are phased out, the respective personnel are no longer required. Older systems also require more personnel to operate and maintain. 3) To fully meet capability requirements: Older systems are not as technologically advanced and no longer meet the current requirements.
Implementation	*[Guidance: A description of the **key actions** that you took to execute this strategy? **How did you do it?**]* Phased out materiel is normally: 1) Used to provide spare parts for systems that remain in use; 2) Transferred to friendly nations as contributions in kind; 3) Used for education and training purposes; or 4) Disposed of.
Results	*[Guidance: Establishment of cost savings / cost avoidance; key business changes; re-prioritisation of capabilities; savings profile (as a high-level narrative, or by Financial Year – if able to share) etc. **What was the result?**]* Resources that are freed up by the phasing out of materiel (personnel, funds) can already be reallocated when materiel-related decisions are made. This can create positive long-term effects (lower cost of, and less personnel for, newer weapon systems). We have an overview of annual budgetary expenses and requirements for each piece of materiel. This database serves as the basis for decision-making.
Capability Impact	*[Guidance: Projected/actual impact on high-priority capabilities? Impact of resourcing strategy on ability to provide NATO defence capabilities?]* When materiel is phased out – and no alternative capability is made available – this normally results in the loss of a capability. However, when capabilities are introduced, their life cycle is also determined, which does in theory enable timely follow-on planning.
Lessons Identified	*[Guidance: What worked? What didn't? If another country were to adopt this strategy, what advice would you give them?]* • The phasing out of materiel must be closely coordinated with respective capability planning efforts. Otherwise, capabilities may be lost. • Short-term decisions to phase out materiel lead to the immediate loss of capabilities.

Resource Management Theme:	
Initiative/Strategy Title: Reducing Personnel Costs	
Context	*[Guidance: Background information leading to initiative and affecting its implementation. **Why did you do it?**]* Due to the need to reduce personnel costs.
Implementation	*[Guidance: A description of the **key actions** that you took to execute this strategy? **How did you do it?**]* 1) By ending compulsory military service; and 2) By reducing the overall number of personnel.
Results	*[Guidance: Establishment of cost savings / cost avoidance; key business changes; re-prioritisation of capabilities; savings profile (as a high-level narrative, or by Financial Year – if able to share) etc. **What was the result?**]*
Capability Impact	*[Guidance: Projected/actual impact on high-priority capabilities? Impact of resourcing strategy on ability to provide NATO defence capabilities?]* Reductions in the number of personnel may affect weapon systems that are essential to the structure of the Armed Forces (introductory and operational phases). Giving up entire capabilities (e.g. GBAD) will naturally have a negative impact on NATO defence capabilities.

Resource Management Theme:	
Initiative/Strategy Title: Outsourcing of Non-Core, Personnel-Related Tasks • **Shared service organizations.**	
Context	*[Guidance: Background information leading to initiative and affecting its implementation. **Why did you do it?**]* The German federal administrative authorities were performing tasks similar to those of the MoD administrative authorities. These included allowances and child benefits. These tasks are not exclusive to the Bundeswehr and can therefore also be performed by external units/ authorities.
Implementation	*[Guidance: A description of the **key actions** that you took to execute this strategy? **How did you do it?**]* The allowances and child benefits of Bundeswehr personnel are now processed by other ministries. The Bundeswehr is therefore no longer responsible for these tasks.
Results	*[Guidance: Establishment of cost savings / cost avoidance; key business changes; re-prioritisation of capabilities; savings profile (as a high-level narrative, or by Financial Year – if able to share) etc. **What was the result?**]* Bundeswehr staff that used to perform these tasks have been transitioned to other ministries and are therefore no longer on the Bundeswehr's payroll. This has lowered overall costs.
Capability Impact	*[Guidance: Projected/actual impact on high-priority capabilities? Impact of resourcing strategy on ability to provide NATO defence capabilities?]* By giving up these tasks, no military capability was affected.
Lessons Identified	*[Guidance: What worked? What didn't? If another country were to adopt this strategy, what advice would you give them?]* • This measure did not in any way negatively influence the Bundeswehr's ability to perform its mission. • This will save the defence budget the personnel costs. • Prior to handing over tasks, the following differentiations must be made: First, does this concern a core military capability and, second, will a task be handed over to public administrative authorities or to the private sector? The hand-over of other tasks to industry – via Public Private Partnerships – has not been very successful (see examples on sheet related to materiel).

Resource Management Theme:	
Initiative/Strategy Title: Infrastructure (NATO Support and Procurement Organization NSPA)	
Context	*[Guidance: Background information leading to initiative and affecting its implementation. **Why did you do it?**]* The NATO Agencies reform activity is part of an ongoing NATO reform process, which is also examining changes to the military command structure. The reform aims to enhance efficiency and effectiveness in the delivery of capabilities and services, to achieve greater synergy between similar functions and to increase transparency and accountability. At the 2010 Lisbon Summit, NATO Heads of State and Government agreed to reform the 14 existing NATO Agencies, located in seven Member Nations. In particular, Allies agreed to streamline the agencies into three major programmatic themes: procurement, support and communications and information.
Implementation	*[Guidance: A description of the **key actions** that you took to execute this strategy? **How did you do it?**]* As one outcome of the Agencies Reform the programmatic themes of procurement and support have been merged into one single agency responsible. On 1 April, 2015, the NATO North Atlantic Council approved the stand-up of the NATO Support and Procurement Organization, the NATO Support and Procurement Agency acting as its executive body. These changes mark the expansion of former NSPA's (former NAMSA[12]) capability scope and the inclusion of major, multi-national weapons system acquisition in a broad capability set, accompanied by concurrent emphasis on streamlining supporting functions – Finance, Procurement, HR, IT, and Management to leverage best business practices and strive for optimized processes.
Results	*[Guidance: Establishment of cost savings / cost avoidance; key business changes; re-prioritisation of capabilities; savings profile (as a high-level narrative, or by Financial Year – if able to share) etc. **What was the result?**]* NSPA is now to support NATO by leveraging capabilities for customers and geographic areas, and developing new capabilities as required in the future: • Support to Operations and Exercises; • Systems Procurement and Life-Cycle Management; • Fuel Management; • Strategic Transport and Storage; and • Logistics Services and Project Management. The NSPA brings together in a single organisation NATO's logistics and procurement support activities, providing integrated multi-national support solutions for its stakeholders and partners.
Capability Impact	*[Guidance: Projected/actual impact on high-priority capabilities? Impact of resourcing strategy on ability to provide NATO defence capabilities?]* With NATO Agency reform, and in particular the new NSPA, the Alliance and its members will be able to enhance efficiency and effectiveness in the delivery of capabilities.
Lessons Identified	*[Guidance: What worked? What didn't? If another country were to adopt this strategy, what advice would you give them?]* Since the NSPA assumed its new role and responsibilities as of 1 April 2015, a set of lessons has not been identified yet with regard to the procurement theme. The advantages of the Agency as a supporter to multi-national logistics efforts are incontestably.

[12] NATO Maintenance and Supply Agency.

Resource Management Theme:	
Initiative/Strategy Title: International Partnerships (e.g. LEOBEN, U212A)	
Context	*[Guidance: Background information leading to initiative and affecting its implementation. **Why did you do it?**]* Friendly Nations expressed interest in joint development and procurement of weapon systems with Germany. The main aim was to jointly bear non- recurring expenses. These arise during the development, procurement and employment phases. Also, lower prices can be obtained through cooperation, due to economies of scale.
Implementation	*[Guidance: A description of the **key actions** that you took to execute this strategy? **How did you do it?**]* Together with partners, and depending on the status of project implementation, requirements were defined, tasks and responsibilities assigned and, wherever possible, joint action agreed. Ideally, a joint project office is set up in one of the participating Nations, which is used to steer all activities.
Results	*[Guidance: Establishment of cost savings / cost avoidance; key business changes; re-prioritisation of capabilities; savings profile (as a high-level narrative, or by Financial Year – if able to share) etc. **What was the result?**]* Besides generating cost savings on non-recurring expenses, another benefit is interoperability. Nearly identical weapon systems or major components are an ideal prerequisite for joint command and control of operations, and for joint training. Examples of such partnerships are the LEOBEN programme (Leopard battle tank user group) and the U212A project (joint DEU/ITA project). With the submarine project alone, cost savings in the double-digit millions have been generated on non-recurring expenses.
Capability Impact	*[Guidance: Projected/actual impact on high-priority capabilities? Impact of resourcing strategy on ability to provide NATO defence capabilities?]* Based on financial and operational considerations, especially for the most important capabilities, joint procurement and operation is absolutely necessary to introduce and maintain these capabilities.
Lessons Identified	*[Guidance: What worked? What didn't? If another country were to adopt this strategy, what advice would you give them?]* • Joint operational requirements are needed; • There must be one Lead Nation; • Universal logistics (common pool of spare parts) must be ensured; • Contracts must be awarded via a competitive bidding procedure; and • There must be no national conditions (offsets, juste retour).

Resource Management Theme:	
Initiative/Strategy Title: Infrastructure (Shared Services)	
Context	*[Guidance: Background information leading to initiative and affecting its implementation. **Why did you do it?**]* The Bundeswehr has a large number of facilities, barracks, bases, apartment buildings, and firing ranges. This infrastructure must be maintained and administrated. Administration of offices and similar infrastructure can be outsourced (not needed for core Bundeswehr tasks). Infrastructure that is no longer needed can be sold.
Implementation	*[Guidance: A description of the **key actions** that you took to execute this strategy? **How did you do it?**]* Much of this infrastructure has been handed over to the Institute for Federal Real Estate (BImA), which is now responsible for administrating and selling it.
Results	*[Guidance: Establishment of cost savings / cost avoidance; key business changes; re-prioritisation of capabilities; savings profile (as a high-level narrative, or by Financial Year – if able to share) etc. **What was the result?**]* Two results have been achieved: 1) Revenue: revenue achieved from the sale of real estate is divided according to a scale and accrues to the budgets of the DEU MoD and the Finance Ministry. 2) Operating costs: personnel costs have been reduced for the MoD (infrastructure has been handed over to, and is administrated by, the Institute for Federal Real Estate).
Capability Impact	*[Guidance: Projected/actual impact on high-priority capabilities? Impact of resourcing strategy on ability to provide NATO defence capabilities?]* No impact.
Lessons Identified	*[Guidance: What worked? What didn't? If another country were to adopt this strategy, what advice would you give them?]* Selling infrastructure that is no longer needed eases pressure on the budget. Before any savings are included in budgetary planning, however, specific revenue must already have been taken in.

Resource Management Theme:	
Initiative/Strategy Title: Relations with Industry	
Context	*[Guidance: Background information leading to initiative and affecting its implementation. **Why did you do it?**]* The increased cost of procurement and maintenance is also due to attempts by industry to maximize profits.
Implementation	*[Guidance: A description of the **key actions** that you took to execute this strategy? **How did you do it?**]* The Bundeswehr has introduced the following mechanisms: • Insofar as possible, reach agreement on market rates (this also prevents monopolies in the industry and increases the number of service providers); • Implement competitive bidding (ditto); • Perform own maintenance, at regular intervals (e.g. for vessels); and • Conduct negotiations in a strict way (without political influence).
Results	*[Guidance: Establishment of cost savings / cost avoidance; key business changes; re-prioritisation of capabilities; savings profile (as a high-level narrative, or by Financial Year – if able to share) etc. **What was the result?**]* All above-mentioned measures were successful. When open competitive bidding is conducted, the prices of bids immediately decrease. Particularly contracting services from a range of small- and medium-sized enterprises generates cost savings. In areas in which only one or two companies are able to bid, it was helpful to employ in-house resources (Navy arsenal) to perform maintenance (under our in-house management). This significantly lowers costs (by several million euros). The cost of follow-on contracts with industry was lowered, as well. If there is only one bidder, the regulations set out in Defence Policy Guideline 30/53 must be strictly adhered to. Experience showed that, when results of the quantity structure examination and the price audit were not applied, or when external influence was exerted (leadership, political influence), then no cost savings were achieved.
Capability Impact	*[Guidance: Projected/actual impact on high-priority capabilities? Impact of resourcing strategy on ability to provide NATO defence capabilities?]* No capability impact.
Lessons Identified	*[Guidance: What worked? What didn't? If another country were to adopt this strategy, what advice would you give them?]* Positive results achieved through: competitive bidding, involving small and medium-sized enterprises, tough negotiating, and, if possible, performing in-house maintenance in certain test cases.

Resource Management Theme: Example LEOBEN	
Context	*[Guidance: Background information leading to initiative and affecting its implementation. **Why did you do it?**]* The focus of cooperation is the LEOPARD 1 and 2 systems, with their family of vehicles in different versions, and the Anti-Aircraft Tank (AAT) GEPARD. All systems involved in this cooperation were basically developed by Germany; however, some projects were conducted together with Partner Nations on a cost-sharing basis. Most of the vehicles in use were manufactured in Germany; a few, however, were produced abroad under licence. System design responsibility is shared by the companies Krauss-Maffei-Wegmann for the LEOPARD 1 and 2 MBT and the Anti-Aircraft tank GEPARD, and Rheinmetall Landsysteme for the family of vehicles. As of now, these systems are being used worldwide by 21 Nations. Nineteen of these are LEOBEN members, or are on the way to full LEOBEN membership. Only Switzerland, which uses the LEOPARD 2, and Great Britain, which uses the BARV (Beach Armoured Recovery Vehicle) in a quantity of 4 systems, are not members/observers of the LEOBEN community. None of the national tank fleets has a size that would give a single Nation the status of a "privileged major customer" of industry. This status can be achieved only by bundling national interests. In this field, user Nations can greatly profit by intensively participating in collaborative efforts. This assumption led to the build-up of the LEOBEN project.
Implementation	*[Guidance: A description of the **key actions** that you took to execute this strategy? **How did you do it?**]* The objective of the cooperative effort is to jointly work on the: • Improvement; • Logistic support; • Maintenance; and • Post-design service for the LEOPARD 1 and 2 systems and family of vehicles.
Results	*[Guidance: Establishment of cost savings / cost avoidance; key business changes; re-prioritisation of capabilities; savings profile (as a high-level narrative, or by Financial Year – if able to share) etc. **What was the result?**]* The two Equipment Service Use Management Working Groups, which are both active, deal with the LEOPARD 1 and 2 MBTs and their family of vehicles. The current main focus is joint system configuration management, with the objective of achieving and maintaining a common design and construction standard and thus establishing the conditions for optimizing logistic support. One major effort is the technical logistic service, which has been established to prevent items from becoming obsolete and to eliminate deficiencies and weak points. This is done on a cost-sharing basis, which generates continuous savings for all Member Nations.

Resource Management Theme: Example LEOBEN	
Results (cont'd)	The WGs are composed of representatives of the user Nations. In principle, the Federal Office of Defence Technology and Procurement (BWB) as well as the prime contractors (KMW for the LEOPARD 1 and 2 and RLS for the family vehicles) attend WG meetings regularly. Thanks to this involvement, specialized knowledge of the systems is available and, in addition, order processing times can be kept short, because prime contractors can be addressed directly. The joint execution of technical logistic services and software management significantly lowers the financial contribution of each Nation. The cost of technical modifications is borne exclusively by the respective involved Nations.
Lessons Identified	*[Guidance: What worked? What didn't? If another country were to adopt this strategy, what advice would you give them?]* At present, LEOBEN is the most successful cooperation model for the common use of land-based systems.

Resource Management Theme: U 212 A	
Context	*[Guidance: Background information leading to initiative and affecting its implementation. **Why did you do it?**]* The project started when Germany placed an order for four U212-class submarines. The design focusses on stealth, since it can use fuel cells as air- independent propulsion, which also leads to reduced noise emissions. Italy joined the project via an MoU and placed an order for two additional submarines – to be built in Italy, with HDW retaining design authority. Due to some changes in the design to meet Italian requirements, the class was renamed U212A. The design of these vessels included some improvements in communication capacities, endurance and sustainability. Later, Italy ordered another two submarines similar to the first batch, mainly to replace obsolescent vessels. Even after two decades, the U212A design has further potential for improvement!
Implementation	*[Guidance: A description of the **key actions** that you took to execute this strategy? **How did you do it?**]* Cooperation has been cross-sectoral and multi-faceted: In the area of procurement, a number of positive effects were achieved – costs could be reduced for replacing obsolete systems, a larger number of spares could be bought, and new equipment could be fielded. Financial arrangements had to be made (i.e. agreement on cost share) for administrative and other overhead costs. Procedures for accountancy had to be jointly defined. Common training and sharing of the required equipment created opportunities to share general experience in the use of materiel. Regarding materiel support, positive effects were creation of a common pool of spare parts and the use of each other's supply chains. This also enhanced life cycle management. In the domain of technical logistic support, common technical documentation, a common data base, and common configuration management were implemented.
Results	*[Guidance: Establishment of cost savings / cost avoidance; key business changes; re-prioritisation of capabilities; savings profile (as a high-level narrative, or by Financial Year – if able to share) etc. **What was the result?**]* **Comment** / **Design costs per unit** procurement 1st batch — 31,8 Mio € procurement 1st batch — 21,2 Mio € procurement 2nd batch, minor changes to 1st batch — 15,9 Mio €* procurement 2nd batch — 12,7 Mio €* The design costs for the U212A class amounted to approx. MEUR 127. If the class had only consisted of the four German vessels in the first batch, this would have meant almost MEUR 32 design costs per unit. With Italy joining the project, these costs were divided among six vessels, which reduced design costs per unit to MEUR 21.2. With the second batch, the costs per unit were reduced even further, although minor additional costs for some design changes were added to the above-mentioned figures.

Resource Management Theme: U 212 A	
Capability Impact	*[Guidance: Projected/actual impact on high-priority capabilities? Impact of resourcing strategy on ability to provide NATO defence capabilities?]* Obvious through savings – additional funds available.
Lessons Identified	*[Guidance: What worked? What didn't? If another country were to adopt this strategy, what advice would you give them?]* Cooperation has succeeded in: • Reducing costs; • Reducing risks; • Increasing knowledge and experience; • Enhancing capabilities; • Enhancing sustainability; and • Enhancing reliability.

D.5 ITALY

20150805 – SAS-113

05 Aug 15

NATO STUDY SAS-113 FUTURE BUDGETARY CONSTRAINTS: CHALLENGES AND OPPORTUNITIES

ITALY CONTRIBUTION TO PHASE 2 RE-ATTACK

> ***Phase Guidance:*** *This phase of the paper is focussed* ***solely*** *on the resource management strategies applied by your country. There is no need to repeat previous context. We are after both breadth (variety of strategies) and depth (what the strategies involved). Actual submissions are encouraged to include more detail if said information enhances otherwise nuanced content.*

D.5.1 Introduction

> **Section guidance**: Just list the headings.

The resource strategies employed by Italy in response to budget constraint were:

1) Sale of part of the property assets. A lot of buildings and other defence property assets has been put on sale.
2) Sale of defence means and materials. Also equipment and weapons that are no longer used because obsolete and out of service.
3) Reduction of force strength. Reduction of military executives and civilian staff.
4) Reallocation of financial resources.

D.5.2 Possible Themes to Consider

> ***NB: This list is not exhaustive, and is simply provided as an aide memoir. You may choose to include any number of examples against each theme/'thrust area', or none at all – in addition to any new themes appropriate to your country experiences.***

- Rationalise capabilities and programs.
- Procure goods and services more economically.
- Generate operating efficiencies.
- Control costs of major programs and personnel.
- Increase the transparency of resource management process.
- Leverage opportunities to collaborate between key partners.

- Leveraging common capabilities (test/evaluation, logistical support).
- Shared service organizations.
- Efficient procurement of common goods.
- Regional/bilateral partnerships/sharing (V4, GBR/FRA).
- Multi-national cooperation, re: equipment development (Smart Defence).
- Portfolio analysis/management practice.
- How to properly "shed" capabilities in light of constraints.
- Balancing force structure, modernization, and readiness.
- Greater involvement of partner countries (expand scope of efficiencies).
- Greater use if "commercial-off-the-shelf" technology.
- Enhanced interoperability (leading to decreased requirements and resource demands).
- Review and organize various means for countries to collaborate.
- Formulation of multi-national targets (collective vs. multi-national vs. national).
- Need to enhance procurement efficiencies (i.e. decrease margins on less competitive contracts).
- Leasing capabilities; greater reliance on public-private partnerships/privatization.
- Explore ways to value non-pecuniary costs of NATO members (willingness to pay for access to Slovakia's airspace).
- Etc.

D.5.3 Resource Strategies

***Section Guidance**: In this section please complete one copy of the template below for each resource management strategy adopted by your country. **Please include a good variety of examples with sufficient depth to be collated prior to the Canada meeting so that the final report can be reviewed then. This input is critical, and without it the final report will not be a viable product**. The target audience is a NATO Member Nation facing similar challenges, and considering adopting your strategy – hence please include why/how did you did it; what were the results/consequences; what advice you can offer based on your experience. Please refer to Annex A for a list of possible themes to consider; and Annex B for a worked example.*

(*See following pages*)

Resource Management Theme: Generating Operating Efficiencies	
Initiative/Strategy Title: Sale of Part of the Property Assets • **A lot of buildings and other defence property assets has been put on sale**	
Context	*[Guidance: Background information leading to initiative and affecting its implementation. **Why did you do it?**]* To carry out assigned tasks, the Armed Forces need military installations where they can work and be accommodated in. This includes training areas, munition deposits, storage of materials and areas devoted to the defence of the territory. The national arrangement of the Armed Forces is planned as a result of specific military requirements and with it come economic advantages. Although sometimes these installations can result in different levels of costs there are benefits for the local population. Despite this, military installations are unavoidable and essential in guaranteeing the safety of all citizens.
Implementation	*[Guidance: A description of the **key actions** that you took to execute this strategy? **How did you do it?**]* The State's military property includes installations that are engaged in national defence. These installations include ports, airports, fortifications, barracks, administrative and logistic facilities of various types and deposits. State property provides a logistical element critical to the proper functioning of the Armed Forces, which must be effective and beneficial when in use. For these reasons, the Defence has started a process of assessing the actual needs of those areas that are no longer considered necessary, returning them to the community for their full use. In addition to this activity, the Defence will start a census of the limitations, established by Legislative Decree n.66 / 2010, which are subject to areas adjacent to military property and examine every possibility to keep restrictions to a minimum. The integration process of logistic and territorial bodies, together with the reorganization of forces and high commands, will reduce the needs of state property and embark on the modernization of the remaining infrastructure. This concept includes relatively few large multi-functional infrastructures. This process will make it more convenient and synergistic, for economies of scale, with the establishment and use of staff support services and general operations of the forces.
Results	*[Guidance: Establishment of cost savings / cost avoidance; key business changes; re-prioritisation of capabilities; savings profile (as a high-level narrative, or by Financial Year – if able to share) etc. **What was the result?**]* The integration process of logistic and territorial bodies, together with the reorganization of forces and high commands, will reduce the needs of state property and embark on the modernization of the remaining infrastructure. This concept includes relatively few large multi-functional infrastructures. This process will make it more convenient and synergistic, for economies of scale, with the establishment and use of staff support services and general operations of the forces. Of particular importance is the need to develop a new and modern housing policy to ensure the availability of onsite service staff in a high mobility context that is inherent to military life. The current demand for housing is much greater than availability and is geographically unbalanced due to the changed operating conditions linked to the reorganization of the defence forces. The difficulty in finding the necessary financial resources for housing, require that the issue be addressed by a number of innovative solutions.

Resource Management Theme: Generating Operating Efficiencies	
Initiative/Strategy Title: Sale of Part of the Property Assets • **A lot of buildings and other defence property assets has been put on sale**	
Capability Impact	*[Guidance: Projected/actual impact on high-priority capabilities? Impact of resourcing strategy on ability to provide NATO defence capabilities?]* The land, sea and air training areas, are an essential element to maintain the operational effectiveness of the Armed Forces. Italy is a densely populated country, with complex terrain and has an extensive tourist industry, therefore, there needs to be a sensitive approach when using public areas for military training activities. Defence recognizes this need and over the past twenty years has worked to reduce the impact of its activities in terms of time dedicated to exercises. As a result, Italy today, is among the first European countries, which has the lowest percentage of its territory set aside for military exercises. However, Defence efforts to minimize this impact are incomplete, and provide temporary use of alternate areas for the military and civilians, with particular attention to areas of natural beauty and landscape. Bearing in mind these objectives, there is a need to use training areas outside the national territory. In the light of these experiences, the use of these external areas is a major factor when fully preparing, effective and realistic units.
Lessons Identified	*[Guidance: What worked? What didn't? If another country were to adopt this strategy, what advice would you give them?]* Notwithstanding the need to maintain a minimum but adequate number of training areas for real assets in the coming years, the Defence will strive to increase the portion of its activities carried out in simulated mode or through the use of information systems and simulators. Priority will be given to minimize the environmental impact of activities and to make the training areas risk free to the public and technologically developed for dual use, i.e. for purposes related to civil protection and security. Finally, the use of these areas will promote the economic development and growth of industrial communities.

Resource Management Theme: Generating Operating Efficiencies	
Initiative/Strategy Title: Sale of Defence Means and Materials • **Also equipment and weapons that are no longer used because obsolete and out of service**	
Context	*[Guidance: Background information leading to initiative and affecting its implementation. **Why did you do it?**]* During the years the Armed Forces have to improve their capability. So they have to change equipment and weapons and so on. A lot of military installation is storage of means and materials. A lot of this means and material are obsolete and out of service, many materials, even if outdated, can still be useful to national economic operators and foreign Nations.
Implementation	*[Guidance: A description of the **key actions** that you took to execute this strategy? **How did you do it?**]* All means, materials, equipment, and weapons have been cataloged, rationalized and asked for an Agency that works for the Defence to seek the parties interested in purchasing. Then this Agency will make suitable tenders.
Results	*[Guidance: Establishment of cost savings / cost avoidance; key business changes; re-prioritisation of capabilities; savings profile (as a high-level narrative, or by Financial Year – if able to share) etc. **What was the result?**]* The result of this activity will be the emptying of areas of greatest importance – the rationalization of resources and major revenue that can be used to integrate the funds used to buy materials and means modern and efficient.
Capability Impact	*[Guidance: Projected/actual impact on high-priority capabilities? Impact of resourcing strategy on ability to provide NATO defence capabilities?]* No capability impact.
Lessons Identified	*[Guidance: What worked? What didn't? If another country were to adopt this strategy, what advice would you give them?]* It's important to know all the resources and materials that you have, where they are and the state of use and conservation. There are no particular contraindications. The laws of the country must be respected. The results are satisfactory, but it would be appropriate to create a better system of information.

Resource Management Theme: Generating Operating Efficiencies	
Initiative/Strategy Title: Reduction of Force Strength – Reduction of Military Executives and Civilian Staff	
Context	*[Guidance: Background information leading to initiative and affecting its implementation. **Why did you do it?**]* Defence has acknowledged the urgent need to reorganise its Armed Forces against the pressing requirements imposed by global challenges to security and the complex and difficult economic and financial situation. Across Defence at large, transformation processes are diverse and complex and often require other than short implementation time. The Act envisages a deep and meaningful review of national military forces, in order to shape a financially sustainable defence system characterised by higher efficiency and operational effectiveness, and that can be fully integrated into the European and NATO Defence and Security Systems, with a focus on human resources. The proposed reorganisation of the Ministry of Defence relies on a crucial assumption: no new or additional public spending is required – while the standard European and Allied expenditure standards are used as reference.
Implementation	*[Guidance: A description of the **key actions** that you took to execute this strategy? **How did you do it?**]* The project to review the Italian military – which stems from the above delegated legislation – adheres to the following guidelines: • Streamlining the Armed Forces' architecture by disbanding and merging operational, logistic, and training units; and territorial and subordinate bodies; merging functions based a joint approach; • Reducing the overall strength to 150,000 through steady decrease; • Reducing the total number of defence-employed civilians to 20,000 through decremented steps; and • Introducing flexibility in defence financial planning and management so as to rebalance allocations among the expenditure sectors and therefore make best use of the available resources, provided the total appropriated budget is unchanged. Such guidelines are unavoidable and necessary to achieve a balanced military instrument which meets quality, operational, and deployability requirements and, at the same time, is consistent with the resources likely available.
Results	*[Guidance: Establishment of cost savings / cost avoidance; key business changes; re-prioritisation of capabilities; savings profile (as a high-level narrative, or by Financial Year – if able to share) etc. **What was the result?**]* The 'Defence Function' is currently allocated a maximum of 0.84% of GDP, compared to 1.01% in 2004. According to the latest data published by EDA (the European Defence Agency), European countries allocate 1.61% on average to the Defence Function. Moreover, it should be noted that 70% of such resources in Italy is allocated to cover personnel costs; the resources and investment sectors share the remaining 12% and 18%, respectively. An obvious, significant imbalance results from this: resources are not allocated as fittingly as in the case of European and Allied expenditure sectors, where allocation ratio is 50%-25%-25% to personnel, resources and investments, respectively.
Capability Impact	*[Guidance: Projected/actual impact on high-priority capabilities? Impact of resourcing strategy on ability to provide NATO defence capabilities?]* With the transformation of the Armed forces there will be no capability impact.
Lessons Identified	*[Guidance: What worked? What didn't? If another country were to adopt this strategy, what advice would you give them?]* This is an example of how if you rationalise the organisation, you can give the same result with less human resources.

Resource Management Theme: Generating Operating Efficiencies	
Initiative/Strategy Title: Reallocation of Financial Resources	
Context	*[Guidance: Background information leading to initiative and affecting its implementation. **Why did you do it?**]* The top priority continues to consists in redefining expenditure to ensure the operational efficiency of the instrument, both by increasing the level of resources which will gradually be made available thanks to savings made in the Personnel sector, and by concentrating expenditure on a downsized and streamlined instrument structure. Hence, central and peripheral structures shall be significantly reduced, in conjunction with a structural downsizing of no less than 30%.
Implementation	*[Guidance: A description of the **key actions** that you took to execute this strategy? **How did you do it?**]* The said objective shall have to be pursued with the greatest possible consistency within the medium term (tentatively five to six years) by reducing the number of sites at the national level, significantly concentrating, integrating and streamlining the different functions (operational, territorial, logistic, educational, training), which are currently separated and scattered over the territory. The number of commands, bases/bodies and the organizational elements of all the instrument components (land, sea and air) shall continue to be the object of specific actions. A streamlining of the Armed Forces central organisms in a joint perspective and with a view to employing the human resources available in the best possible manner shall be undertaken. In order to ensure a new governance structure with appropriate governing mechanisms, new administration tools and methods will be introduced to make activities transparent, participatory and provide effective processes of choice. In parallel, tools will be developed to ensure effective internal evaluation when achieving objectives. In particular, the Defence will have to move towards the following priority areas of action: • Outdated distribution of costs: for personnel, for operations and for investments; • Modernization of procedures for planning, management and accountability of resources and services provided; • Development of a culture of effectiveness and efficiency; and • Development of accurate assessment tools will be devised to measure costs in relation to results.
Results	*[Guidance: Establishment of cost savings / cost avoidance; key business changes; re-prioritisation of capabilities; savings profile (as a high-level narrative, or by Financial Year – if able to share) etc. **What was the result?**]* 1) Outdated distribution of costs: for personnel, for operations and for investments, there is in fact, the need to adopt a more modern and better allocation of resources, in accordance with criteria adopted by other European countries, but above all, with the real role that these costs play in the Defence budget. At an initial level and on the understanding that major investment programs will be included in a specific law, the three points of reference should be: "personnel"; "operability of the military component" (administration, training, rapid response technology development); and "operations" (cooperation and military missions at a national and international level). 2) Modernization of procedures for planning, management and accountability of resources and services provided is required in order to synchronize with available resources. This is also linked to the range of assigned tasks, established by political objectives and destined to relevant military branches including the instruments needed to attain them.

Resource Management Theme: Generating Operating Efficiencies	
Initiative/Strategy Title: Reallocation of Financial Resources	
Results (cont'd)	3) Development of a culture of effectiveness and efficiency, will be established not only in the operating area, but also in the use of resources and by all those responsible, with particular reference to skills of technical planners, planning and control at all levels, and ethical aspects. These capabilities, in fact, cannot be improvised or delegated, but require continuous updating, with verification and assimilation of the concept "for the good of the State". 4) Development of accurate assessment tools will be devised to measure costs in relation to results, while taking into account the systemic interdisciplinary nature of the Defence sector, with the primary task of reducing the level of bureaucratic processes that cannot be converted into simple formal procedures. Existing rules will change, along with procedures and methods of using resources, which will be simplified. Objectives must be realistic, measurable and correlated to available resources.
Capability Impact	*[Guidance: Projected/actual impact on high-priority capabilities? Impact of resourcing strategy on ability to provide NATO defence capabilities?]* The capability will be improved.
Lessons Identified	*[Guidance: What worked? What didn't? If another country were to adopt this strategy, what advice would you give them?]* The rationalization of spending is always positive if you decide right priorities and if you "know what you want to rationalize". So it is important to make very strong decisions and have 360° knowledge.

D.6 POLAND

D.6.1 The Level of Defence Expenditures

In 2001, the new law was adopted by the Parliament and since then the level of annually planned defence expenditures in Poland has been legally determined as "no less than 1.95% of GDP of the previous year". It was also stated that level of capital investments since 2006 would be no less than 20% of defence expenditures.

Taking into consideration "A Defence Spending Pledge for the Wales Summit 2014", the new legal regulations have been recently adopted in Poland and since 2016 the level of annually planned defence expenditures would be determined as "no less than 2% of GDP of the previous year". It was also confirmed that no less than 20% of defence expenditures would be allocated for capital investments and additionally that no less than 2.5% of defence expenditures would be allocated for research and development in defence area.

The defence expenditures calculated according to the regulations mentioned above are annually presented in the budgetary law what entitles to enter into commitments.

The defence sector is the only public sector having legally guaranteed level of expenditures. Regardless of financial situation and changes in governmental policies, strategies or priorities, the index 1.95% (2% since 2016) referring to the defence expenditures must be applied during the process of budget planning.

Having in mind that even during the financial crisis there was an increase in GDP in Poland, there was also automatically an increase in defence expenditures annually planned and presented in the budgetary law. Legal regulations guarantee the stability of the defence sector and the ability to prepare long-term programs.

However, the legal regulations can be changed and that is what happened in Poland in 2013 when the Parliament in September 2013 adopted the one-year law stating that index 1.95% would be not applicable in 2013 and as a result the budgetary law was changed determining the new level of defence expenditures.

Regardless of what was mentioned above, during the financial crisis the problems appeared mainly during the budget execution (2008 – 2009, 2013). The defence sector had already entered into commitments in accordance with the budgetary law but did not received funds granted in the budgetary law to meet these commitments.

It is also necessary to mention that there are many expenditures, rules and procedures that are legally strictly defines and that made much more difficult to react during financial crisis because the flexibility was limited.

D.6.2 The Armed Forces Modernization Fund

In 2001, the Armed Forces Modernization Fund was established as an additional source of financing the procurement of the military equipment. There are several sources of income but the most essential one is – 93% of profits generated by the Military Property Agency from the management (sale or disposal) of the property determined as redundant to the Armed Forces[13]. Funds allocated to the Armed Forces Modernization Fund don't expire at the end of the year.

[13] The Military Property Agency was established as a State Agency operating under supervision of the Minister of National Defence. The main task of the Agency includes sale or disposal of the property (real and movable) considered redundant to the Armed Forces.

To increase funds, the new legal regulations have been recently adopted and since 2016 the income of the Fund will also include income received as reimbursement concerning provided HNS and financial contractual penalties.

D.6.3 The Public Finance System

In 2009, the new law on financial system was adopted by the Parliament.

The aim was to increase the financial discipline in public sectors and improve the transparency and effectiveness in spending public funds. The main measures that were taken:

- **The State's Multi-Annual Financial Plan** was implemented and the Government adopts that Plan each year for next four years. The Plan determines the priorities and presents the financial policy of the State including macroeconomic factors, revenues and expenditures forecasts. It determines relation between allocated funds and long- and medium-term priorities (aims) of the Government. It helps in more rationale funds allocating and management.
- **The performance budget** was implemented as a tool supporting traditional budget. The aim was to present the objectives as well as the activities and resources (funds) required to achieve these objectives. There should be clear relationship between allocated funds (resources) and achieved objectives (expected results). The aim was to improve the transparency and effectiveness in spending public funds.
- **The management control** is legally defined as all activities taken to assure that tasks are legal, effective and economical including protection (management) of resources, risk management, reliable reports, adequate structure and procedures as well as professional personnel. The management control is a set of guidance (standards) presenting what factors should be taken into consideration when determining aims and fulfilling tasks. The management control is organized on two levels: the Minister of National Defence is responsible for the effective management control in defence sector and Heads of organizational units are responsible for the effective management control at the level of the unit. The aim is to determine priorities, aims and tasks, to coordinate activities, to assure balance between tasks and resources, to adapt adequate procedures and structures, to monitor activities, to identify obstacles and to determine and implement necessary improvements. The Minister and each public institution are obliged to publish plans of activity including aims and tasks and then reports concerning the activities and identified obstacles.
- **The risk management** is an important element of the management control. The institutions are obliged to constantly monitor and analyze the environment to evaluate the risk and react adequately to eliminate or limit the negative consequences. Documentation concerning the risk management and reports on this issue have to be prepared and presented to the supervisors.
- **The organizational changes** were implemented in 2010. All public sectors were obliged to analyze the internal structures and scope of tasks. The aim was to concentrate on public tasks, adapt the structures and eliminate all additional activities. The number of self- financing institutions was limited to increase financial discipline and improve the transparency and effectiveness in spending public funds. In defence sector it applied to the publicly accessible military restaurants, hotels and kindergartens. These activities were determined as having no relation with defence issues.

D.6.4 The Timetable of the Budget Execution

Within the public finance system it is necessary to mention the public funds management implemented by the Minister of Finance. The annual timetable presents the limits concerning revenues and expenditures for each

month. During the budget execution the Minister of National Defence requires funds for each month, then for ten days and then for each day (two days in advance). Funds are available during the day as it was required in accordance with the timetable. The funds that were available but were nor spent, are automatically transferred to the Minister of Finance account at the end of each day. The aim of this mechanism is to increase the financial discipline in public sectors.

D.6.5 Multi-Annual Program on the Armed Forces Modernization (2014 – 2022)

The multi-annual program on the Armed Forces Modernization was adopted by the Government in 2013. The aim was to determine and get the governmental acceptance for the most important projects concerning the procurement of the new military equipment. The program determined the priorities in the area of Armed Forces modernization for next ten years. The Program is annually presented in the budgetary law. However, it is essential to coordinate the procurement of the new equipment with expenditures needed for operation, maintenance and personnel training.

D.6.6 The System of Logistic Support

The process of logistic and financial consolidation has been recently implemented in Polish Armed Forces. At the moment there are about 900 military units and about 80 logistic units responsible for providing logistic and financial support to all Armed Forces. The consolidation is still in progress to optimize the system. The aim was to establish highly specialized logistic units responsible for the area of logistic support, public procurement, infrastructure management and financial issues including personnel expenditures.

The implementation of logistic support system resulted in:

- Efficient procurement of common goods; better resources management; better coordination of support provided within Armed Forces; better risk management; procurement goods and services more economically as within logistic units there are unit specialize particularly in certain areas like infrastructure management or fuel procurement.
- Savings on personnel as there is no need to employ logistic and financial personnel in every military unit – there are liaisons appointed to provide needs and coordinate cooperation with logistic units; professionalism as logistic units employ highly professional personnel.
- Efficient activity of the military unit commander who can concentrate only on training or operation. All needed support (logistic, financial, administrative) should be provided by logistic units.

D.6.7 Defence Sector During Financial Crisis

No special strategy was implemented in defence sector during financial crisis. The measures presented above were established and implemented in defence sector regardless of financial crisis, but can be regarded as important tools that were definitely helpful during the crisis time and in the everyday process of resources management to guarantee stability and the ability to assure the capabilities.

During the financial crisis the problems appeared mainly during the budget execution. The defence sector did not received funds granted in the budgetary law to fulfill all commitments. What is more, the situation in the defence sector during financial crisis worsened at the end of each year when all contractual procedures were completed and contracts concluded. At the end of the year a lot of payments were cumulated and as a result the flexibility in dealing with a problem was much limited.

Legally determined rules and procedures concerning the budget execution and public procurement are very important and helpful in assuring stability, discipline and transparency. Legally determined benefits for personnel (military and civilian) also provide stability in the area of military service and employment. On the other hand, strict legal regulations did not allow to react flexible when it is necessary especially as these were State regulations which could not be easily and quickly adapted.

In consequence the main aim was to look for savings and the following measures were taken:

- The tasks were prioritized;
- The number of military exercises limited;
- The investments cancelled or postponed;
- The concluded contracts on military equipment negotiated to postpone payments;
- The new contracts on military equipment limited;
- The procurement of goods (e.g. fuel) and services limited; and
- The number of additional benefits for soldiers was limited[14].

[14] The analysis concerning the system of salaries and additional benefits identified some of additional benefits as not justifiable. Those benefits, that were facultative according the law, were limited. In some cases when benefits were obligatory according to the law – there was legislative initiative to change the law.

D.7 SLOVAKIA

NATO STUDY SAS-113 FUTURE BUDGETARY CONSTRAINTS: CHALLENGES AND OPPORTUNITIES

SLOVAKIA CONTRIBUTION TO PHASE 2 RE-ATTACK

> ***Phase Guidance:*** *This phase of the paper is focussed* ***solely*** *on the resource management strategies applied by your country. There is no need to repeat previous context. We are after both breadth (variety of strategies) and depth (what the strategies involved). Actual submissions are encouraged to include more detail if said information enhances otherwise nuanced content.*

D.7.1 Introduction

> **Section guidance**: Just list the headings.

The resource strategies employed by Slovakia in response to budget constraint were:

1) Increase of effectiveness in use of resources.
2) Looking for internal reserves, savings.
3) Internal reorganizations and reduction of commands, units, and agencies.
4) Increase of involvement in multi-national cooperation within Smart Defence Projects.
5) Increase of involvement in sharing some capabilities with other Nations.

D.7.2 Resource Strategies

> ***Section Guidance****: In this section please complete one copy of the template below for each resource management strategy adopted by your country.* ***Please include a good variety of examples with sufficient depth to be collated prior to the Canada meeting so that the final report can be reviewed then. This input is critical, and without it the final report will not be a viable product****. The target audience is a NATO Member Nation facing similar challenges, and considering adopting your strategy – hence please include why/how did you did it; what were the results/consequences; what advice you can offer based on your experience. Please refer to Annex A for a list of possible themes to consider; and Annex B for a worked example.*

(*See following pages*)

Resource Management Theme: Enhancement of Effectiveness	
Initiative/Strategy Title: Increase of Effectiveness in Use of Resources	
Context	*[Guidance: Background information leading to initiative and affecting its implementation. **Why did you do it?**]* Gradual reduction in defence budgets and lack of resources, mainly since 2009.
Implementation	*[Guidance: A description of the **key actions** that you took to execute this strategy? **How did you do it?**]* 1) Restructuring valid contracts with the aim to: • Decrease the price for services and goods; • Gain more services and goods for the same price; and • Decrease the margin (profit) of suppliers. 2) Common procurement of some goods and equipment (pistols, guns, ammunition, uniforms, etc.) with the Ministry of Interior with the aim to decrease the prices.
Results	*[Guidance: Establishment of cost savings / cost avoidance; key business changes; re-prioritisation of capabilities; savings profile (as a high-level narrative, or by Financial Year – if able to share) etc. **What was the result?**]* 1) In some cases the prices for services and goods were decreased or more services and goods were gained from suppliers for the same price, in some cases not. 2) In the case of common procurement with MoI, the prices were lower.
Capability Impact	*[Guidance: Projected/actual impact on high-priority capabilities? Impact of resourcing strategy on ability to provide NATO defence capabilities?]* No impact on NATO high priority capabilities.
Lessons Identified	*[Guidance: What worked? What didn't? If another country were to adopt this strategy, what advice would you give them?]* 1) Restructuring valid contracts worked in some cases and brought certain savings. This measure can work also in other NATO Nations, but it depends on particular contracts. Therefore, it is advised to think about that option, and if it is possible, to include that measure directly into the future contracts. 2) Common procurements of some services, goods or equipment with other ministries can work very well also in other NATO Nations.

Resource Management Theme: Reorganization	
Initiative/Strategy Title: Looking for Internal Reserves, Savings	
Context	*[Guidance: Background information leading to initiative and affecting its implementation. **Why did you do it?**]* Gradual reduction in defence budgets and lack of resources, mainly since 2009.
Implementation	*[Guidance: A description of the **key actions** that you took to execute this strategy? **How did you do it?**]* 1) Decline in number of military garrisons and facilities. 2) Selling or letting abandoned or unused garrisons and facilities (buildings) to private sector or yielding them to other state institutions. 3) Joining of groups, divisions, departments into bigger units/bodies with the aim to save military and civilian personnel.
Results	*[Guidance: Establishment of cost savings / cost avoidance; key business changes; re-prioritisation of capabilities; savings profile (as a high-level narrative, or by Financial Year – if able to share) etc. **What was the result?**]* 1) Savings in payments for energies, taxes, maintenance, protection, etc. 2) The fulfilment of the task referring to incomes of state budget. 3) Savings in salaries and personal benefits.
Capability Impact	*[Guidance: Projected/actual impact on high-priority capabilities? Impact of resourcing strategy on ability to provide NATO defence capabilities?]* No impact on NATO high priority capabilities.
Lessons Identified	*[Guidance: What worked? What didn't? If another country were to adopt this strategy, what advice would you give them?]* 1) Selling, letting or yielding abandoned or unused military garrisons and facilities work in some cases and bring certain savings. This measure can work also in other NATO Nations, but it depends partly on particular facilities and particular areas, and partly on real interest in purchase or letting unused military facilities. 2) Decline in number of military and civilian personnel brings certain savings on the one hand, but on the other hand, it brings vacancies in manning and subsequently exhaustion, over-work, burn out, mistakes, loss of motivation, concentration, etc.

Resource Management Theme: Reorganization	
Initiative/Strategy Title: Internal Reorganizations and Reduction of Commands, Units, and Agencies	
Context	*[Guidance: Background information leading to initiative and affecting its implementation. **Why did you do it?**]* Gradual reduction in defence budgets and lack of resources, mainly since 2009.
Implementation	*[Guidance: A description of the **key actions** that you took to execute this strategy? **How did you do it?**]* 1) Decline in number of military and civilian personnel. 2) Decline in number of commands, garrisons, units. 3) Decrease in military ranks.
Results	*[Guidance: Establishment of cost savings / cost avoidance; key business changes; re-prioritisation of capabilities; savings profile (as a high-level narrative, or by Financial Year – if able to share) etc. **What was the result?**]* 1) and 3) Savings in salaries and personal benefits. 2) Close-down of Logistic Command, Signal Command, Training Command and Training and Support Forces Command, and several garrisons and units. Savings in payments for energies, taxes, maintenance, protection, etc.
Capability Impact	*[Guidance: Projected/actual impact on high-priority capabilities? Impact of resourcing strategy on ability to provide NATO defence capabilities?]* No impact on NATO high priority capabilities.
Lessons Identified	*[Guidance: What worked? What didn't? If another country were to adopt this strategy, what advice would you give them?]* 1) and 3) Loss of experienced, capable, competent and educated military personnel. Lack of personnel for the fulfilment of all the tasks for the Armed Forces following from the laws, treaties, directions, etc. Loss of motivation to serve or join the Armed Forces. These measures (in limited extent) can work only in bigger NATO Nations with bigger Armed Forces. 2) Reorganizations in the Armed Forces are due to dynamic changes in security environment and decreasing resources necessary; however, it is advised to consider them very properly with as less negative consequences as possible.

Resource Management Theme: International Cooperation	
Initiative/Strategy Title: Increase of Involvement in Multi-National Cooperation Within Smart Defence Projects	
Context	*[Guidance: Background information leading to initiative and affecting its implementation. **Why did you do it?**]* Gradual reduction in defence budgets and lack of resources, mainly since 2009.
Implementation	*[Guidance: A description of the **key actions** that you took to execute this strategy? **How did you do it?**]* 1) Establishment of MATC (Multi-national Aviation Training Centre) together with Czech Republic, Croatia and Hungary for common training on the basis of Mi-type helicopters. Serious intention to expand the centre when the new helicopter platforms will be introduced into the inventory of the Armed Forces. 2) Consideration of establishment / serious intention to establish similar centre for supersonic fighter aircraft.
Results	*[Guidance: Establishment of cost savings / cost avoidance; key business changes; re-prioritisation of capabilities; savings profile (as a high-level narrative, or by Financial Year – if able to share) etc. **What was the result?**]* 1) Savings in training, maintenance, support, administrative. 2) Enhancement of mutual multi-national cooperation within NATO or for interests of NATO.
Capability Impact	*[Guidance: Projected/actual impact on high-priority capabilities? Impact of resourcing strategy on ability to provide NATO defence capabilities?]* No impact on NATO high priority capabilities.
Lessons Identified	*[Guidance: What worked? What didn't? If another country were to adopt this strategy, what advice would you give them?]* Establishment of similar or different centres within NATO Smart Defence Projects has full range of advantages (savings, deepening multi-national cooperation in various areas, etc.) not only for directly engaged countries, but for the whole NATO. It is fully advised to establish similar centres.

Resource Management Theme: International Cooperation	
Initiative/Strategy Title: Increase of Involvement in Sharing Some Capabilities with Other Nations	
Context	*[Guidance: Background information leading to initiative and affecting its implementation. **Why did you do it?**]* Gradual reduction in defence budgets and lack of resources, mainly since 2009.
Implementation	*[Guidance: A description of the **key actions** that you took to execute this strategy? **How did you do it?**]* Increased effort to implement sharing some military capabilities and capacities with other NATO Member Nations.
Results	*[Guidance: A description of the **key actions** that you took to execute this strategy? **How did you do it?**]* 1) Made first steps and executed several official negotiations/talks on the highest level of MoD and government with the Czech Republic with the aim to share common capabilities in the area of air defence, education, various types of training, and in other possible areas. 2) In the case of agreement and successful implementation – savings in training, maintenance, support, administrative, and simultaneously, enhancement of mutual cooperation within NATO.
Capability Impact	*[Guidance: Projected/actual impact on high-priority capabilities? Impact of resourcing strategy on ability to provide NATO defence capabilities?]* No impact on NATO high priority capabilities.
Lessons Identified	*[Guidance: What worked? What didn't? If another country were to adopt this strategy, what advice would you give them?]* This measure can work also in other NATO Nations, but it depends on particular countries, capabilities, capacities and agreements. Considerable amount of expenditures can be saved in engaged countries.

D.7.3 Suggested Areas for Future Study

***Section Guidance**: SAS-113 is both novel and time limited. As such, we have encountered a number of topics that would benefit from further study which we are unable to bring into the scope of SAS-113. Please outline any suggestions that you would like to make or are aware of.*

Defence Expenditures Devoted to Military and Civilian Personnel

According to "Financial and Economic Data Related to NATO Defence 2015" (Table 6a) [4], there are considerable differences among NATO Member Nations in the area of defence expenditures devoted to military and civilian personnel. For instance, in 2014, the expenditures devoted to personnel in NATO Nations ranging between 35.5% (USA) and 82.3% (Slovenia). Naturally, the differences among countries follow from the total amount of defence budgets in particular countries, but, most likely, there are also differences among countries in methodologies what kind of personal expenditures are included in this category. Are there included only expenditures for military and civilian salaries and pensions, or there are also included expenditures for various types of benefits (if yes, what kind of benefits), and for retirement insurance, health insurance, accident insurance, medical treatment, or any other expenditures related to military and civilian personnel? As there is strong presupposition that countries use different methodologies and includes in this category various types of expenditures, there is suggestion to make a survey in this area in order to find out what kind of personal expenditures Member Nations include in this category, and if there is any possibility, to propose to issue within NATO new unified methodology.

D.8 UNITED KINGDOM

20150820 – SAS-113

20 Aug 15

NATO STUDY SAS-113 FUTURE BUDGETARY CONSTRAINTS: CHALLENGES AND OPPORTUNITIES

UK CONTRIBUTION TO PHASE 2 RE-ATTACK

> ***Phase Guidance:*** *This phase of the paper is focussed* ***solely*** *on the resource management strategies applied by your country. There is no need to repeat previous context. We are after both breadth (variety of strategies) and depth (what the strategies involved). Actual submissions are encouraged to include more detail if said information enhances otherwise nuanced content.*

D.8.1 Introduction

> **Section guidance**: Just list the headings.

The resource strategies employed by the UK in response to budget constraint were:

1) Business Model: Defence Reform.
2) Prioritisation: Capability Prioritisation.
3) Efficiency: High-Level Efficiency Strategy.
4) Efficiency: Centralised Procurement Efficiencies.
5) Efficiency: Equipment Support Programme Review.
6) Optimisation: Military Headcount Reductions.
7) Optimisation: Civilian Headcount Reductions.
8) Business Model: Defence Infrastructure.

D.8.2 Resource Strategies

> ***Section Guidance****: In this section please complete one copy of the template below for each resource management strategy adopted by your country.* ***Please include a good variety of examples with sufficient depth to be collated prior to the Canada meeting so that the final report can be reviewed then. This input is critical, and without it the final report will not be a viable product****. The target audience is a NATO Member Nation facing similar challenges, and considering adopting your strategy – hence please include why/how did you did it; what were the results/consequences; what advice you can offer based on your experience. Please refer to Annex A for a list of possible themes to consider; and Annex B for a worked example.*

(*See following pages*)

Resource Management Theme: Business Model	
Initiative/Strategy Title: Defence Reform	
Context	*[Guidance: Background information leading to initiative and affecting its implementation. **Why did you do it?**]* **UK-Specific Example**: In 2010, the UK Secretary of State for Defence asked Lord Levene, a former Chief of Defence Procurement, to conduct an independent and fundamental review of how Defence is structured and managed. It was arguably the first such review since the 1980s. But many of the issues are not new, and have troubled similar reviews over the last century (for example: should decision-making be conducted by Head Office or the Armed Services (Navy, Army, Air Force)? How joint should Defence be? What is the right balance between the roles of Military and Civilians?). A key driver for this review was the Department's over-heated equipment procurement programme, to which the existing Departmental management structure and behaviours contributed. Many of the proposals are designed to help prevent the Department from getting into such a poor financial position in the future, and to put it in the position to make real savings. This is not a distraction from providing the Military capability the country needs; it is an essential enabler to it. Ultimately, an over-heated programme is only manageable when funding continues to increase. Tackling it (and the behaviours that cause it) allow reductions to be made in a robust and sustainable way.
Implementation	*[Guidance: A description of the **key actions** that you took to execute this strategy? **How did you do it?**]* The review[15] made 53 recommendations in total, the key ones of which are to: • Create a new and smaller Defence Board chaired by the Defence Secretary to strengthen top-level decision-making; • Clarify the responsibilities of senior leaders, including the Permanent Under Secretary and the Chief of the Defence Staff, to strengthen individual accountability; • Make the Head Office smaller and more strategic, to make high-level balance of investment decisions, set strategic direction and a strong corporate framework, and to hold the empowered Commands to account; • Focus the Service Chiefs on running their Service and empower them to perform their role effectively, with greater freedom to manage, as part of a much clearer framework of delegated financial accountability and control; • Strengthen financial and performance management throughout the Department to ensure that future plans are affordable and that everyone owns their share of responsibility for this; • Create a 4-star-led Joint Forces Command, to strengthen the focus on joint enablers and on joint warfare development; • Create single, coherent Defence Infrastructure and Defence Business Services organisations, to ensure enabling services are delivered efficiently, effectively and professionally; and • Manage and use senior Military and Civilian personnel more effectively, with people staying in post for longer and more transparent and joint career management.

[15] Lord Levene. (2011). Defence Reform: An independent report into the structure and management of the Ministry of Defence. Retrieved from: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/27408/defence_reform_report_struct_mgt_mod_27june2011.pdf.

Resource Management Theme: Business Model	
Initiative/Strategy Title: Defence Reform	
Implementation (cont'd)	These recommendations were only seen as the first step. It is the people in the organisation at all levels who will need to make it work. The study therefore concluded with recommendations on implementation and behaviours. Implementation has since been driven by Ministers and the senior leadership of the Department, who have been focussed on leading by example and acting in the ways on which the success of the new model depends. This included making the tough decisions, given Defence affordability constraints.
Results	*[Guidance: A description of the **key actions** that you took to execute this strategy? **How did you do it?**]* Lord Levene recommended that each year, for 3 years following the publication of his report, he produce an independent review of the progress that MoD had made on implementing his recommendations. The details of these reports can be found at the link provided, but in short he recognises that "*improving the management of Defence is an unceasing endeavo*ur", but that there is evidence the recommendations made are being implemented and embedded from the highest levels of the organisation. There is still some way to go, not least because of the very changeable financial and political world Defence operates within. It would do the report a dis-service to try and summarise it here, and it is highly recommended that other nations read it and learn from it what they feel appropriate given much of the content is applicable more widely and generally across Defence internationally. Further, it has proven difficult to link Defence Reform with clearly defined financial 'results' or benefits, although it undoubtedly led to some. This strategy could therefore be seen as an 'enabler' underpinning other work.
Capability Impact	*[Guidance: Projected/actual impact on high-priority capabilities? Impact of resourcing strategy on ability to provide NATO defence capabilities?]* Ultimately reorganisation and restructuring of the delivery of Defence into a more efficient and effective model has ensured high priority capabilities are better protected, better ensuring the delivery of such capabilities to both the UK and NATO.
Lessons Identified	*[Guidance: What worked? What didn't? If another country were to adopt this strategy, what advice would you give them?]* • This is a huge transformational change programme. It needs to be treated as such, with a long-term outlook, and significant senior commitment and buy-in. • Direct financial benefits will not always be easy to quantify and report. • It takes time. • As a result it is difficult at this stage to be more specific about outcomes, but as time goes on the strengths and weaknesses of the transformation programme will become clearer.

Resource Management Theme: Business Model	
Initiative/Strategy Title: Defence Reform	
Member Nation Examples	*[The above information is asked for in anonymous/generic terms; specific examples/links to reports go here. This should provide countries increased freedom to present findings.]* Further information from a UK perspective please see: Lord Levene. (2011). Defence Reform: An independent report into the structure and management of the Ministry of Defence. Retrieved from: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/27408/defence_reform_report_struct_mgt_mod_27june2011.pdf Lord Levene's progress reports can be found here: https://www.gov.uk/government/publications/defence-reform-an-independent-report-into-the-structure-and-management-of-the-ministry-of-defence--2

Resource Management Theme: Prioritisation	
Initiative/Strategy Title: Capability Prioritisation	
Context	*[Guidance: Background information leading to initiative and affecting its implementation. **Why did you do it?**]* Given a significant scale of challenge, the Member Nation had to review and reset its capability ambition within the resource constraints faced. Rigorous prioritisation of capabilities against Defence and Security planning assumptions, using evidence from operational analysis, meant that 'lower priority' capabilities were 'delayed/ deferred/de-scoped/deleted' – protecting those capabilities judged to be of higher importance. This allowed the Department to make the maximum contribution to Defence outputs. This strategy enabled the available resources to be spent on the things that were judged to matter most at the time. Improving the productivity of every element of Defence is an essential element of securing better value for money.
Implementation	*[Guidance: A description of the **key actions** that you took to execute this strategy? **How did you do it?**]* The starting point was judging what the core Defence outputs were and then working backward from those to identify the key capabilities that were required to deliver these outputs. This work also helped shape the future force structures which would meet Defence requirements. In conducting this process, Operational Analysis was heavily employed to try to underpin evidence based decision-making wherever practicable. The work also started by identifying those capabilities which could not practicably be delayed/deferred/deleted, as they may be for example, either too critical to Defence and/or the cost impacts of any changes unachievable (such as through contract re-negotiation). From this, a list of those capabilities that may be altered was identified, and from this work conducted to prioritise across these, applying the filters of "do nothing/defer/de-scope/delete/ delay" accordingly. The terms "defer" and "delay" may seem similar, but ultimately attempt to represent the difference between postponing an entire capability, versus postponing specific elements within a particular capability (i.e. the difference between delaying procurement of an entire ship versus still buying the ship to the same timescale but delaying fitment of a particular weapon system on the ship).
Results	*[Guidance: A description of the **key actions** that you took to execute this strategy? **How did you do it?**]* Ultimately this approach enabled the Department to be able to balance the books, and fully mitigate a previous conflict between the allocated budget and the previously committed equipment programme. To achieve this, some painful decisions had to be taken alongside a considered assessment of the Department's risk appetite. For example, a 'capability holiday' was taken in some areas, whilst waiting for new capabilities to come online, whilst others were deleted. Reductions were also made in manpower numbers for Armed Forces and Civilian personnel, realised through natural outflow and redundancy. This strategy and the capability prioritisation techniques employed would be of use to those nations left with little alternative but to cut outputs (i.e. all available efficiency options have been exhausted). The only caveat might be the requirement for a central view that capabilities maintained across the Alliance remain balanced.

Resource Management Theme: Prioritisation	
Initiative/Strategy Title: Capability Prioritisation	
Capability Impact	*[Guidance: Projected/actual impact on high-priority capabilities? Impact of resourcing strategy on ability to provide NATO defence capabilities?]* The approach protected what were judged to be the core outputs, and working backwards from those the essential capabilities that deliver them. This in turn provided the vision for the future force structure. The resources focused towards investment in high priority areas, although this does mean that calculated risk was taken elsewhere. NATO commitments play a central part in the Member Nations Defence planning and hence these considerations were taken into account in ranking which capabilities were high or low priority. This strategy therefore underpinned the enduring ability to continue to provide NATO Defence capabilities.
Lessons Identified	*[Guidance: What worked? What didn't? If another country were to adopt this strategy, what advice would you give them?]* • Although some capabilities may be labelled 'lower priority', any changes were still not 'easy' choices. • Do not underestimate the emotional/patriotic attachment that people have towards some Military equipment. Expect significant media/pundits/lobbyists to show a lot of interest. • A clearly articulated and detailed baseline of current capabilities and the associated risks is key. As is a clear process for mapping future capabilities to overall Defence strategy and future force structures. This mapping needs to include, what is affordable/deliverable, risks and linkages across all stakeholders (Government, international, etc.) as well as incorporating internationalisation through seeking opportunities across NATO for best practices, shared services, burden sharing, etc. • A comparison of efficiency/productivity within and across capabilities also greatly assists where practicable. However, achieving useful and accurate comparisons can be highly challenging. For example, being able to compare the productivity of one particular type of aircraft/vehicle/ship with another can be very difficult to achieve. • Linked to the point above, ensuring the decision-making process is underpinned by evidence wherever practicable, is key for major capability assessments and decisions.
Member Nation Examples	*[The above information is asked for in anonymous/generic terms; specific examples/links to reports go here. This should provide countries increased freedom to present findings.]* This activity was undertaken as part of the UK Strategic Defence and Security Review (SDSR) 2010. For further information on the findings from the review, please see: HM Government. (2010). Securing Britain in an Age of Uncertainty: The Strategic Defence and Security Review. Retrieved from: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/62482/strategic-defence-security-review.pdf

<table>
<tr><th colspan="2">Resource Management Theme: Optimisation</th></tr>
<tr><th colspan="2">Initiative/Strategy Title: High-Level Efficiency Strategy</th></tr>
<tr><td>Context</td><td>[Guidance: Background information leading to initiative and affecting its implementation. Why did you do it?]

The Member Nation was seeking opportunities to protect capabilities from the effects of cost growth and budget reductions. Searching for efficiencies was deemed a better starting point than deciding what to ‘cut’.

This strategy allowed capabilities to be maintained despite a constrained budget. This was achieved by reviewing spending and improving the productivity of Defence in order to secure better value for money.</td></tr>
<tr><td>Implementation</td><td>[Guidance: A description of the key actions that you took to execute this strategy? How did you do it?]

Different sub-strategies were adopted. These are elaborated upon as individual examples within the paper.

In general terms, following Defence Reform (please see previous example), Head Office are responsible for setting the high-level direction and strategy for budget and efficiency targets. It is then the responsibility of the individual budget holders to implement these targets within their own budget areas. Head Office provides scrutiny and assurance, holding to account the budget holders to ensure efficiency and budgetary targets are met. Throughout, high-level decisions are evidence-based (using baselines and benchmarking exercises).</td></tr>
<tr><td>Results</td><td>[Guidance: A description of the key actions that you took to execute this strategy? How did you do it?]

The Member Nation was able to entirely offset the effect of budget constraints with efficiencies in some areas. For example a review of the equipment support plan was able to identify sufficient savings to maintain the capability programme.

It is strongly believed that lessons, both positive and negative, from this country’s efficiencies programme are broadly applicable across the Alliance.

High-level examples of where efficiency measures might be taken are outlined in the table below:

<table>
<tr><td>Military Manpower</td><td>• ‘Non-front line’ structures of the Armed Forces (e.g. Headquarters functions and Regional Command structures).
• Pay (e.g. pay freezes).
• Allowances.</td></tr>
<tr><td>Civilian Manpower</td><td>• Reducing the size of the Civilian workforce.
• Pay (e.g. pay freezes).
• Allowances.</td></tr>
<tr><td>Commercial Relationships / Equipment Support</td><td>• Driving efficiencies from major equipment support projects (for example through contract reviews rather than deletion of fleets).</td></tr>
<tr><td>Estates and Utilities</td><td>• Estate rationalisation.</td></tr>
<tr><td>IT and Comms</td><td>• Decreased number of workstations for reduced workforce.
• Increase interoperability and efficiency across Defence.</td></tr>
<tr><td>Procurement</td><td>• Central Government purchase of ‘common goods and services’.</td></tr>
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Resource Management Theme: Optimisation	
Initiative/Strategy Title: High-Level Efficiency Strategy	
Capability Impact	*[Guidance: Projected/actual impact on high-priority capabilities? Impact of resourcing strategy on ability to provide NATO defence capabilities?]* The capability impact is nil if conducted properly. Because this strategy protects capability outputs, it also underpins the provision of Defence capabilities to NATO.
Lessons Identified	*[Guidance: What worked? What didn't? If another country were to adopt this strategy, what advice would you give them?]* • Early indications are that engaging external expert consultancy support was highly successful in increasing the efficiency of the equipment support programme. • The Member Nation recognises that incentivising efficiency from the bottom up is a key driver/enabler – in other words, getting buy-in and support from people at all levels of the business from the ground up. This element is still work in progress. • A solid 'programme management' approach is essential from the start if achievable benefits (i.e. savings) are to be identified and delivered. This includes benefits tracking and high-level support/governance. For example, whilst Civilian headcount reductions have the potential to secure greater savings, these may not be fully realised if the right number of people leave through natural wastage (retirements, or voluntary redundancy etc., which are cheaper than having to fund enforced redundancy payments), but if the mix of grades left remaining in the organisation do not meet the future need (such as too many senior grades leaving through natural wastage, leaving too many junior grades to meet the organisational structure). • The Member Nation has achieved significant efficiency savings in the past. This experience has identified the importance of taking an evidence-based approach to identifying efficiencies before they are taken from the budget. Specifically with regard to: accurate baselines against which to measure future performance; and engagement with key stakeholders to avoid the risk of 'double counting' savings. • Benchmarking and comparisons wherever practicable can also be key for identifying opportunities; however, such work must also be treated with caution at times given Defence is a complex arena, within which direct comparisons (for example across Services, or Countries, or different equipment types or Industries) can be tricky to usefully conduct without considerable detail and context. • Work to identify the key cost tipping points can be a very powerful tool to understand where costs can be reduced for limited reductions in capability. For example, the cost may initially increase linearly for a given performance metric (such as vehicle speed), before hitting a point when the costs suddenly increase exponentially. Ensuring requirements are set below this point therefore increases efficiency and/or ensures any requirement set above this point has to be fully and rigorously defined to justify the significantly increased investment.

Resource Management Theme: Efficiency	
Initiative/Strategy Title: Centralised Procurement Efficiencies	
Context	*[Guidance: Background information leading to initiative and affecting its implementation. **Why did you do it?**]* A Government-wide decision was taken to centralise procurement of 'Common Goods and Services' (CG&S) (e.g. IT provision, hire cars, office supplies).The objective of this was to optimise value for money in Government procurement by leveraging economies of scale across Government and sharing best practice (providing better buying power by procuring on mass). A central Government service was established to coordinate this work. They were responsible for: i) Managing procurement of common goods and services to public sector organisations; ii) Improving supplier and contract management across Government; iii) Increasing savings for taxpayers by centralising buying requirements and bringing together smaller projects; and iv) Leading procurement policy on behalf of Government. Personnel from the Defence ministry liaised with the central Government service to inform on its procurement requirements and obtain the appropriate goods and services for Defence.
Implementation	*[Guidance: A description of the **key actions** that you took to execute this strategy? **How did you do it?**]* • The scope and value of Defence Common Goods and Services (CG&S) was analysed in line with high-level categories (e.g. travel, printing and consultancy). • A formal agreement was made between the Defence and the central Government procurement service. This outlined the principles under which procurement for the CG&S categories would be transitioned from Defence to the central Government service, and the principles that would guide delivery of the Service (e.g. verification of savings). • A strategy/plan was agreed between Defence and the central Government procurement service setting out timescales (phased) and methodologies. • Trade Unions were engaged on the plan and process for managing the people aspects of change. • A governance process was established to oversee delivery of the programme plan, and authorise transition of procurement activities to the central Government procurement service master category. • A communications strategy was also established to increase awareness of the programme across Defence. • The responsibility for procuring the agreed items (e.g. IT provision, hire cars and office supplies) was then transferred from the Defence Ministry to the central government service.
Results	*[Guidance: A description of the **key actions** that you took to execute this strategy? **How did you do it?**]* **Objective**: Better value for money and savings across Government for procurement of CG&S, by leveraging economies of scale and sharing best practice. This change programme is in its infancy, and has some time to run to completion across Government. Initial results are showing savings. Key items/services now being centrally procured include (but are not limited to) IT provision, hire cars, office supplies, travel, printing and consultancy.

Resource Management Theme: Efficiency	
Initiative/Strategy Title: Centralised Procurement Efficiencies	
Results (cont'd)	To help establish the programme and enhance capability of teams, external consultancy support has proven beneficial.
Capability Impact	*[Guidance: Projected/actual impact on high-priority capabilities? Impact of resourcing strategy on ability to provide NATO defence capabilities?]* No impact on capability delivery. Transition process includes check points to assure continuity of services and guard against this potential. Equally, this programme should generate efficiencies and savings which help protect capability and potentially be reinvested.
Lessons Identified	*[Guidance: What worked? What didn't? If another country were to adopt this strategy, what advice would you give them?]* • Such an approach needs to be resourced adequately and treated as a major change programme. This includes: governance, baseline development, benefits tracking, stakeholder engagement. • Conducting a 'deep dive' (in-depth and detailed review) process of analysis was successful in exploring and understanding the various contracts making up each category. • Good quality management information is absolutely essential to the successful delivery of the programme. This can come from numerous sources, including suppliers. • Consider at the outset the potential impact of day to day business and other programmes/ projects/initiatives on programme planning; it is easy to underestimate such impact.

Resource Management Theme: Efficiency	
Initiative/Strategy Title: Equipment Support Programme Review	
Context	*[Guidance: Background information leading to initiative and affecting its implementation. **Why did you do it?**]* The Equipment Support Programme formed a significant portion of the overall Defence budget and hence driving increased efficiency throughout this expenditure could maximise cost effectiveness.
Implementation	*[Guidance: A description of the **key actions** that you took to execute this strategy? **How did you do it?**]* A review was conducted of the contracts within the Equipment Support Programme to examine areas that may provide the greatest efficiencies and savings. This review used external consultants to conduct the core of the work, supported by a mix of civil service and service personnel.
Results	*[Guidance: A description of the **key actions** that you took to execute this strategy? **How did you do it?**]* The initial phases of the work are only relatively recently completed and hence it is difficult to be specific about results. Significant savings were identified and have been agreed, such that the cost of employing external consultants to conduct the work was far outweighed by the overall savings. These savings were also more than just "in-year" savings, but showed the ability to achieve efficiencies over the 10-year financial planning period.
Capability Impact	*[Guidance: Projected/actual impact on high-priority capabilities? Impact of resourcing strategy on ability to provide NATO defence capabilities?]* Fundamentally, if this work is conducted correctly it should protect capability and there should be zero negative impact on capability, as Defence outputs should remain protected as the savings are achieved through efficiencies in supplier productivity and similar. Such savings therefore also have a positive impact on capability as achieving these greatly assisted in meeting overall budgetary pressures, whilst also providing opportunities for reinvestment in capability.
Lessons Identified	*[Guidance: What worked? What didn't? If another country were to adopt this strategy, what advice would you give them?]* • The use of external consultants to provide an independent review and scrutiny was highly beneficial. In particular, these consultants were able to provide deep expertise at conducting such analysis, which when supported by Defence subject-matter experts, meant the review could identify significant savings relatively quickly. • Although it is too early to be definitive, there are early indications, that such a review could be applied more widely, including across the equipment procurement programme. • The savings need to be agreed between all parties before they can be secured or formally announced/detailed as savings. For example, if the external consultants find areas where efficiencies and savings can be achieved, then the value of the savings needs to be agreed across the Defence team, the Industry supplier and the end user (Navy, Army, Air Force, Joint) before the savings can be formally noted as an output of the review. Contracting the consultants on the basis of such agreement can assist in ensuring the consultants deliver tangible, achievable output which all parties can and will agree to. • Incentivising the end user is also highly beneficial in driving a culture and behaviour that actively seeks to continue such efficiency work into the long term. Incentives may include permitting the budget holder to "keep" and re-invest a proportion of any savings found, or alternatively cutting their budget to force the budget holder to find efficiencies.

Resource Management Theme: Optimisation	
Initiative/Strategy Title: Efficiency – Specific Example – Military Headcount Reductions	
Context	*[Guidance: Background information leading to initiative and affecting its implementation. **Why did you do it?**]* During a Strategic Defence and Security review, the Member Nation identified that Defence spending plans were unaffordable and also needed to identify savings in line with other Government departments to contribute towards reducing the fiscal deficit in order to restore the economy. Part of the activities to identify savings included a reduction of non-front-line Service personnel.
Implementation	*[Guidance: A description of the **key actions** that you took to execute this strategy? **How did you do it?**]* To meet the Military headcount reductions the Armed Forces used a number of manning levers, including a reduction in recruitment levels; however, to ensure the retention of a balanced structure across ranks and specialisations a phased targeted redundancy programme was required. The different Military services (Navy, Army, Air Force) ran decentralised workforce plans to determine the number of redundancies required ad formed selection boards that assessed individuals using specific criteria. Although the preference was via applications for redundancy (i.e. volunteers), some non-applicants were selected in order to ensure that the right balance of skills was retained across the rank structure.
Results	*[Guidance: A description of the **key actions** that you took to execute this strategy? **How did you do it?**]* The required number of Military personnel left over four tranches, achieving the associated cost savings whilst also ensuring that overall service manpower numbers were matched to the capability requirements, including where capability reductions had been made. For example, where equipment was deleted or removed from service, then commensurate savings may be made against both the deployable personnel who operated the equipment, as well as from the non-front-line personnel who supported the equipment.
Capability Impact	*[Guidance: Projected/actual impact on high-priority capabilities? Impact of resourcing strategy on ability to provide NATO defence capabilities?]* As the Armed Forces have transitioned towards their future liability (headcount) there have been periods where the Services were above or below the programmed liability. However, the principle challenge has been matching manning levels within rank and specialisation; this will likely take several years to be fully achieved. In the interim, a number of risks have appeared within particular cadres, which required varying levels of mitigation to prevent operational impact. As various structural initiatives are implemented these shortfalls are forecast to reduce, with reducing impact on personnel.
Lessons Identified	*[Guidance: What worked? What didn't? If another country were to adopt this strategy, what advice would you give them?]* There was considerable political and media interest in the reductions in the Armed Forces which needed to be carefully managed. Key considerations in the planning of the reductions included: • The impact on recruitment. A balance needs to be struck between minimising redundancy (and the costs associated with it) and reducing recruitment. Although reducing recruitment will save money in the short term it will create a "black hole" (future gap) within the Armed Forces manning structures which can create difficulties in the future including limited pools for promotion, extended time serving in ranks, dissatisfaction, vulnerability to small increases in voluntary outflow and training efficiencies. The impact of reduced

Resource Management Theme: Optimisation	
Initiative/Strategy Title: Efficiency – Specific Example – Military Headcount Reductions	
Lessons Identified (cont'd)	recruitment in the early part of this century is still impacting on the Armed Forces manning structures today. • Importantly the public perception of an organisation reducing numbers can take a very long time to overcome, creating long-term recruitment problems. • The timing of any redundancy programme is key. Early redundancies will save money quickly, but there is a risk that organisational design and future demand may not have been completely finalised. The risk is that you may make the wrong people redundant and create workforce 'pinch points'. • Understanding "natural wastage" (people leaving on their own accord over time – e.g. resignations and retirement) is difficult particularly in a challenging economic situation where there may be pressure to achieve savings quickly, but the Armed Forces turnover staff at a high level in normal circumstances. If this can be predicted accurately it can help to reduce the cost of any reduction programme. • There may be pressure to run only a voluntary redundancy programme, but this may not yield the right mixture of skills for the new organisation. Where applicants are not successful they may choose to resign anyway which needs to be factored into planning. • Statutory periods of notice for redundancy should be factored into planning assumptions. Key considerations when implementing the reductions included: • In general redundancy was offered to applicants over non-applicants – however to ensure the right balance of skills within the Armed Forces some applicants were refused. • Personnel deployed on Operations or recently returned were not selected for redundancy unless they applied. • Personnel who were medically downgraded were not made redundant until they reached a point in their recovery that meant that leaving the Armed Forces was the right decision. If they were subsequently determined as unfit for Military service, they were medically discharged. • The opportunity was provided for Military personnel to transfer to different elements of the Armed Forces where they could provide skills which were in need. • Some redundees retained a reserve liability to be called up in the event of emergency based on their length of service. • Notification was made in person, normally face to face or if necessary by telephone. Welfare services were available to all personnel, including resettlement programmes. • It was ensured a robust appeals process was established. • One significant issue was managing individuals who were made redundant before reaching their entitlement to the Armed Forces pension scheme. Additional compensation payments can be made to ensure individuals are not disadvantaged.
Member Nation Examples	*[The above information is asked for in anonymous/generic terms; specific examples/links to reports go here. This should provide countries increased freedom to present findings.]* **Strategic Defence and Security Review and Army 2020** This activity was undertaken as part of the UK Strategic Defence and Security Review (SDSR) in October 2010, which laid out the commitments expected of the UK Armed Forces. For further information on the findings from the review, please see: HM Government. (2010). Securing Britain in an Age of Uncertainty: The Strategic Defence and Security Review.

Resource Management Theme: Optimisation	
Initiative/Strategy Title: Efficiency – Specific Example – Military Headcount Reductions	
Member Nation Examples (cont'd)	Retrieved from: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/62482/strategic-defence-security-review.pdf Following the SDSR, a number of programmes were initiated by UK MoD to transform the Department in line with the review findings. One such programme was Army 2020 – to transform the British Army for 2020 and beyond, in response to the strategic challenges it is likely to face in the future. The programme, completed in July 2012, developed from first principles a proposition for delivering required levels of Military capability within given manpower constraints and taking account of other changes such as the return of Army from Germany to the UK. The outcome is a design for the future British Army that will be more adaptable and flexible to undertake a broader range of Military tasks at home and overseas. This future Army will, for the first time, fully integrate Regulars and Reserves within a whole force, consisting of some 82,000 Regular personnel and 30,000 trained Reserves – i.e. an integrated Army of around 112,000. Reserves will be used routinely, rather than in extreme circumstances, for defined tasks including providing troops for lengthy stabilisation operations and Defence Engagement overseas. Further information can be found at the following link: http://www.army.mod.uk/structure/33449.aspx

Resource Management Theme: Optimisation	
Initiative/Strategy Title: Civilian Headcount Reductions	
Context	*[Guidance: Background information leading to initiative and affecting its implementation. **Why did you do it?**]* During a strategic Defence and Security review, the Member Nation identified that Defence spending plans were unaffordable and also needed to identify savings in line with other Government departments to contribute towards reducing the fiscal deficit in order to restore the economy. Personnel costs (Armed Forces and Civilian personnel) are the single largest elements of the Defence budget. Part of the activities to identify savings included a reduction in the number of Civilian personnel.
Implementation	*[Guidance: A description of the **key actions** that you took to execute this strategy? **How did you do it?**]* An estimate was made of personnel savings necessary to meet the overall financial savings. Those savings were then translated into headcount targets which were transferred to the individual budget areas to implement. Each area was responsible for developing plans to deliver the required savings – although in some cases these plans were an integral part of the wider reforms across Defence. These plans included transfers of some responsibilities to other parts of Government and the privatisation/ contractorisation of some functions (e.g. recruitment, catering). Other manpower reductions were achieved through a combination of four factors: • Natural wastage (people leaving on their own accord over time – e.g. resignations and retirement). • A voluntary early release scheme which allowed eligible individuals to potentially gain some compensation payments and in some cases draw their pension early. • Restrictions were placed on external recruitment so that when vacancies arose they were likely to be filled by members of the existing workforce who had become surplus. • Finally there were a small number of compulsory redundancies for staff with non-mobile employment contracts, employed at establishments which were closing and where alternative employment was not available within reasonable travelling distance. Each budget area had its own Civilian personnel reduction targets and could largely choose how quickly to implement changes. Some areas opted to reduce headcount quickly so they re-invest some of the benefits and bring in new skills – while others wished to manage transition over a long period to reduce risk to delivery.
Results	*[Guidance: A description of the **key actions** that you took to execute this strategy? **How did you do it?**]* The required headcount targets were met and in fact exceeded the original target date (reducing the headcount reduction target for future years). The reductions in workforce were achievable as a result of a combination of operational and process reforms introduced over the period. These included: • Reductions directly related to changes in operational capabilities, i.e. closure of air bases after withdrawal of some aircraft from service. • Structural changes to Military organisations which required a corresponding reduction in Civilian workforce supporting them.

Resource Management Theme: Optimisation	
Initiative/Strategy Title: Civilian Headcount Reductions	
Results (cont'd)	• Restructuring of Headquarters and finance organisations. • Reform of corporate service support organisations delivering finance, personnel, security and audit services. • Reduction of Logistic roles. • Reduction in Security and Guarding resources following a review of deployment and working practices. • In addition many reductions have been made through restructuring of individual units and sections and reduction of corporate support roles (administrative assistants) for these.
Capability Impact	*[Guidance: Projected/actual impact on high-priority capabilities? Impact of resourcing strategy on ability to provide NATO defence capabilities?]* Largely the re-alignment of responsibilities and changes in delivery processes has meant that the reductions have been made without impacting on the delivery of specific output and capabilities. Although where some parts of the organisation reduced numbers quickly there was some temporary impact on delivery of outputs while new capabilities were grown.
Lessons Identified	*[Guidance: What worked? What didn't? If another country were to adopt this strategy, what advice would you give them?]* • There is a balance to be struck between reducing the number of personnel quickly to save money and taking more time to ensure you retain key skills. It is important to have a detailed Civilian workforce planning process to identify which skills may wish to be retained or this can also risk leadership being reluctant to stop people leaving who wished to leave. • The financial savings were calculated on the basis of average costs of a middle management grade, but in practice most of those leaving may come from lower grades. • The need to comply with headcount reduction targets for Civilians may have unintended consequences; i.e. to maintain delivery of outputs, more expensive external assistance (such as consultancy) or service personnel could be used to undertake a role rather than exceed a headcount target. • Any wish to establish the optimum cost effective force mix between Regular and Reserve Armed Forces personnel, Civilians and Contractors may be made more complicated if the Armed Forces are not allowed to drop below a certain level and/or the Civilians are not able to exceed a different level; such policy may not help to identify the most cost effective solution. • The need to re-utilise surplus personnel and the imposition of any recruitment restrictions may impact the Department and slow the process of replacing staff in key roles. • Morale may be impacted during a period of reform as changes can be found to be unsettling to some personnel, particularly when reductions in staff numbers are being made. Additionally, there may be other effects, although it may be difficult to link these directly; for example an increase in staff absence related to mental health and behavioural issues (including stress) may be seen, as against a generally declining trend of sick absence.

Resource Management Theme: Optimisation	
Initiative/Strategy Title: Civilian Headcount Reductions	
Member Nation Examples	*[The above information is asked for in anonymous/generic terms; specific examples/links to reports go here. This should provide countries increased freedom to present findings.]* This activity was undertaken as part of the UK Strategic Defence and Security Review (SDSR) 2010. For further information on the findings from the review, please see: HM Government. (2010). Securing Britain in an Age of Uncertainty: The Strategic Defence and Security Review. Retrieved from: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/62482/strategic-defence-security-review.pdf

Resource Management Theme: Business Model	
Initiative/Strategy Title: Defence Infrastructure	
Context	*[Guidance: Background information leading to initiative and affecting its implementation. **Why did you do it?**]* Historically, expenditure on the Defence estate had largely been managed and provided by the Military Service using it (Navy, Army, Air Force). Particularly when budgets become pressured, this approach leads to a risk that the Services prioritise funds on estate maintenance and upkeep as much lower than other commitments (such as personnel and equipment), with the result that facilities are left requiring significant capital investment and with high running costs (as early investment has may not have been made to reduce overheads); such financial pressures risk becoming unaffordable in the long term. Furthermore, major changes in future force structures and organisation will also likely change the over-arching requirements for Defence real estate and facilities which therefore also need to be considered.
Implementation	*[Guidance: A description of the **key actions** that you took to execute this strategy? **How did you do it?**]* The Member Nation created a Defence Infrastructure Organisation, provided it with a single infrastructure budget, and made it responsible for the maintenance of the entire estate. This organisation develops an infrastructure programme that is based on the requirements of the Military Services and wider Defence. The exception to this funding flow relates to infrastructure projects for new capabilities, where projects include funding for their infrastructure needs within their overall project costs, and then pass this associated funding to the infrastructure organisation at the appropriate moment for this organisation to implement the associated changes to Defence estate, such as building new facilities. The infrastructure organisation awarded a 10-year contract with a Strategic Business Partner (a contractor organisation), to lead and manage the organisation, allowing for industry best practice to be used. The infrastructure organisation together with their Strategic Business Partner are also implementing cross-Government initiatives. These include for instance the Government's Construction Strategy which aims to reduce the cost of Government construction projects by 15 – 20 % through standardising commercial contracts and requirements.
Results	*[Guidance: A description of the **key actions** that you took to execute this strategy? **How did you do it?**]* The Member Nations approach of placing responsibility for all Defence infrastructure and estate responsibilities together within a single organisation, has resulted in a 'one-stop shop' service to Defence, including: • Managing facilities, both 'hard' (for example, maintaining property) and 'soft' (for example, cleaning, catering and grounds maintenance); • Delivering infrastructure projects; • Managing utilities, including energy, water and waste water; and • Managing estate and working with the budget holders across Defence to develop their infrastructure needs into an affordable infrastructure programme. As a result of the changes: • Appropriate priority and funding is placed upon maintaining and developing the Defence infrastructure and estate.

Resource Management Theme: Business Model	
Initiative/Strategy Title: Defence Infrastructure	

Results (cont'd)	• Spend on infrastructure is now subject to improved Corporate scrutiny and prioritisation through a detailed infrastructure investment plan.
	• Corporate governance and the governance authority are both better defined, further improving overall coherency and accountability for all Defence estate.
	• These principles are being employed to drive out cost from of the running of the estate, including through 'spend to save' initiatives, particularly focused upon Utilities costs (electricity, water, etc.) as well as an accommodation review and analysis of commercial contracts.
	• A long-term "Footprint Strategy" is being developed to identify the most cost effective approach to basing all the Armed Forces set against their future force structure and organisation, and how this may be achieved in the most effective and cost efficient manner.
	• The key financial results which are expected from the footprint strategy include:
	  • Creating a smaller and better estate which is affordable, sustainable and efficient to meet the need of the Armed Forces.
	  • Achieving significant running cost reductions through better estate utilisation.
	  • Releasing embedded value currently held in infrastructure assets, back to Defence through rationalisation and commercial opportunities.

Capability Impact	*[Guidance: Projected/actual impact on high-priority capabilities? Impact of resourcing strategy on ability to provide NATO defence capabilities?]* The changes made and proposed through the Footprint Strategy are designed implicitly to protect Defence outputs by delivering a Defence estate that can be **sustained and provide optimum value for money, thereby protecting capabilities**.
Lessons Identified	*[Guidance: What worked? What didn't? If another country were to adopt this strategy, what advice would you give them?]* • Where efficiency programmes are proposed, there is a need to be clear on financial baselines and to ensure that activities are undertaken to drive down costs rather than simply to reduce funding availability (savings). This therefore includes consideration of "spend to save" measures, where upfront investment is required to achieve longer-term savings. Simply reducing available funding may limit the opportunities for spend to save measures. • Risks there being no incentive for the end users to be efficient or rationalise the estate as they may perceive no benefit. • Significant organisational change requires clear leadership and communication. Putting in place appropriate governance around such major change is essential. • It is important to recognise the time taken to develop clear and credible proposals, including identifying the internal policy levers/changes that could be made, whilst protecting Defence outputs. For example, this includes identifying opportunities for consistent design proposals and any constraints around equipment requirements that need to be incorporated into any infrastructure designs.

D.9 UNITED STATES

D.9.1 Resource Strategies

***Section Guidance**: In this section please complete one copy of the template below for each resource management strategy adopted by your country. **Please include a good variety of examples with sufficient depth to be collated prior to the Canada meeting so that the final report can be reviewed then. This input is critical, and without it the final report will not be a viable product**. The target audience is a NATO Member Nation facing similar challenges, and considering adopting your strategy – hence please include why/how did you did it; what were the results/consequences; what advice you can offer based on your experience. Please refer to Annex A for a list of possible themes to consider; and Annex B for a worked example.*

Resource Management Theme: Generate Operating Efficiencies	
Initiative/Strategy Title: Total Ownership Cost	
Context	*[Guidance: Background information leading to initiative and affecting its implementation. **Why did you do it?**]* The concept of Total Ownership Cost (TOC) has been used by some acquisition specialists for nearly 20 years. TOC was defined in 1998 as "*the sum of all financial resources necessary to organize, equip, train, sustain, and operate military forces sufficient to meet national goals in compliance with all laws, all [applicable] policies, all standards in effect for readiness, safety, and quality of life, and all other official measures of performance for [the service] and its components…TOC is comprised of costs to research, develop, acquire, own, operate, and dispose of weapon and support systems, other equipment and real property, the costs to recruit, train, retain, separate and otherwise support military and civilian personnel, and all other costs of business operations*" (Gansler, 1998). Since 2010, the service has refocused on TOC as a method for maintaining capabilities in a cost-constrained operating environment. The service has grouped TOC into two broad categories: • Cost Mitigation; and • Cost Reduction. Cost Mitigation is tied to the early life cycle phases of new start systems or major system upgrades and offers the greatest potential for life cycle affordability returns. This potential exists because, on average, the majority of expenses for most systems are incurred during the Operations and Sustainment (O&S) life cycle phase; and most of the decisions that influence O&S costs are made early in the system's life cycle (see Figure D-9) (Currie, TOC OPNAV RO Training Course, 2015). Cost Reduction focuses on decreasing the TOC of fielded systems. While Cost Reduction initiatives do not have the potential to have as large of an impact as Cost Mitigation initiatives, their contribution to potential savings can be significant (Currie, TOC OPNAV RO Training Course, 2015). TOC is a vital program for the service, because the cost of operating and sustaining all of the service's current and planned systems is significantly greater than the service's expected budget (Currie, TOC OPNAV RO Training Course, 2015).

Resource Management Theme: Generate Operating Efficiencies	
Initiative/Strategy Title: Total Ownership Cost	
Implementation	*[Guidance: A description of the **key actions** that you took to execute this strategy? **How did you do it?**]*

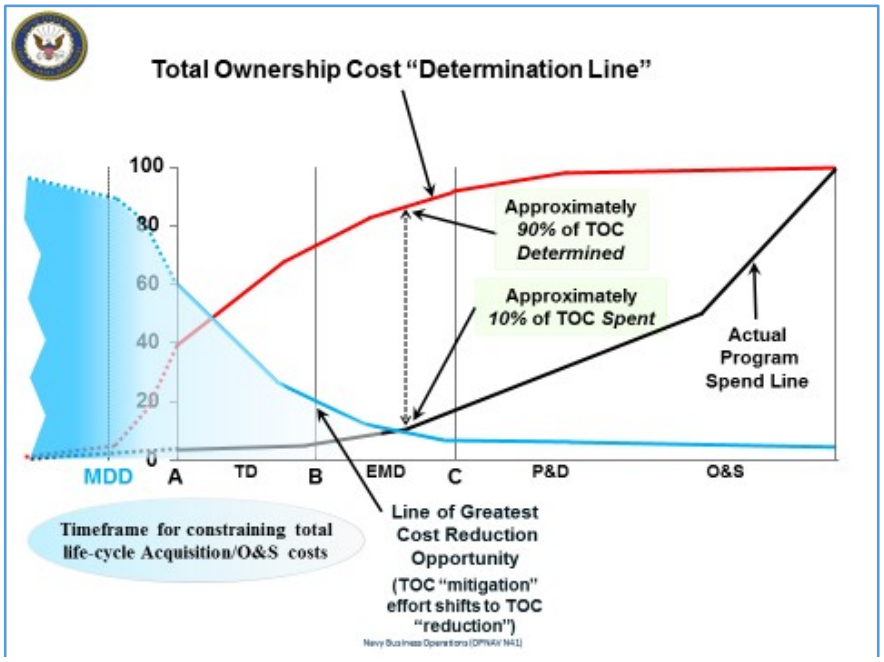

Figure D-9: Total Ownership Cost over System Life Cycle (Currie, TOC Naval Operations (OPNAV) RO Training Course, 2015).

Cost Mitigation and Cost Reduction focus on different life cycle phases, and achieve their goals through very different mechanisms, so their implementation has followed two distinct paths.

Cost Mitigation: In order to increase focus on TOC, the service has modified its governance processes concerning the Sustainment Key Performance Parameter (KPP). KPPs are specifications for the critical performance goals in an acquisition program, and are used to measure the "goodness" of competing systems against a standard goal (Defense Acquisition University, 2015). While the Sustainment KPP is not unique to any one service, this service's senior leader has directed additional parameters, to constrain cost further, which have equal weight as KPPs. They are the Cost KPP or Key Cost Parameter (KCP) and the Schedule KPP or Key Schedule Parameter (KSP). While the KCP started to address problems with unconstrained cost planning, it tended to constrain procurement cost in the short term without taking into account the impact on TOC over the life of a system. For instance, early in a program's life cycle, Program Managers and Resource Sponsors are often forced to make decisions in order to avoid short-term procurement related constraints. While this does constrain procurement cost in the near future, these short-sighted decisions can result in a hefty bill in O&S over later phases in a system's life cycle.

A new policy has recently been released but has yet to be fully implemented that expands the KCP to include "Total R&D" and "Total Ownership Cost" KCPs in addition to Program Acquisition Unit Cost (PAUC) or Average Procurement Unit Cost (APUC). Each of these

Resource Management Theme: Generate Operating Efficiencies	
Initiative/Strategy Title: Total Ownership Cost	
Implementation (cont'd)	KCPs will grow or diminish in priority based on the phase of a program's life cycle. For example, the Total R&D KCP will diminish in favour of the PAUC or APUC as the program progresses into procurement and the weight of the O&S Cost KCP will grow as the program transitions from procurement to sustainment (Currie, NATO SAS-113 Study/TOC POCs (e-mail), 2015). To ensure TOC receives proper oversight, the service has added a review of TOC to at least nine of the formal review points in the oversight process, with specific requirements on the material covered at each review point (Currie, TOC OPNAV RO Training Course, 2015). **Cost Reduction**: Cost Reduction programs focus on existing systems and processes, and seek to find and take advantage of efficiencies that were previously infeasible or not considered. One existing Cost Reduction program seeks to identify and fund candidate programs across the service's enterprise with the intent of moving the service towards a more efficient, effective, and cost-conscious way of doing business. Approved initiative candidates that can show an adequate return on investment in terms of cost reduction are funded via the service's multi-year funding process. As a result, the applicable total program funding is reduced. Another Cost Reduction program is a true Science and Technology (S&T) effort dedicated to closing capability gaps by taking advantage of advancements in S&T. One of the pillars of the program, which seeks to use S&T to reduce TOC, is the Enterprise and Platform Enablers (EPE) Integrated Product Team (IPT). A recent example is the funding of a metal additive manufacturing S&T effort to demonstrate the viability of using metal three-dimensional (3D) printers to manufacture airworthy parts for use in aviation. If successful, the service will likely use this technology to produce on-demand parts or as an alternative source for low demand/ obsolete/expensive parts within the service's supply system. Another program funds proposals that cost less than $2M, can be completed within 2 years, have been tested in a relevant environment (TRL > 5), and show a significant return on investment over the Future Year Defense Program (FYDP). A candidate for this program may be something as simple as identifying a commercially available tool that can do the same job as a specialized tool, either better or cheaper.
Results	*[Guidance: A description of the **key actions** that you took to execute this strategy? **How did you do it?**]* An example of a Cost Mitigation program that is providing savings is the Hybrid Electric Drive (HED). HED is a surface ship propulsion plant configuration that uses an electric motor attached to the main reduction gear of a mechanical-drive (typically gas turbine powered) ship. HED enables higher efficiencies by using the ship service generators at low propulsion loading conditions (i.e. low speeds), where the main propulsion gas turbines are least efficient. HED is providing significant savings, which are detailed in the examples section below. A Cost Reduction program that provides limited funding for finding new or innovative ways of using existing technology to generate savings is also experiencing success. In a recent interview with a program director of technology transition initiatives, he stated, "*We found that [digital dental x-ray machines] can be used to find and monitor cracks on aircraft. Instead of sorting through [physical] files and looking at piles of developed film, we can compare digital X-rays and determine which cracks are growing and need to be fixed.*" This program's funding enabled the service to test and evaluate the idea (Lundquist, 2014).

Resource Management Theme: Generate Operating Efficiencies	
Initiative/Strategy Title: Total Ownership Cost	
Capability Impact	*[Guidance: Projected/actual impact on high-priority capabilities? Impact of resourcing strategy on ability to provide NATO defence capabilities?]* Focussing on TOC has benefitted capabilities in several ways that go beyond cost avoidance. For example, HED-enabled ships not only have improved fuel efficiency compared to conventionally powered ships, but because the fuel capacity of the ships was not reduced, they have improved range and can operate longer before needing to refuel. This also dramatically simplified the supply chain, since the ships operate on the same fuel that their aircraft use, therefore, both the aircraft and ship can operate longer between resupply missions. This means more time on station and more time to complete key mission tasks. When 3D printers mature and are certified to manufacture operational parts, the supply chain will be further simplified because remote locations will not have to carry as many spare parts on hand, or wait for spare parts to be shipped from often distant supply depots. This will result in greater operational availability of equipment. Use of digital x-rays in aircraft maintenance has improved maintenance facility turnover and accuracy, reducing time to identify maintenance issues, and improving safety.
Lessons Identified	*[Guidance: What worked? What didn't? If another country were to adopt this strategy, what advice would you give them?]* It is common for there to be financial uncertainty associated with a program that is in its early stages of development. However, conducting rigorous cost analysis earlier in program's development process reduces overall cost as the program matures.
Member Nation Examples	*[The above information is asked for in anonymous/generic terms; specific examples/links to reports go here. This should provide countries increased freedom to present findings.]* *U.S.S. MAKIN ISLAND* (LHD 8) is the first U.S. Navy amphibious assault ship to replace steam boilers with gas turbines, and the first Navy ship to be equipped with both gas turbines and an Auxiliary Propulsion System (APS) in an HED configuration. By using this unique propulsion system in conjunction with systems that help to improve operational awareness of the crew, the ship saved approximately $2M in fuel costs during her transit from Pascagoula, MS to San Diego, CA compared to a similar ship using steam boilers (Doerry, McCoy, & Martin, 2010). The Navy is planning to install this system on the AMERICA-class amphibious assault ships, in addition to *U.S.S. MAKIN ISLAND*. Instead of using gas turbines, which are less efficient at lower speeds, the ships will be able to use an APS for roughly 75 percent of the time they are underway. Over the course of *U.S.S. MAKIN ISLAND*'s 40-year service life, the Navy expects to see a savings of more than $250M. Because they will use the gas turbines infrequently, the Navy will also save on maintenance costs. Multiplied across the 11 planned ships in the AMERICA-class, the savings potential is significant.
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Resource Management Theme: Acquisitions Reform	
Initiative/Strategy Title: Should Cost	
Context	*[Guidance: Background information leading to initiative and affecting its implementation. **Why did you do it?**]* One Nation realized that its acquisition programs had taken on a "business- as-usual" approach to program costs and had come to assume that program costs would grow to match or exceed the independent cost estimate produced prior to acquisition. With tightening budgets after the 2008 recession, defense leadership created an initiative for program managers to "challenge the inevitability of past [cost] performance by identifying and eliminating process inefficiencies and embracing cost savings opportunities" (Carter & Mueller, 2011). This initiative is called "Should Cost," and it "demolishes the assumption that historical data, which are the basis for a program's independent cost estimate, represent efficient economical operation" (Carter & Mueller, 2011). Defense leaders recognized that within any given program, there are countless processes, technologies, and trade-offs that can increase efficiency, reduce unnecessary overhead, drive down risk, and bring substantial savings over historical "norms".
Implementation	*[Guidance: A description of the **key actions** that you took to execute this strategy? **How did you do it?**]* The Program Manager (PM) is the focal point for driving improvements in the "should cost" initiative. PMs have been tasked with gathering their program's functional leaders together to perform an end-to-end review of their program, question assumptions, and ask probing and perhaps uncomfortable questions, such as (Carter & Mueller, 2011): • Are the current program requirements still valid? • Is engineering trade space available? • What technical aspects of the program appear to be driving costs? • Do alternative technologies or processes exist and what are the potential savings? • Is the program properly structured and resourced? • What changes to organization, processes, schedule, or budget profile would make the program more efficient? • What government activities, processes, or bureaucracy drive costs? Are these actions necessary for program success or risk mitigation? Can these activities be waived, modified, or eliminated? • What are other programs doing to cut costs? Could similar changes be applied to this program? • Can modifications to the contract be made to help the contractor improve efficiencies? • What data or deliverables is the government requesting from the contractor? What individual or organization uses them? Are they useful and necessary? The PM, along with the functional leaders, form a "Should Cost" Management Team (SCMT), and must include members with broad cross-functional experience, because the initiative is not just a business function, but encompasses all aspects of a program's execution. The team scrutinizes every element of program cost, starting with the largest line items. Using a Pareto chart of the program's cost drivers is as a good way to initially prioritize the team's efforts (Carter & Mueller, 2011). The SCMT also looks for savings in repetitive activities. One reason for this is, over time, repetitive processes can become habitual and self-sustaining, even when the need for the process has long gone away. The team questions the reasons for "routine" reports and analyzes how the time or staff required to complete repetitive tasks could be reduced. Perhaps the

Resource Management Theme: Acquisitions Reform	
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Implementation (cont'd)	number of people attending meetings could be reduced. Encourage contractors to similarly self-evaluate, and jointly look at inefficiencies in processes that both the government and contractor engage in. Seek to leverage learning curves as repetitive tasks, particularly in manufacturing, and tend to be completed faster over time because early-on mistakes are discovered, items are reworked, and processes are refined. Check cost estimates for production lots to see if they include credit for the learning curve effect. (Learning-curve benefit is frequently cited as a percentage decrease in unit price for every doubling of the quantity produced). Minimize changes in the product or process once manufacturing has begun, because it could "reset" the learning curve, resulting in the loss of its benefit (Carter & Mueller, 2011). The SCMT must also consider overhead and indirect costs. While these costs are frequently viewed as secondary when compared to the direct program costs, they often offer an opportunity to take advantage of low-risk efficiencies. A routine review of invoices may find items that are negotiable and will save the program money. Detailed reviews of contractor overhead costs can be difficult because they require detailed insight into corporate structures, business assumptions, subcontractor arrangements, and a well-trained and experienced audit team, in addition to a significant amount of time. Because of these issues, this type of review is only recommended if there is reason to believe the costs are out of line (Carter & Mueller, 2011). Finally, incentivizing contractors to save costs by creating a win-win situation for the government and contractor can be a path to significant savings. If properly incentivized, the contractor has the best chance of reducing costs since they have greater engineering and business insight into the actual design and manufacturing processes of the program. PMs often have a wide range of possible incentives, ranging to improving cash flow to higher fees or profit when the price to the government is reduced (Carter & Mueller, 2011). It should be emphasized that "should cost" savings are not arbitrary (e.g. every program gets cut by 10%), and should be tied to specific engineering or business changes that can be quantified and tracked. Success of this program has relied on solid analysis of potential savings, consequences, and risks. It is important to try and anticipate longer-term unintended consequences that may result from short-term savings strategies like reduced test hours or inspections or decreasing acquisition costs at the expense of a drastic increase to operations and sustainment costs. The objective of this initiative is making smart changes that result in better outcomes (Carter & Mueller, 2011).
Results	*[Guidance: A description of the **key actions** that you took to execute this strategy? **How did you do it?**]* "Should cost" management has been implemented incrementally, starting with the most expensive programs and moving to lower cost programs over time, as PMs have learned what works and what does not work well in cutting these costs. There are many different approaches to realizing these savings, and because every PM has been challenged to complete this process, many opportunities for savings have been identified. At least 15 Major Defense Acquisition Programs have realized or projected over $8 billion dollars of savings as a result of implementing "should cost" reviews (Husband, 2014). Many of the concepts behind "should cost" management are not new, but they do require long-term vision, as well as strategic thinking and planning.

Resource Management Theme: Acquisitions Reform	
Initiative/Strategy Title: Should Cost	
Capability Impact	*[Guidance: Projected/actual impact on high-priority capabilities? Impact of resourcing strategy on ability to provide NATO defence capabilities?]* "Should cost" management has removed many inefficiencies from defense acquisition programs, and continues to have a positive impact on acquisition programs because it is revisited over the life of a program. With each iteration of the process, the opportunity for improved performance exists. Several programs and their associated capabilities may have been too costly to maintain if "should- cost" savings had not been uncovered.
Lessons Identified	*[Guidance: What worked? What didn't? If another country were to adopt this strategy, what advice would you give them?]* • Prioritization of program cost drivers can help to yield significant results quickly because identifying small efficiencies in high-dollar line items can result in large savings. • Minimize changes, especially frequent changes, after production has started because "learning curve" savings are often neutralized by such changes. • Initially, a source of confusion over how the program should be implemented and executed arose because the program name was very similar to another existing program that was already in use. Earlier differentiation may have resolved some confusion (Husband, 2014). • There was also confusion in the initial roll out because this initiative was one part of a larger collection of initiatives. Within this family of initiatives, known as Better Buying Power, was another initiative that seemed similar and yet seemed to conflict with the guidance of "should cost". This was resolved and clarified in a later memorandum. Clear guidance is vital to gaining traction when major changes are implemented (Husband, 2014).
Member Nation Examples	*[The above information is asked for in anonymous/generic terms; specific examples/links to reports go here. This should provide countries increased freedom to present findings.]* **TABLE 1. SHOULD COST APPROACHES WITH CORRESPONDING MDAPs, ACQUISITION PHASE, AND REALIZED & PROJECTED SAVINGS**

Should Cost Approach	Program	Acquisition Phase	Realized Savings*/FY	Projected Savings*/FY
Balancing affordability versus capability in design	*OHIO*	TDP		~$1B per sub
Applying Continuous Process Improvement Tools	*IAMD*	EMD	$53M/FY13-15	~$240M PROC ~$122M O&C
	AIM-9X	Production	$21M, Lot 11/FY11	$82M/FY11-15
	F-18	Production	$27M/FY11	
Test program efficiencies	*Apache*	EMD	$35M/FY11-12	N/A
	GMLRS	EMD	$33.6M/FY12-13	
	Stryker	Production	~$$7.7M/FY12	
Reducing Schedule	*Apache*	EMD	NSP	
	GMLRS	EMD	NSP	
	AIM-9X	Production	NSP	
	VIRGINIA	Production	~$2.4B/FY05-12	
Competitive Source Selection that placed premium on price	*KC-46*	EMD & Production	$2.4B/FY11-16	$428M by FY17

Resource Management Theme: Acquisitions Reform

Initiative/Strategy Title: Should Cost

Member Nation Examples (cont'd)

Should Cost Analysis to inform negotiations prior to contract award	*F-22*	Production	$32M/FY11
	EELV	Production	NSP
	DDG-51	Production	NSP
	GMLRS	Production	NSP
Tandem/Block/Bundle buys	*E-2D*	Production	$73M, LRIP3 & 4/FY11-12
	GMLRS	Production	$52.3M/FY12-13
	Stryker	Production	$18M/FY11-12
Multiyear Procurement#	*C-130J*	Production	$610.6M/FY14-18
	CH-47F	Production	$373M/FY13-17
	DDG-51	Production	$319M/FY13-17
	E-2D	Production	$522.8M/FY14-18
	F-18	Production	$590M/FY10-13
	UH/MH-60	Production	$1051M/FY12-16
	V-22	Production	$852M/FY13-17
	VIRGINIA	Production	$1.04B/FY14-18

Should Cost Approach	Program	Acquisition Phase	Realized Savings*/FY	Projected Savings*/FY
Accelerating or more efficiently aligning production	*AIM-9X*	Production	NSP	
	EELV	Production		-$1.1B/FY14-18
	F-18	Production	NSP	
Downselect changed to dual award based on price	*LCS*	Production	$2.9B/FY10-15	
Sharing benefits of favorable financing	*E-2D*	Production	-1.5%/FY11-12	
Maximizing competition through Profit-Related-to-Offer strategy	*DDG-51*	Production	-$300M/FY11-12	
Leveraging FMS for Economic Order Quantity buys	*AIM-9X*	Production	NSP	
Performance Based Logistics	*Apache*	O&S	$276M/FY11-15	
	V-22	O&S	All O&S initiatives: 18% reduction cost/flying hr	
Increasing operational cycle; reducing depot time	*VIRGINIA*	O&S		-$1.4B/BY10
Repairing parts that were previously consumable	*V-22*	O&S	NSP	
Incorporating automation to lower future manpower costs	*LCS*	O&S	NSP	

*All savings in Then Year $ unless otherwise noted
Number based on CAPE estimate; Service estimated savings are generally greater
NSP: not separately priced

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Resource Management Theme: Acquisitions Reform	
Initiative/Strategy Title: Open Systems Architecture	
Context	*[Guidance: Background information leading to initiative and affecting its implementation. **Why did you do it?**]* Research has shown that promoting competition in federal contracting presents the opportunity for significant cost savings. Among their many benefits, competitive contracts can help save the taxpayer money, improve contractor performance, curb fraud, and promote accountability for results. Therefore, competition should be a cornerstone of any defence acquisition system and can be a critical tool for achieving the best possible return on investment for taxpayers. In a review of its federal contracting practices, one NATO Member Nation found that in recent years, tens of billions of dollars had been obligated under non-competitive contracts. Further, the government found that it had obligated billions of dollars annually under contracts that were awarded competitively but for which the government received only one offer. This government has cited both of these situations as high risk and identified these instances as areas where significant cost savings could be realized (United States Government Accountability Office, 2010). Upon identifying the cost and risk of its contracting practices, this government implemented an acquisitions initiative, which emphasized the importance of competition in federal contracting and strongly encouraged the use of competition-promoting techniques by acquisitions officials. As part of this initiative, this government published a report describing guidelines for how to create and maintain a competitive environment (Department of Defense, 2014). One key concept of this report, and a technique which has been implemented successfully by acquisition officials, is Open Systems Architecture (OSA). "*[Commercially,] OSA describes a system in which the specifications are made public to encourage third-party vendors to develop add-on products. In defence acquisition, the term extends to creating separate modules in a larger system, each of which can be updated to modernize the entire system without rebuilding it, and the modules can be produced by different vendors, promoting diversity and competition at the module or component level.*" (Pellerin, 2014).
Implementation	*[Guidance: A description of the **key actions** that you took to execute this strategy? **How did you do it?**]* The defense concept of OSA is composed of five fundamental principles (The Department of Defense Open Systems Architecture Data Rights Team, 2013): 1) Modular designs based on standards, with loose coupling and high cohesion, that allow for independent acquisition of system components. 2) Enterprise investment strategies, based on collaboration and trust, that maximize reuse of proven hardware system designs. 3) Transformation of the life cycle sustainment strategies for software intensive systems through proven technology insertion and software product upgrade techniques. 4) Dramatically lower development risk through transparency of system designs, continuous design disclosure, and government, academia, and industry peer reviews. 5) Strategic use of data rights to ensure a competitive playing field and access to alternative solutions and sources, across the life cycle. Implementation of OSA should focus on supporting these principles in defence acquisition programs. The following list describes foundational business and technical practices of OSA (The Department of Defense Open Systems Architecture Data Rights Team, 2013).

Resource Management Theme: Acquisitions Reform	
Initiative/Strategy Title: Open Systems Architecture	
Implementation (cont'd)	**Business Practices of OSA** • Seek data deliverables and rights in technical data and computer software sufficient for competition throughout the life cycle as an objective. • Continuous competition throughout the life cycle. • Increased capability to the warfighter on a faster development timeline. • Reduced life cycle costs. • Shared risks with other programs. • Minimized duplication for technology development investments, shared life cycle costs. • Collaboration through peer reviews. **Technical Practices of OSA** • Modular architectures with open standards and published interfaces. • Separation of hardware and software through middleware (software that connects two otherwise separate applications). • Maximized reuse of assets to limit unique development. • Full design disclosure. • Limited use of well-defined proprietary solutions. Implementation of OSA is heavily dependent on: 1) The feasibility and cost-effectiveness of incorporating OSA into an acquisitions programs; and 2) The willingness and commitment of acquisition officials to incorporate these practices into their programs. Some acquisitions programs will have the industrial base or technological understand to make OSA a feasible and/or cost-effective course of action, while other programs will not. Historically, OSA has typically been applied to computing-based products, where software can be designed to meet specified modular design parameters and use widely supported and consensus-based standards as key interfaces, and to some physical systems, where a desired physical product can be developed as a system of sub-components linked by standardized interfaces (Defense Acquisition University, 2014). Specific practices and examples of how OSA can be incorporated into acquisition programs have been previously reported. Interested parties are encouraged to read *DoD Open Systems Architecture, Contract Guidebook for Program Managers v.1.1*.
Results	*[Guidance: A description of the **key actions** that you took to execute this strategy? **How did you do it?**]* OSA, when applied, has been successful in increasing competition for national defence proposals by providing opportunities for niche companies to compete against companies with broader expertise. This increased competition has lowered cost and increased quality of contracted products and services, as expected. OSA has also led to the development of products, which, due to their modular nature, can accept add-ons and upgrades without significant modification (Defense Acquisition University, 2014; Pellerin, 2014).

Resource Management Theme: Acquisitions Reform	
Initiative/Strategy Title: Open Systems Architecture	
Results (cont'd)	Additional benefits to acquisitions programs which adopt OSA include (Defense Acquisition University, 2014): • Reduced acquisition and sustainment cost without sacrificing capability. • Reduced reliance on single-source vendors ("Vendor Lock"). • Shortened acquisition timeline. • Enhanced rapid and agile development. • Accelerated transition from science and technology into acquisition due to modular insertion. • Increased ability to retrofit/upgrade system elements for new/evolving capability. • Enhanced incremental approach to capabilities. • Increased innovation. • Enhanced ability to create security structures within a design to reduce security risk.
Capability Impact	*[Guidance: Projected/actual impact on high-priority capabilities? Impact of resourcing strategy on ability to provide NATO defence capabilities?]* OSA has allowed this government to maintain, and in cases, improve its defence capabilities. Total costs for OSA acquisition programs have decreased through increased competition, making these programs financially feasible and able to be maintained.
Lessons Identified	*[Guidance: What worked? What didn't? If another country were to adopt this strategy, what advice would you give them?]* • One key to implementing OSA is the government ownership of the linkages, which connect the sub-components of a system. Therefore, a government looking to implement OSA in its acquisition system needs to have policies in place which clearly define how that country will manage the intellectual property rights/licensing of those linkages (The Department of Defense Open Systems Architecture Data Rights Team, 2013). • OSA should be implemented early is a product's life cycle. While OSA can be incorporated into the acquisition program of legacy systems, it is challenging to modify the design of a well-established product. • "*A key enabler for open architecture is the adoption of an open business model, which requires doing business transparently to leverage the collaborative innovation of numerous participants across the enterprise permitting shared risk, maximized asset reuse, and reduced total ownership costs. The combination of open architecture and an open business model permits the acquisition of OSA systems that yield modular, interoperable systems allowing components to be added, modified, replaced, removed and/or supported by different vendors throughout the life cycle in order to drive opportunities for enhanced competition*." (The Department of Defense Open Systems Architecture Data Rights Team, 2013). • A mandate of OSA is that technical requirements are based to the maximum extent practicable on open standards. In cases where no standards exist, standards must be developed. At a minimum, technical standards and related specifications, requirements, source code, metadata, Interface Control Documents (ICDs), and any other implementation and design artifacts that are necessary for a qualified contractor to successfully perform development or maintenance work for the government must be made available throughout the life cycle (The Department of Defense Open Systems Architecture Data Rights Team, 2013).

Resource Management Theme: Acquisitions Reform	
Initiative/Strategy Title: Open Systems Architecture	
Member Nation Examples	*[The above information is asked for in anonymous/generic terms; specific examples/links to reports go here. This should provide countries increased freedom to present findings.]* • The Navy's Acoustic Rapid Commercial-Off-The-Shelf (COTS) Insertion (A-RCI) program created rivalries by using OSA, which resulted in lower switching costs. The A-RCI program is a success story in the use of Modular Open Systems Approach (MOSA)/Open Architecture (OA) by lowering costs, which allowed installation of sonar system upgrades on the entire submarine fleet. A-RCI is a program for transforming existing submarine sonar systems from legacy systems to a more capable and flexible COTS/OSA to provide the submarine force with a common sonar system. The program's concept is simple: upgrade the system without physically changing the sensors. Additionally, A-RCI's open architecture concept makes it easier to integrate additional sensors, providing a dual-track improvement option for submarines. By sharply upgrading ship sensor processing, it integrates and improves the submarine's towed array, hull array and sphere array sonars, and runs more advanced algorithms to provide a fuller "picture" of the surrounding environment (Department of Defense, 2014). • Consolidated Afloat Networks and Enterprise Services (CANES): This program is designed to streamline and update shipboard networks to improve interoperability across the fleet. CANES enables greater efficiency by introducing OSA to eliminate many legacy, stand-alone networks, to provide an adaptable-responsive information technology platform which strengthens network infrastructure by meeting changing warfighter needs, and reducing hardware footprint, operation and sustainment workloads, and total ownership costs. The CANES program replaces five shipboard legacy network programs with a commercial hardware-based, common computing environment for command, control, intelligence, and logistics. The consolidation is expected to lower operations/maintenance costs, and reduce training needs by providing the Infrastructure and Platform as a Service (IaaS/PaaS) through a rolling 4-year hardware baseline and 2-year software baseline (Department of Defense, 2014). • The Future Airborne Capability Environment Technical Manual (FACE(TM)) is an example of how standards can be developed to promote OSA. Built with consensus from the FACE Consortium, which includes participation from all branches of the military, academia, and more than 60 industry partners, FACE defines open technical standards, business practices, and conformance processes. For example, FACE defines common and open software architecture and interfaces, and the corresponding data model, which enables a Department of Defense software product line approach. These technical standards enforce hardware and operating system-independent, capability-based applications that can be used by multiple platforms, which promote software reuse, improved integration and interoperability; and reduce redundant development efforts, vendor lock, and time to field (Department of Defense, 2014).
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Resource Management Theme: Acquisitions Reform	
Initiative/Strategy Title: Open Systems Architecture	
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Resource Management Theme: Acquisitions Reform	
Initiative/Strategy Title: Incentivize Performance	
Context	*[Guidance: Background information leading to initiative and affecting its implementation. **Why did you do it?**]* Characteristics of the commercial business sector motivate businesses to be innovative, efficient, and effective. The public sector does not share the same characteristics, so other means are used to encourage businesses to pursue these goals. In the 1990s, the government of one NATO Member Nation chose to influence industry by developing a complex body of laws and regulations dedicated to controlling performance and production. As laws and policies proliferated and regulatory implementation increased, costs and complexity increased significantly. This evolved into a government-contractor relationship that was characterized as problematic and adversarial as it tried to balance two often-conflicting goals: • The government sought to maximize contractor performance and gain the best product for the lowest price. • The contractor sought to minimize risk while maximizing profit and delivering to the government what was expected. This resulted in frequent disconnects between contractual incentives to achieve the government's desired performance and the motivational factors driving the contractor. Consequently, the structure of the business relationship often met only the minimum required performance goals at the expense of cost and schedule goals – usually to the detriment of the user, the mission, and the taxpayer. With declining budgets and the changing security environment, these inefficiencies have become more significant, in terms of resources consumed and inadequate access to key, leading-edge technologies, resulting in difficulty in achieving performance goals (Office of the Under Secretary of Defense for Acquisition and Technology, 2001). To address this problem, the government has adopted incentive strategies to successfully attract, motivate, and reward traditional and non-traditional contractors, thus ensuring successful performance and maximizing the use of commercial practices to enhance its ability to attract non-traditional contractors (Office of the Under Secretary of Defense for Acquisition and Technology, 2001).
Implementation	*[Guidance: A description of the **key actions** that you took to execute this strategy? **How did you do it?**]* In general, this government's defence organization developed incentive strategies to reward suppliers for adopting business processes and principles designed to reduce costs and cycle time while maintaining schedule, achieving performance expectations, and maximizing efficiency. These strategies were meant to address over-arching business considerations related to each acquisition strategy and founded on the following objectives: • Use incentives tailored to the specific business case to achieve maximum benefit for both parties. • Assess the most critical issues related to specific acquisitions, and design incentives to ensure optimal results. • Design strategies to reflect an understanding of the business case from industry's perspective. Profit, earnings per share, cash flow, and return on investment are important industry considerations in entering into business relationships. • Recognize and reward contractors that strategically focus on efficient and effective management practices, thereby reducing unneeded capacity and maximizing overall value to the customer (e.g. lean industry principles and best practices should be recognized and rewarded including maximum practicable use of small businesses in subcontracting).

Resource Management Theme: Acquisitions Reform	
Initiative/Strategy Title: Incentivize Performance	
Implementation (cont'd)	• Recognize that a requirement's structure drives business solutions. Match the essential program objectives and potential incentive arrangements early on and communicate objectives to industry. • Agree on incentives and remedies to ensure successful business relationships. • Strive to be creative and resourceful; maximize continuous improvement and joint problem-solving, with a focus on performance outcomes. • Integrate commercial and commercial-like best practices into defence acquisitions to the maximum extent possible to achieve efficiency and effectiveness for both parties. • Make incentives realistically reflect performance objectives and standards so that they are measurable and attainable. • Communicate expectations, assessments, and any change in focus clearly to maximize the potential performance. This government's performance incentives have included a broad spectrum of business considerations and ranged from economic to non-economic and cost-based to non-cost-based tools, processes, and practices. Some incentives have been multi-dimensional, while others have been targeted to specific deliverables or efforts. Some incentives were more traditional while others were new and innovative (Office of the Under Secretary of Defense for Acquisition and Technology, 2001). The following list contains the major themes under which incentive programs can be developed. See *Incentive Strategies for Defense Acquisitions* for more information on these themes: • Contract Length Considerations; • Strategic Supplier Alliances; • Performance-Based Payments; • Performance Incentives; • Schedule Incentives; • Award Fee Contract Arrangements; • Past Performance; • Competition Considerations; and • Remedies for Non-Performance.
Results	*[Guidance: A description of the **key actions** that you took to execute this strategy? **How did you do it?**]* This government's focus on leveraging performance-based incentives has had positive results, albeit, not as significantly as originally intended. Performance-based incentives have been used to control cost growth and to encourage contractors to provide above-average product performance in key capability areas. It has also been suggested that performance incentives can influence industrial research and development efforts. This suggestion is based on the idea that performance incentives convey to industry the performance metrics which are most valued by a government, and what the government is willing to pay to achieve those metrics. From this understanding of what higher levels of performance are worth, industry can then compare the costs of meeting higher performance levels, possibly through research and development efforts, with the willingness of the government to pay for that performance. Industry can then decide how much and where to investment in research and development (Kendall, 2015).

Resource Management Theme: Acquisitions Reform	
Initiative/Strategy Title: Incentivize Performance	
Results (cont'd)	It should also be noted, however, that due to practices that undermine efforts to motivate contractor performance, such as incentivizing performance which does not exceed standard practice or not incentivizing the correct performance metrics, this government's focus on performance-based incentives has not been as effective as forecasted (United States Government Accountability Office, 2005). The government expects to increase the effectiveness as it identifies and corrects these undermining practices.
Capability Impact	*[Guidance: Projected/actual impact on high-priority capabilities? Impact of resourcing strategy on ability to provide NATO defence capabilities?]* This focus on leveraging performance-based incentives has had positive impacts on this government's defence capabilities. Industry has been encouraged to invest in research and development which will help to ensure that cutting edge capabilities are available. Well-developed incentives have also encouraged industry to pursue business practices to decrease operating costs, pass savings on to the government, and improve the government's ability to maintain capabilities under resource constraints. In addition to controlling costs for key capabilities, these incentives have also encouraged industry to improve the quality of capabilities. By leveraging performance-based incentives, this government has been able to preserve its key capabilities and continue to support NATO.
Lessons Identified	*[Guidance: What worked? What didn't? If another country were to adopt this strategy, what advice would you give them?]* • Thorough market research should be conducted to develop a better understanding of the business strategy from both the government's and the contractor's viewpoints, leading to behaviour that jointly achieves the mutual goals of all parties (e.g. best-value acquisitions and targeting high performance based on best business practices) (Office of the Under Secretary of Defense for Acquisition and Technology, 2001). • Contractual incentives are effective if: (1) they are actually used and not simply discussed; (2) they are significant, stable, and predictable; and (3) they are tied directly to key defence objectives (Department of Defense, 2014). • The emphasis should be on matching incentives to the situation at hand instead of expecting fixed-price contracting to be a guaranteed solution. Fixed-price contracts have lower costs because they are used in lower-risk situations, not because they control costs better. Moreover, prices on fixed-price contracts are only "fixed" if the contractual work content and deliverables remain fixed which often is not true (Department of Defense, 2014). • The failure to examine the basis for their use, assess how well they are working, and account for various factors that arise in the complex acquisition environment has limited the effectiveness of performance-based incentives as a management tool (United States Government Accountability Office, 2005).
Member Nation Examples	*[The above information is asked for in anonymous/generic terms; specific examples/links to reports go here. This should provide countries increased freedom to present findings.]* One example of a program where performance incentives controlled cost growth is the KC-46 Tanker Program. In 2011, the USAF awarded Boeing the KC-46 contract to build a new aerial refueling aircraft. To incentivize cost performance on this contract, the USAF structured the contract as a fixed-price contract, with stipulations to limit the Air Force's liability during engineering and manufacturing development phase of the tanker program.

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Initiative/Strategy Title: Incentivize Performance	
Member Nation Examples (cont'd)	These stipulations set a target cost for engineering and manufacturing development of $3.9 billion and a cost ceiling of $4.9 billion, and stated the following agreement: 1) The USAF would be responsible for all costs at or below the target of $3.9 billion; 2) For every dollar over $3.9 billion and below $4.9 billion, the USAF would pay 60% and Boeing would pay 40%; and 3) Boeing would be fully responsible for any costs over $4.9 billion (Weisgerber, 2011). Under this agreement, Boeing, not the USAF, has agreed to pay if the contract exceeds the original budget, but benefits from the knowledge that the USAF will not alter or add to the contract (Baldwin, Lorell, & Younossi, 2015). To date, it is estimated that this contract and stipulations have saved the government an estimated $2.5 billion. During the engineering and manufacturing development phase, Boeing encountered issues with the electrical wiring and the integrated fuel system on the tanker, causing the contract to exceed the cost ceiling of $4.9 billion by $1.2 billion (Mehta, 2015). Under other contract types, the government may be responsible for these costs. But in this instance, given the conditions of the contract, Boeing has accepted responsibility for the $1.2 billion over-ceiling cost and 40% of the $1 billion between the contract target and contract ceiling, for a total of $2.5 billion. One example of performance incentive improving product performance is the F-22 Fixed Price Incentive Firm multi-year Performance-Based Logistics (PBL) sustainment contract. The goal of PBL is to incentivize a "less I use, the more profit I can make" mentality versus a "more spares and repairs I can sell, the more profit I can make" mentality by focusing on performance outcomes (Defense Acquisition University, 2015). In the case of the F-22, PBL led to the establishment of a "fair and reasonable" sustainment contract between the government (F-22 System Program Office, 3 Air Logistics Complexes, and the Air Combat Command) and contractors (Lockheed Martin Aeronautics, Boeing, and Pratt and Whitney) which has both saved the government money and improved F-22 reliability and availability. In 2013, due to this contract, spares costs declined by 40% from $43.8 million to $32.6 million, consumable costs decreased by 24%, and the overall costs for the $2 billion contract was reduced by 4.2%. Also, because of incentives to improve weapon systems performance, rather than contractor performance, defective equipment was identified and removed from the supply chain, resulting in an estimated cost avoidance of $111,803 or about 2380 Maintenance Man Hours of unnecessary maintenance over four years. Also in 2013, as a result of this contract, both the F-22 Fleet Mission Capable Rate and the Fleet Aircraft Availability Rate reached records highs of 71.1% and 61.9%, respectively, Aircraft Abort Rate dropped to an average of 5.1% for the year, and the average Total Not Mission Capable Supply Rate was the lowest on record at 4.3% ("the Commander of Air Combat Command lauded the fact that F-22 supply performance was the best in the command for fighter programs.") (U.S. Air Force, 2015).
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Resource Management Theme: Acquisitions Reform	
Initiative/Strategy Title: Incentivize Performance	
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Resource Management Theme: Portfolio Analysis, Rationalize Capabilities, and Programs	
Initiative/Strategy Title: Capability Portfolio Reviews	
Context	*[Guidance: Background information leading to initiative and affecting its implementation. **Why did you do it?**]* In FY2009, one service's leadership realized that they lacked a comprehensive view of program requirements and capabilities (Roth & McCouch III, A Strong Lens, 2012). Instead of analyzing programs holistically, this service's programs were analyzed on an individual basis only, meaning that the interaction effects between solutions were never explicitly analyzed. This led to sub-optimal capability management, including the unnecessary and costly attainment of redundant capabilities (Greene, 2012). In February 2010, to improve its capability management (which included addressing the attainment of overlapping capabilities) and buying power (Association of the United States Army (AUSA) Institute for Land Warfare (ILW), 2010), this service developed the Capability Portfolio Review. The Capability Portfolio Review, or CPR, is a service-wide, all-component review and assessment of requirements within a defined capability portfolio (a collection of similar defence capabilities functionally grouped to support analysis), and is meant to ensure that the service can meet the needs of its operational force while wisely programming, budgeting, and executing funding (McHugh, 2010). With the CPR, a service is able to: *1)* "*Validate, modify, or terminate requirements;* *2) Develop a baseline understanding of all requirements;* *3) Ensure that funds are programmed, budgeted, and executed against validated requirements and cost- and risk-informed alternatives; and* 4) *Revalidate portfolios through an examination of commanders' operational needs, wartime lessons learned, service force generation, emerging technologies, affordability, interest, and opportunity*" (Roth & McCouch III, A Strong Lens, 2012).
Implementation	*[Guidance: A description of the **key actions** that you took to execute this strategy? **How did you do it?**]* The CPR is a two-part holistic analysis of a defined capability portfolio. The first part of the CPR focuses on the individual needs (requirements) that drive capability development, acquisition, and sustainment within the defined portfolio. During this phase, the requirements within the portfolio are identified and then validated, modified, or recommended for termination by comparing the requirements to a future threat assessment (McHugh, 2010). Once a final requirements list is compiled, the requirements are prioritized against each other and over time. To facilitate the development of a schedule of requirement priorities, the threat assessment is used to provide context to the risks over time, of not fulfilling a requirement (Roth & McCouch III, A Strong Lens, 2012). The goal of this phase is to lay the foundation for the second stage of the CPR by validating the requirements within a defined portfolio and provide an understanding of how priorities vary over time. The second stage of the CPR focuses on investigating the effects of alternative investment decisions within the defined portfolio. During this phase, existing planned and conceptual Doctrine, Organization, Training, Materiel, Leadership and education, Personnel and Facilities (DOTMLPF) solutions, which could meet the previously defined requirements, are identified. Then, the services' requirements, acquisitions, and resourcing communities work together to analyze the current investment plan and seek opportunities to gain investment efficiencies. For example, these opportunities could include areas where DOTMLPF solutions provide unnecessarily redundant capabilities and are resourced simultaneously; lower priority requirements are filled while high priority requirements are not; procurement quantities

Resource Management Theme: Portfolio Analysis, Rationalize Capabilities, and Programs	
Initiative/Strategy Title: Capability Portfolio Reviews	
Implementation (cont'd)	and timelines can be altered; and/or requirements have become inflated, increasing the required resourcing, and can be relaxed (Roth, How the CPR Works, 2012). The intent at this stage is to develop a vision for the portfolio from an operational perspective which will provide direction to the resourcing community who ultimately decide what resources will be invested in the portfolio. The exact output of the CPR is an information brief that is prepared for the service's senior leaders. This briefing documents the information captured during the CPR, including information regarding the current "health" of the selected portfolio (How well does the current portfolio align with the service's strategic vision, the service's strategy, and the service's force structure? Are there any key factors, such as technology limitations, that are restricting the development/ performance of this portfolio?), information about future plans for that portfolio and the impact of these future plans on portfolio "health" (How will this portfolio develop over the next 30 years? Do future threat assessments reveal major risks being accepted by this portfolio? Are these future plans affordable?), and risk- and resource-informed recommendations regarding portfolio priorities and strategy for the senior leaders to consider (Do priorities need to be adjusted, possibly due to risk or affordability issues?). This information is meant to help senior leaders make tough decisions affecting the service's planning, programming, budgeting, and execution process, and to provide a stronger defense of the service's requirements (Huggins, 2015).
Results	*[Guidance: A description of the **key actions** that you took to execute this strategy? **How did you do it?**]* Through the use of the CPR, the service has constructed strategic visions for various portfolios which have been developed in conjunction with an overall vision for that service. These visions have provided insights and context for decisions regarding what, when, and how portfolio-specific requirements will be met. These decisions include a choice by the service to reduce the procurement quantity of an expensive munition based on the CPR discovery that capability could be maintained by other systems (an identification of expendable capability redundancy which resulted in savings of approximately $500M), and a separate decision to cancel production of two expensive munitions so that funding could be allocated towards the fulfillment of a requirement which was found to be of higher priority. The successes of the CPR have led the services' leaders to state that the CPR has become the service's "*most comprehensive tool for validating, modifying, or terminating its programs*" (Roth & McCouch III, A Strong Lens, 2012).
Capability Impact	*[Guidance: Projected/actual impact on high-priority capabilities? Impact of resourcing strategy on ability to provide NATO defence capabilities?]* This initiative has helped the service find ways to improve the effectiveness of its investments, or, in other words, get the biggest "bang for its buck". This means that the operational units that would support an invocation of Article 5 of the North Atlantic Treaty Organization Washington Treaty of 1949 would deploy with the highest level of capability attainable given the funding level provided to the services.
Lessons Identified	*[Guidance: What worked? What didn't? If another country were to adopt this strategy, what advice would you give them?]* The CPR is a method that facilitates the evaluation of investment plans for current and future capabilities based on the importance of the requirement for those capabilities, the interactions that exist between capabilities, and the threat forecast.

Resource Management Theme: Portfolio Analysis, Rationalize Capabilities, and Programs	
Initiative/Strategy Title: Capability Portfolio Reviews	
Lessons Identified (cont'd)	One key to the CPR is the holistic, complimentary portfolio management approach taken during the analysis. By analyzing a portfolio of investments rather than single solutions, the service has been able to identify solutions that provide duplicative capabilities, balance portfolios funding based on their priority, and synchronize investment strategies across portfolios. Another key to the CPR is the synchronization of the requirements, acquisitions, and resourcing communities. Without this environment, the CPR would not adequately steer the portfolio toward the desired capabilities. By gathering these three communities, the service can ensure investments will provide the right capabilities at the right time to the warfighter.
Member Nation Examples	*[The above information is asked for in anonymous/generic terms; specific examples/links to reports go here. This should provide countries increased freedom to present findings.]* Several service-specific key decisions based on CPR results follow: • In April 2010, approximately $500M was saved when the planned procurement quantity of the M982 155 millimeter (mm) Excalibur was reduced from 30,000 to 6,264 rounds. This decision was based on the Precision Fires CPR, which found that capability could be maintained by other Army systems (Blickstein, et al., 2012). The Precision Fires CPR also led to the cancellation of the Non-Line-Of-Sight – Launch System (NLOS-LS) and a reduction in procurement quantity of Accelerated Precision Mortar Initiative (APMI) rounds. • In 2011, findings from the Air and Missile Defense CPR led to the termination of the Medium Extended Air Defense System (MEADS) and the Surface Launched Advanced Medium-Range Air-to-Air Missile (SLAMRAAM) (Greene, 2012).
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Resource Management Theme: Portfolio Analysis, Rationalize Capabilities, and Programs	
Initiative/Strategy Title: Capability Portfolio Reviews	
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Resource Management Theme: Portfolio Analysis / Management Practice	
Initiative/Strategy Title: Long-Range Investment Requirements Analysis	
Context	*[Guidance: Background information leading to initiative and affecting its implementation. **Why did you do it?**]* Planning is a fundamental practice of any well-designed acquisition system. Plans not only help decision-makers understand how an acquisitions strategy will be executed, but also help decision-makers consider the long-term impacts of near-term decisions. The Long-Range Investment Requirements Analysis (LIRA) represents the process that one service uses to develop long-range plans. The LIRA is a decision support tool, which enables improved long-range planning and budgeting by analyzing projected spending authority and current and emerging procurement requirements over a 30-year planning horizon. Through this analysis, the service is able to identify and address discrepancies between: 1) Planned spending and its projected budget; and 2) Projected capabilities and projected threats, thus allowing the service to "*stay within its fiscal top line while also maximizing its capabilities for the Warfighter*" (Miller, 2014).
Implementation	*[Guidance: A description of the **key actions** that you took to execute this strategy? **How did you do it?**]* The LIRA provides a linkage between the CPR (described elsewhere) and the entities who actually manage the services' resources (Dyess Jr. & Lakin, 2015). The CPR defines the strategic vision for the development of a defined capability (or group of capabilities) within a portfolio (a grouping of related capabilities; e.g. the precision fires portfolio, the movement and maneuver portfolio, the infantry brigade combat team portfolio). During the LIRA, the service's resourcing community synchronizes those strategic visions into a financially-feasible, capability-driven 30-year plan. The LIRA process begins by first laying out the services' current investment plan for the next 30 years, with a focus on acquisition, science, and technology accounts. Then this plan is compared to forecasts of future spending authority, projected threats, the service's strategy to align investments with strategic priorities (the CPR strategic visions), and the service's vision for how "*future forces will prevent conflict, shape security environments, and win wars*" (Dyess Jr. & Lakin, 2015). The purpose of this comparison is to: 1) Identify areas where planned spending and spending authority are out of sync. 2) Identify areas where capability development is not in line with the threat assessment and the service's strategic vision. Following identification of these areas, the service's resourcing, requirements, and planning communities collaborate to develop a cost-informed plan where capability development is strategically managed against future threat. This collaboration involves cost-, risk-, and strategy-informed decisions about which requested solutions will have their procurement timelines shifted early or later, shortened or extended, or omitted, by leveraging the expertise of these three communities. The exact output of the LIRA is a 30-year budget plan that integrates research, development, procurement, and equipment sustainment investments. This budget plan is documented in a spreadsheet with annual spending organized by program.

Resource Management Theme: Portfolio Analysis / Management Practice	
Initiative/Strategy Title: Long-Range Investment Requirements Analysis	
Results	*[Guidance: A description of the **key actions** that you took to execute this strategy? **How did you do it?**]* The LIRA has been successful in helping the service to develop long-term resourcing plans. These plans have made the services' leaders aware of areas where planned spending exceeds budget projections and helped these leaders ensure that capability development is synchronized with the threat assessment and the strategic vision. These plans have helped to prevent leaders from making choices which could jeopardize future affordability or the ability of the force to execute its strategic vision. According to one expert, the LIRA has helped this service to "*see strategically what decisions can and should be made to ensure that [the service's programs] remain affordable and brings the best capability it can to the Soldiers*" (Cox, 2015).
Capability Impact	*[Guidance: Projected/actual impact on high-priority capabilities? Impact of resourcing strategy on ability to provide NATO defence capabilities?]* The LIRA has helped this service develop affordable plans to preserve key capabilities. Without the LIRA's long-range plans and the analysis required to create these plans, there exists a strong possibility that the service would plan investments in critical capabilities in a way in which it could not afford. For example, the service could inadvertently schedule the costly modernization of two critical weapon systems to occur simultaneously 15 years into the future. Not only could this cause the service's budget to exceed its funding levels at that time, but it may also force the service to sacrifice the readiness of one, or both, weapon systems. By developing long-range plans through the LIRA, the service has been able to foresee and avoid harmful events of this nature and protect the high profile capabilities of the service.
Lessons Identified	*[Guidance: What worked? What didn't? If another country were to adopt this strategy, what advice would you give them?]* The value of the LIRA is that it creates "*an environment where the communities who invest in all phases of the materiel life cycle work together to maximize the services' capabilities over time*" (Miller, 2014). The LIRA forces a service to view capability development as a system of interrelated parts rather than as a series of concurrent, but independent endeavors. From this perspective, the service can gain a better sense of how various resourcing and timing decisions will influence the development of a specific capability, and the service as a whole. The service is then able to coordinate its efforts better through this awareness, and consequently, limit the impact that decreased funding has on readiness.
Member Nation Examples	*[The above information is asked for in anonymous/generic terms; specific examples/links to reports go here. This should provide countries increased freedom to present findings.]* Following are two examples of coordinated decisions that have results from the LIRA: • While conducting the LIRA in 2012, the Army realized that the training and maintenance required to sustain the Armored Vehicle Launch Bridge (AVLB) until the fielding of its replacement, the Joint Assault Bridge (JAB), was unaffordable. The Army also understood how critical this capability was to the Soldier and decided to accelerate JAB acquisition to reduce the duration and overall cost of AVLB training and maintenance (Dyess Jr. & Lakin, 2015). • In 2014, the LIRA revealed that funding would not be available to continue the Ground Combat Vehicle (GCV) program, fund the Army's proven platforms (Abrams, Bradley, and Stryker), and to continue development of the Armored Multi-Purpose Vehicle (AMPV) (U.S. Army, 2014). Based on the priorities and the risk assessment from the LIRA, the Army made the decision to conclude the GCV program upon completion of the technology development phase (Cox, 2015).

Resource Management Theme: Portfolio Analysis / Management Practice	
Initiative/Strategy Title: Long-Range Investment Requirements Analysis	
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REPORT DOCUMENTATION PAGE

1. Recipient's Reference	2. Originator's References	3. Further Reference	4. Security Classification of Document
	STO-TR-SAS-113 AC/323(SAS-113)TP/689	ISBN 978-92-837-2033-1	PUBLIC RELEASE

5. Originator

Science and Technology Organization
North Atlantic Treaty Organization
BP 25, F-92201 Neuilly-sur-Seine Cedex, France

6. Title

Future Defence Budget Constraints: Challenges and Opportunities

7. Presented at/Sponsored by

This Technical Report documents the findings of System Analysis and Studies (SAS) Panel Team 113.

8. Author(s)/Editor(s)	9. Date
Multiple	December 2016
10. Author's/Editor's Address	**11. Pages**
Multiple	230

12. Distribution Statement

There are no restrictions on the distribution of this document. Information about the availability of this and other STO unclassified publications is given on the back cover.

13. Keywords/Descriptors

2008 Great Recession
Analytical framework
Best practices
Constraint model
Decreased defence spending
Defence resource management practices
Defence spending
Financial
Financial constraint
Financial crisis
Macroeconomics
Planning, Programming, Budgeting and Execution (PPBE)
Resourcing strategies

14. Abstract

In the five years following the Great Recession, average defence spending as a share of GDP by all NATO Member Nations declined from 1.72% in 2009 to 1.46% in 2013. According to Henius and McDonald (2014), this decline and the likelihood of continued resource management austerity could last for the next two decades. Because of this, NATO's success critically depends on the widespread application of effective and efficient defence resource management practices. In this study, a group of NATO Member Nations identified and evaluated resource management practices and developed a collection of resource management strategies for use by Member Nations facing financial stress. The methodology for conducting this research consisted of developing an analytical framework that organizes selected "exemplar" country contributions. Of the 41 practices submitted, this study found that 59% of all practices submitted focused on reactive resourcing strategies while only 15% focused on proactive planning. Currently, there is no generally accepted NATO-wide analytical framework to assist Member Nations to identify, organize, and share defence resource management practices. This study highlights the need for NATO to adopt and expand the proposed analytical framework to provide Alliance Nations a common foundation to achieve effective and efficient defence resource management.

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ISBN 978-92-837-2033-1