A Blueprint For 21st Century Force Development

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ABSTRACT

All nations have some process by which they determine how their armed forces should evolve into the future. This is often termed Force Development. In recent decades, capability-based planning has been advanced as an analytical approach to support Force Planning and Force Development[1]. Research Task Group SAS-164, comprising representatives of eight nations and the NATO NCI Agency, has surveyed current national practices and reviewed past NATO and five eyes[2] literature in the field.

From this, we derived a generalised analytical process model for Force Development, which has been verified as being reflective of the national practices of those participants of the Task Group. The model applies equally to smaller and larger nations and those in various strategic stances. The model is not envisaged as being a mandated, 'mechanistic' process but rather to serve as a blueprint for those seeking to review or revise their national Force Development approaches. It can also be used as a common frame of reference to support collaboration on methods or tools to support Force Development. This paper describes the model and illustrates its applicability through a set of user cases.

KEYWORDS: *Force planning, Force development, Capability-based planning, Balance of investment, Long term defence planning*

[1] In this paper, the term "Force Development" is exclusively used. This term also encompasses what is generally referred to as "Force Planning" in some countries.

[2] The Five Eyes (FVEY) refers to Australia, Canada, New Zealand, the United Kingdom, and the United States. The Technical Cooperation Program (TTCP) is a defence scientific collaboration organisation connecting the FVEY defence establishments.

1.0 INTRODUCTION

This paper encapsulates the principal findings from the Research Task Group (RTG) SAS-164 report [1], which was principally aimed at investigating Force Development (FD) in the context of the 21st century, aligning with the RTG research question: "Is the TTCP process model still fit for purpose given evolving 21st century challenges?" Through this lens, a notable research gap emerges in the existing literature concerning the adequacy and applicability of prevailing FD approaches. RTG SAS-164 sought to bridge this gap, offering a critical examination of the 20-year-old TTCP process model [2], and fostering a nuanced understanding of its relevance and potential enhancements amidst 21st-century challenges. From this foundation, the RTG developed and described an improved model rendering the TTCP model obsolete.

The objective of this paper is to offer a thorough summary and explanation of the SAS-164 model to a broader audience[3], underscoring its significance and potential implications in the evolving security landscape. By presenting the model's foundational aspects and real-world applications through user cases, this narrative seeks to contribute to the dissemination and propagation of the SAS-164 model's possibilities, thereby encouraging nations and stakeholders to critically evaluate and potentially enhance their Force Development processes. The articulation in this paper is crafted to provide a comprehensive yet accessible exposition of the SAS-164 model, aspiring to facilitate a broader comprehension and engagement among varied stakeholders. By elucidating the model's theoretical underpinnings and practical implications through user cases, this narrative seeks to foster a wider dissemination and exploration of the SAS-164 model's potential, urging nations to critically appraise their FD processes in light of the insights offered by the RTG.

Force Planning in NATO has faced challenges ever since it was adopted in the 1950s as a structured process to harmonize National and Alliance FD efforts and ensure that the Alliance has the forces and resources required to counter agreed security threats. Some challenges are perennial, and others have become more apparent in the 21st Century. These challenges have necessitated a review of existing FD and include:

1) Costs: In terms of financial challenges of pressure on defence budgets whilst at the same time trying to cope with a geo-political situation not seen since the 'cold war'.
2) Complexity: New cross-domain concepts, such as Multiple Domain Operations [3] which cut across the boundaries between military, civilian, economic and political spheres and military systems (Joint Targeting and Deep Strike) add to complexity of FD.
3) Technology: Keeping pace with technological change has always been a challenge for FD, but one, which appears particularly acute at the time of writing with technology in potentially game changing areas such as Artificial Intelligence becoming more and more available [4].
4) Scope: Defining the scope of FD is becoming increasingly difficult given the increasing globalisation of the world, how best to align defence planning across an increasingly large and wide-ranging group of nations within the Alliance. This plus an increased focus on the 'now' rather than the medium term (up to 19 years in the future) have implications on the FD process [5].
5) Analytical Support: The changing nature of threats may necessitate the development of new campaign models and war-gaming tools to capture represent the intricacies of contemporary conflict and to represent novel concepts and technologies expected to be found in the near-future battlespace.

The group quickly identified that national terminology and usage differs, so we first established a working definition of FD in terms of where it fitted in the context of other interconnected processes (such as such as horizon scanning or force generation). In short, we define it as the activity that falls between the articulation of goals for the force and the actual commitment or expenditure of resources to generate military units.

[3] The SAS-164 report [1] is not in the public domain.

The SAS-164 RTG conducted its work with the understanding that it was not operating in a vacuum. Each nation-state and the NATO alliance itself is already engaged in FD activities, albeit not using the same nomenclature. An initial task of the study was to create a foundational understanding of FD practices by conducting a survey of national methodologies, followed by a comparative analysis across nations. This approach was geared towards discerning standard practices or identifying divergent schools of thought.

After presenting the foundational aspects of the SAS-164 model in this article, we will provide real-world illustrations to help readers better grasp its practical implications and benefits. In this context, we include a series of user cases, each representing different scenarios faced by a fictional NATO member state. The main aim of these user cases is to demonstrate how the SAS-164 proposed FD model can effectively address various complexities inherent in the wider defence planning context by showing the real-world application of the theoretical model. This narrative aims to contribute to the dissemination and propagation of the SAS-164 model's possibilities, encouraging nations to critically evaluate their FD processes and explore the recommendations outlined by the RTG.

1.1 Evaluation of Current National Procedures

The SAS-164 team conducted a comprehensive assessment of current national practices in FD. The aim was to create a foundation for understanding the strategies applied across various participating nations.

An extensive survey instrument was compiled, which comprised approximately 70 questions, a blend of closed (multiple choice) and open-ended (text) questions, divided into 12 thematic areas. All participating nations, including NATO, participated in the survey.

This found that that all participating nations, including NATO, essentially engage in the same practices:

1) There is some form of policy direction framing a vision for the future defence force;
2) A depiction of the future environment is often provided to lend context for future forces planning;
3) Analysis is undertaken to evaluate the performance of the current (or projected) force against expected requirements;
4) Mechanisms are in place to identify potential solutions to identified deficiencies;
5) There is a structured process to devise a FD plan considering resource limitations.

This understanding not only covered the specific activities each nation performed, even if not explicitly labelled as FD, but also helped to compile a broader set of activities reflecting the collective efforts of all nations. Insights gleaned from this rich pool of data acted as the groundwork for constructing a new reference model for FD.

Through reviewing the existing NATO and FVEY literature on best practices [1], [6]-[10], and expert opinion residing within the team, we identified significant factors that drive the utility of a force development model allowing us to make recommendations for areas to be considered when embarking on process improvement.

6) Existing Good Practices: FD implementation varies across nations due to resource differences, analytical capacity, governance structures, and preferred tools and techniques. Each nation has its unique context and constraints, suggesting the absence of a one-size-fits-all approach. However, good practices in Force Development do exist and should be acknowledged.
7) Relationship to NATO Defence Planning Process (NDPP): The NDPP [11] determines the capabilities needed by NATO to meet the level of ambition and apportions the capabilities across the member nations considering fair burden and reasonable challenge. NDPP has a role to harmonise national capability development across the Allies, so ideally, each national process should take into account what NATO has targeted their nation.

8) Multiple Implementations: Nations may operate a single process or multiple force development processes at different levels or scopes, such as within individual military services or at a whole-of-defence or whole-of-nation level.

9) Multiple Time Horizons: FD processes can examine one or multiple different time horizons. The integration of results and decision-making across these timeframes can be challenging.

10) New Analytical Approaches: Tools like big data and Artificial Intelligence (AI) may be able to assist in FD and decision-making. While these tools may enhance what analysts can deliver, they do not replace the need for a thorough understanding of the problem, good organisation, and coordination.

11) Concurrency Analysis: This analysis examines the effect of multiple simultaneous operations on force requirements. Whether to include this analysis depends on national policies about concurrent operations.

12) Force Design Approaches: The FD process can be used to create a force optimised for a specific operational context such as Collective Defence and High-end conflict, or a force mix that is balanced across a range of missions. This would depend on the high guidance received at the beginning of the FD process.

13) Treatment of Allies: Assumptions about allies and their capabilities, and the extent to which they can be relied upon, are crucial when assessing one's forces in an alliance or coalition context.

14) Force Development and Risk Management: FD is fundamentally a risk management activity. It identifies potential risks to policy aims associated with a future environment and leads to a portfolio of mitigation measures to address them.

These factors emphasise the need for a flexible approach that can adapt to different contexts, time horizons, and analytical approaches.

2.0 GENERAL CHARACTERISTICS OF THE MODEL

The proposed new FD model is depicted in Figure 1 and comprises fifteen interconnected boxes grouped into four major segments. To ensure simplicity, the model adopts three main principles:

1) First, the links between the boxes signify information flows, rather than processing flows, thus eliminating the need to indicate feedback loops or revision cycles. This approach allows for flexible organisation of work in activity steps, whether sequentially, iteratively, or in parallel, based on each nation's preference.

2) Second, the overarching context boxes provide relevant information that may vary from nation to nation depending on their development needs at any given stage. The diagram recognises these differences and intentionally avoids suggesting which inputs should be used and where they should be applied.

3) Lastly, it acknowledges that risk and uncertainty are inherent in all government planning processes and hence there is an acknowledgement of the need for systematic risk management without specifying distinct risk assessment procedures in the model.

The model can serve different nations' specific needs and characteristics and their FD processes by maintaining a high degree of flexibility and adaptability. As a result, the model provides a robust framework for describing or developing a FD process without prescribing a "correct" implementation method.

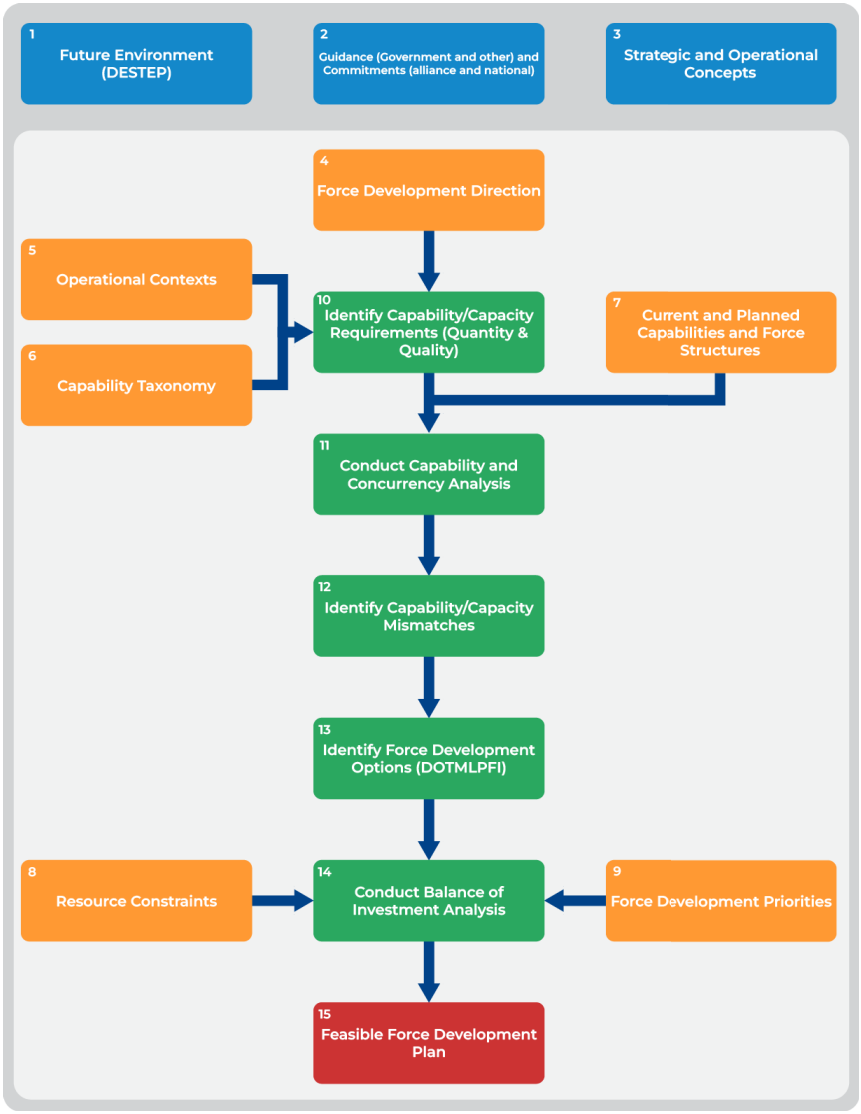

Figure 1. SAS-164 Proposed generalised force development model [1].

3.0 DETAILED DESCRIPTION OF THE MODEL

This section describes the proposed model, underlining its cardinal principles, key inputs, and anticipated outputs. A good understanding of the model's internal structure and rationale are necessary for its integration into the broader context of national security and defence planning.

The model's structure is depicted in Figure 1. The following sections systematically address the numbered boxes, which are grouped into colour-coded themes:

1) Principles & Environment: The context that shapes the FD effort resides in the figure's blue boxes (1-3. These boxes provide explanations about the general strategic environment and government guidance in which the FD process occurs.

2) Inputs: The orange boxes (4-9) represent the inputs required for the model. The model requires various data types and artefacts as inputs. These inputs can be tailored to address the unique requirements and contexts of each nation effectively.

3) Processes: The green boxes (10-14), represent the core analytical processes of the model. Through these mechanisms, the model processes the inputs and formulates meaningful insights.

4) Outputs: The red box (15), captures the fourth facet of the model, the output. Typically, this is an affordable force development plan, but many other insights will flow from the analysis steps.

3.1 Environment

Box 1 – Future Environment. A key driver of FD activities is a shared understanding of the future environment (Box 1) in which the force will be expected to operate.

The future could be perceived as a continuation of the present in terms of geography, threats etc. or could be a more complex vision of the future operating environments – or something in between. A variety of frameworks can be employed to characterise this future environment[4], dependent on national preferences.

The future environment may represent a consensus understanding, be encapsulated in a single reference document such as a "Future Operating Environment" or be distributed across multiple references.

Box 2 – Guidance & Commitments. National guidance and commitments are critical in shaping the response to the future environment. The future environment defines the external context for planning, but internal policies will set the levels of ambition for the military force. Governments typically maintain policies delineating their capabilities and commitments towards allies. For instance, nations within NATO have agreed upon targets for their forces, which should be considered in FD efforts [11].

Internal priorities or constraints within defence institutions may also affect this process, such as decisions to maintain certain capabilities or a specific division of resources across the services. This may also include a cap on the size of forces, or areas deemed 'off-limits' for the process (such as maintaining national nuclear forces). Many nations also define a level of ambition, which defines the maximum scale of effort, whether deployments should be sustained over multiple rotations, and the number of concurrent operations that should be supported.

Box 3 – Strategic and Operational Concepts. These concepts (Box 3) provide the critical context for how the force operates currently and in the future. These concepts include expected ways of working with alliance partners and how different operations (e.g., domestic, alliance, or other international) will be planned and executed. These strategic and operational concepts could form part of the guidance, especially when such concepts exist at an Alliance level[5]. However, as a minimum, FD will invariably occur within a set of shared assumptions about how the force will operate, even if these are not formally documented or disseminated.

3.2 Inputs to the Model

Box 4 – Force Development Direction. This is a pivotal input in the FD process encapsulating the particular assumptions and restrictions a FD process must incorporate. Although this direction could be derived from the overarching guidance and commitments, it might be articulated at the national level in a specific document, such as an initiating directive. The FD Direction will provide an interpretation or clarification of the external context which may lack the level of detail required for analytical process. It might also provide

[4] Examples include DIMEFIL (Diplomatic, Information, Military, Economic, Financial, Intelligence, and Law Enforcement), DESTEP (Demographic, Economic, Social, Technological, Ecological and Political), PMESII or PMESII-PT (Political, Military, Economic, Social, Information, Infrastructure, Physical environment, and Time), PEST (Political, Economic, Social, and Technological factors), and PESTLE (Political, Economic, Social, Technological, Legal, and Environmental).

[5] For example, the NATO Strategic Concept outlining the current strategic environment, core tasks and threats that the Alliance faces. It may also cover more lower-level concepts such as the NATO Warfighting Capstone Concept (NWCC) which "provides the Alliance and Allies with a 'North Star' and organising principle for warfare development for the next 20 years" and will lead to the developing of operational concepts such as the Multi-Domain Operations concept.

direction regarding the analysis's time frame(s), for instance, specifying that the analysis is to be set twenty years into the future. It could also specify governance arrangements and organisations to participate.

Box 5 – Operational Context. The process of FD should not be limited to the development of capabilities or force structures in an abstract environment[6], or to be limited to the replacement of old equipment with newer models. An operational context is essential for testing current and planned forces, especially when considering the capabilities of force packages rather than individual platforms or tactical units. Consequently, operational contexts are a key input for FD analysis. The operational contexts largely derive from the elements of the overarching context, encompassing the future operating environment, government direction, and high-level operating concepts. These contexts may be distinct artefacts developed specifically for FD or they may be distilled from existing sources developed within the defence institution for different purposes. The most common form of operational context is a planning scenario, which typically defines a crisis necessitating a military response, along with the geography, threat forces, and desired end states. Such scenarios can be designed at different scales, ranging from describing operations of global scope to individual theatres of operation and even down to tactical engagements at the unit level or below. Scenarios can be near-term predictions of current crises, fictional future conflicts involving actual countries placed within alternative geo-strategic futures, or even set in parallel worlds using fictional combatants. However, it is recognised that while planning scenarios are the most common form of operational context for FD, other examples can be used. These examples may encompass actual operational plans, contingency plans, alliance commitments, and permanent tasks.

A nation might use a mixture of planning scenarios, and other contexts, to reflect the spectrum of operations required by government policy. They can cover a whole range of mission types covering high intensity conflict against a peer opponent, through regional conflicts, counter-insurgency, counter-terrorism, disaster relief missions, peacekeeping missions and assistance to civil authorities in times of crisis, such as during a pandemic or widespread flooding.

Box 6 – Capability Taxonomy. The notion of capability, defined as the ability to create a specific outcome or effect, is pivotal in defence planning [2], [6]. This perspective prompts planning to focus on the desired capabilities or outcomes rather than simply the available assets, fostering innovative approaches and curtailing the inclination towards mere substitution of existing resources. This conceptual shift, however, necessitates a transition from concrete considerations, such as tangible assets, to more abstract constructs, like capabilities, which in turn necessitates the development and application of a structured capability taxonomy (Box 6).

A capability taxonomy is typically a hierarchical structure of primary capabilities and sub-capabilities, providing a framework to categorise and analyse potential capacities [2], [10][7]. It is worth noting that FD can be conducted without resorting to the concept of capabilities[8], thus keeping the analysis strictly within the domain of actual units and systems. While this might be a more straightforward exercise, it carries the risk of constraining the analysis to the paradigm of direct replacement, thereby potentially stifling innovative thought and exploration of new possibilities.

Box 7 – Current and Planned Capabilities and Force Structures. The FD model is an incremental one, in that it seeks to identify the changes to be made to that which already exists, or which is already planned and funded. This necessitates a comprehensive understanding of the existing military force structure and any imminent plans for its evolution. This knowledge may be captured in various forms, including but not

[6] Such as considering effectiveness against a generic threat, or even ignoring threats altogether and only considering absolute system performance.

[7] NATO uses the Capability Hierarchy for this end which was based on a review of several nations' taxonomies.

[8] For example, if the threat and operating environment is well known and there is no desire for a large scale change to current structures,

limited to organisational charts, listings of ongoing projects (such as planned procurements), and an inventory of current platforms and units.

When working with future time horizons, the planned force is the force anticipated to exist at a certain future point, considering that all current assets are maintained until their planned end of life, and that all approved projects proceed to schedule, and no additional investment decisions are made. This may not be an entirely realistic view, but it does provide a baseline for analysis. The purpose of the FD process is to identify the risks associated with current plans and to identify mitigations. The alternative is to include unfunded aspirational projects, which may be desired by stakeholders, but this will distort the process as decisions on these projects are now removed from the FD decision space.

Box 8 – Resource Constraints. FD is inevitably a constrained resource allocation problem.

These constraints can manifest in various forms but are typically reflected by financial budgets (which may comprise different types of money[9] and have different allocations in different years) and restrictions on the size of components of the armed forces (such as regular force or reserves).

These constraints shape the landscape of FD and play a pivotal role in the Balance of Investment (BoI) process (Box 14). The BoI process serves as a strategic tool to support decision-making, aiming to identify the optimal balance between costs, risks, and benefits in the context of finite resources. Without these constraints to frame the BoI process, it could yield solutions that, while theoretically optimal, may be unfeasible[10]. The presence of constraints, therefore, guides the process towards solutions that are not only optimal but also realistically achievable.

Box 9 – Force Development Priorities. While resource constraints are covered under Box 8, other national priorities and/or policies will further constrain or shape the Balance of Investment decisions. These factors will invariably play a role in shaping the selection of projects. Defence industrial policies, for instance, may mandate procuring certain types of equipment from national businesses. Similarly, political commitments to engage in international collaborative projects can also dictate the trajectory of force development.

Additionally, policies may determine relative priorities to be assigned to different mission types which must be reflected in Balance of Investment decisions. For example, capability deficiencies identified in the defence of national territory may be given a higher weighting than deficiencies in capabilities to undertake out of area expeditionary operations. This complexity, which is inherent in FD, underscores the necessity for a careful, comprehensive approach to resource allocation decisions.

3.3 Processes

The five process steps outlined in this section form the critical backbone of the FD model. Each is presented in broad strokes due to the natural variance that arises from differing national implementations. It is important to note that FD typically engages in a complex dance between the tangible (actual assets) and the abstract (capabilities).

Generally, the process will commence and conclude with tangible factors (for instance, existing units and platforms), leverage the more abstract concept of capability (i.e., the ability to generate effect) while determining the preferred direction of evolution for the force, before circling back to the tangible elements at the conclusion (for instance, tangible procurement projects and future force structures). The model

[9] Such as capital, running cost and personnel budgets.

[10] For example, proposing to meet government ambitions through a series of major projects that would all have an expenditure peak in the same years, making them impossible to program within projected annual budget allocations.

description in this section aims to maintain neutrality on how and where this is done, thereby allowing for a flexible framework adaptable to various national contexts and needs.

Box 10 – Identification of Capability and Capacity Requirements. Identifying capability and capacity requirements constitutes a critical phase in the FD process. This step is responsible for defining the performance standards that the future force is expected to meet. The defined standards encompass three fundamental dimensions - the quality, quantity, and readiness of the future force. Each of these dimensions represents a different aspect of force performance, and together, they encapsulate a holistic view of the force's operational potential.

The quality dimension indicates the force's capability to deliver required effects and so achieve mission objectives. This can be done at a whole of force level or at the unit/platform level. The qualitative requirements can also include compliance with standards such as NATO interoperability standards.

The quantity dimension refers to the volume of capability deliverables, essentially, the size of the force and the scale at which it can operate. This includes the number of units and equipment that the force can deploy.

The readiness dimension relates to the speed at which units can mobilise for operations. This involves assessing the force's preparedness levels, including the availability and condition of equipment, the training and manning status of personnel, and the logistical and infrastructural support necessary for rapid deployment. Readiness, thus, signifies the force's responsiveness to emergent operational demands.

Determining these performance requirements is multifaceted and may involve numerous individual sub-processes. In certain instances, the dimensions of quantity and quality are considered separately, each constituting a distinct area of analysis. In other circumstances, they are treated concurrently, with the understanding that they are interconnected and influence each other.

The sources from which these requirements emerge are diverse. Most of the quality requirements are likely to derive from analysis of the operational contexts defined in Box 5. The quantity and readiness requirements may come for a combination of the study of operational contexts, possibly in combination with direction specified in Box 4. This would be the case when concurrency policies drive requirements for numbers of force elements.

The capability taxonomy (Box 6) provides a structured framework for organising and categorising requirements, enabling a systematic approach to setting capability and capacity targets. This aids in ensuring that the requirements defined are comprehensive, covering all essential aspects of force performance, and systematic, ensuring that no critical area is overlooked.

Box 11 – Conduct Capability and Concurrency Analysis. The process of FD necessitates a detailed exploration of capabilities and concurrency within the context of military operations. This stage of the FD process involves a detailed examination of the planned force's ability to meet the requirements identified in the preceding step. In essence, this step is about determining how well the demand signal – defined in Box 10 – can be met by the supply signal – defined by the attributes of the planned force captured in Box 7.

This capability evaluation asks for each capability, "Can our current and future assets deliver this capability to the necessary standard?" In tandem with the capability analysis, a concurrency analysis may be undertaken. This is an assessment of the force's readiness to field the suitable types and quantities of units at the right time across a range of concurrent and potentially sustained operations. Essentially, it probes whether the force can meet operational demands concurrently, an essential component of any modern military organisation [12].

These analyses can be conducted separately or combined, depending on the analytical methods and tools available. Comprehensive campaign or global-level models or simulations can be employed to integrate these two analyses, providing a holistic perspective on the force's readiness and capability to meet its operational goals. More typically, different tools will be employed, and the results integrated to provide a comprehensive assessment.

Box 12 – Identify Capability and Capacity Mismatches. The next step is the identification of potential mismatches or disparities within the force's capacity or capability. This process stage illuminates any deficiencies or surplus in the force at the time horizon(s) for which analysis is being undertaken, informed by the insights gleaned from the analyses described under Box 11.

These disparities could manifest in various forms, each with its unique challenges and implications for the force's overall effectiveness. Structural shortfalls may be identified, for instance, if our fleet of state-of-the-art vessels is inadequate to provide the coverage we need across multiple operational theatres. On the other hand, capability shortfalls are deficiencies where our forces lack a satisfactory means to counter a specific threat within a given scenario.

This step needs to identify shortfalls and not leap to solutions, which will be explored in the next step (Box 13). This step is essentially a form of risk identification as we seek to area where requirements cannot be met. Note that these risks could be expressed at multiple levels, such as tactical risks to the ability of units to defend themselves against certain threats, or political risks that required contributions to alliance operations may not be available.

In some instances, the mismatches indicate over-provision, like a surplus of a particular capacity where the operational requirement is significantly less. Whatever its cause, a surplus can imply that precious resources are being unnecessarily tied up and not available to address shortfalls elsewhere.

These disparities, once identified, are typically synthesised and reported to senior leadership, often in the form of a risk assessment. This process effectively audits the force's developmental trajectory, providing a critical health check on its evolution. Senior leadership may take this opportunity to guide and direct priorities for the subsequent risk mitigation steps.

Box 13 – Identify Force Development options. Identifying FD options, as outlined in Box 13, is critical in bridging the gap between the desired future force and the currently planned force. At this step potential options for changing the planned force are developed. These options may be constrained by guidelines set out in Box 4, or by leadership direction following a review of the output from Box 12. This process can take different forms depending on the strategic priorities, resource capabilities, and national context.

NATO considers capabilities as being delivered by bringing together contributions from all the DOTMLPFI[11][12] components. Therefore, FD options can encompass any, or all, of these components. Some nations may place more emphasis on capital investment projects, leading to options primarily centred around material procurement.

Considering options that integrate multiple DOTMLPFI components ensures that opportunities for transformative changes are noticed and become integral to the development options. For instance, adjusting training procedures and doctrine or improving interoperability could address specific capability gaps without the need for significant capital expenditure.

[11] Doctrine, Organisation, Training, Materiel, Logistics, Personnel, Interoperability.

[12] Other constructs can also be used such as the Canadian PRICIE or British DLoDs.

For options to be considered further in the balance of investment step (covered in box 14) estimates of implementation costs are required. Different nations employ varying approaches to option costing, such as simple acquisition costs, through-life costs, or equivalent annual costs of entire force elements. The number of personnel associated with an option may also be considered a form of 'cost', especially where caps exist on these numbers.

FD options can encompass investment options (acquiring new assets), sustainment options (allocating resources to maintain existing assets), and divestment options (cutting certain aspects to free up resources). It is worth noting that the SAS-164 study found that while all national processes account for investment options, not all consider divestments.

Box 14 – Conduct Balance of Investment (BoI) analysis. This analysis is the critical cornerstone of FD. This process facilitates the development of a portfolio of diverse FD options that can be realistically implemented.

The primary goal of this portfolio is to mitigate the risk factors previously identified (as discussed in Box 12) to the greatest extent possible while simultaneously complying with the resource constraints in place, as highlighted in Box 7. Additionally, the selection process within the BoI analysis is steered mainly by the FD priorities that the organisation's senior leadership has identified (refer to Box 8).

The methodological approaches to conducting BoI analysis can vary substantially across nations, reflecting the diversity in strategic postures and analytical capabilities. For example, some nations may opt for an approach that leans heavily on the judgement of subject-matter experts, depending on these experts' extensive knowledge and experience, capitalising on their expertise to shape the analysis. On the other hand, other nations may adopt more sophisticated mathematical techniques to automate certain parts of the process. These mathematical models can increase the speed and level of rigour of the analysis. These mathematical models can increase the speed and level of rigour of the analysis but can add complexity which can be difficult to understand for some decision makers.

In certain nations, the BoI process is more iterative, characterised by repeated interaction and collaboration between decision-makers and planners. This collaborative process allows for the refinement of portfolios, ensuring that the final result is the product of comprehensive deliberation and fine-tuning. Conversely, in other nations, the process may be more linear and hierarchical, where one or more proposed solutions are submitted up the command chain for decision-making and approval. This system ensures a clear flow of information and decision-making authority, at a cost in creative engagement by senior leadership.

At its core, the BoI analysis is a risk mitigation exercise. It aims to identify potential future risks associated with the planned force (as outlined in Box 12) and subsequently highlights potential mitigations to these risks (as discussed in Box 13). The BoI analysis then carefully selects a set of these proposed mitigations, with a keen focus on maximising risk mitigation while remaining within the bounds of institutional direction and resource constraints.

3.4 Outputs

Box 15 – Feasible Force Development Plan. The previous BoI analysis step yields a portfolio of FD options. These options collectively represent the most cost-effective strategy for mitigating the previously identified risks (to the extent possible) associated with the planned capabilities and force structure. However, transitioning from this portfolio to a feasible implementation plan may necessitate further elaboration and refinement, depending upon the organisational relationships involved. Typically, the lower the level of detail in the options considered, the more work is needed to develop an implementation plan. This process often involves collaboration with multiple functional organisations, underscoring the interconnected nature of FD planning with other planning activities within the defence institutions, the government or alliance wide.

National capability development organisations are likely to play a pivotal role in program implementation and should have been engaged in option identification in box 13. Depending upon the approach taken they may also be participants in the BoI process. Their participation is essential for successfully transitioning the BoI output into implementation. The nature of the plan itself is contingent on the nation's business processes and governance model. For example, some nations choose to encapsulate the plan in a formal, published document, while others prefer a less structured approach.

It is important to emphasise that the final plan must be feasible and realistic, so should take account of not only financial budgets, but also the institution's capacity and willingness to implement change.

The final step in the process is disseminating the plan to the organisations responsible for its implementation following endorsement by the appropriate level of leadership. Once endorsed and disseminated, the FD plan redefines the Planned Capabilities and Force Structure for FD (Box 7), providing a new baseline for further iterations of the FD process.

4.0 USER CASES

In the following section, a series of user cases are described to show how the SAS-164 model can be used to solve practical, real-world defence planning problems. They illustrate how the SAS 164 model can be used to deal with the complex and ever-changing challenges that nations face today. The user cases are set in the context of a fictitious NATO member nation and do not directly reflect any nation's real force development challenges.

4.1 User Case 1: Planning the Force for the Future

It is anticipated that in approximately 20 years, a significant proportion of a nation's military assets will have reached their end of life. The emergence of new technologies presents a pressing need to develop a comprehensive and future-proof national force development plan.

1) New Technological Innovations: The emergence of new technologies necessitates revisions to the Future Environment Description (Box 1) and the Strategic and Operational Concepts (Box 3). Technological advancements may bring about novel strategic challenges, possibly giving rise to new Operational Contexts (Box 5) for consideration.
2) Governmental Policies: The direction from the government (Box 2) may change in response to the evolving circumstances. The government's altered stance would be integral to shaping the future force development plan.
3) Asset Lifecycle: With the shifting planning horizon, many existing assets will move towards the end of their operational lifetime. This transition necessitates a thorough review of the Current and Planned Capabilities and Force Structures (Box 7). The key objective is not just a like-for-like replacement but devising an alternative plan to bridge the looming capability gaps with more effective and efficient solutions.
4) Capability Gap Analysis: An in-depth Capability and Concurrency Analysis (Box 11) is expected to highlight these capability gaps (Box 12), mainly in this user case due to planned decommissioning which may be further influenced by changes in the requirements (Box 10).
5) Force Development Options: This will identify Options (Box 13) that can effectively fill these gaps. A holistic and creative perspective is vital at this stage, looking beyond mere replacement to considering potential enhancements or alternatives that leverage the strength of the current force structure and emerging technologies (but being aware of technology readiness levels and procurement lead times).

6) Investment Analysis and Implementation: Following this, a BoI Analysis (Box 14) must be conducted, aligning the chosen options with available resources (Box 8) and Force Development Priorities (Box 9). The output of this stage is a Feasible Force Development Plan (Box 15), which should strike a balance between affordability, capability, and strategic alignment.

This user case illustrates how the planning process aids in creating a feasible force development plan that caters to the dynamic technological landscape and the lifecycle of existing assets. With the active involvement of all the necessary stakeholders and keeping in view the strategic priorities, this model provides a robust mechanism to prepare for the future.

4.2 User Case 2: Building Partner Capacity

In an evolving geopolitical landscape, the government has expressed an interest in augmenting the ability to assist regional non-NATO allies. However, the defence budget is not being increased to support this initiative. What are the potential ramifications of this policy for our forces?

1) New Government Commitment: The government's directive to bolster partner capacity emerges as a new commitment (Box 2). This commitment must be understood and incorporated into the strategic landscape, even without an immediate budget increase.
2) Operational Contexts: This shift prompts a review and likely update of Operational Contexts (Box 5). The new commitment could mean increased joint operations, training, or even the sharing of assets with non-NATO allies, which could affect our forces' capacity and capability.
3) Capability/Capacity Analysis: With the additional commitment and no budget increase, a Capability and Concurrency Analysis (Box 11) is required to understand the impact on current operations and whether the current force structure can handle these new requirements (Box 10). This analysis will likely highlight capacity gaps (Box 12), showing where our forces may be overstretched due to this new directive.
4) Force Development Options: To address these gaps, Force Development Options (Box 13) must be formulated. This stage might involve exploring creative solutions like resource sharing, training partnerships, or even capability exchanges with non-NATO allies, to meet the new operational contexts without additional expenditure.
5) BoI Analysis: This will (Box 14) play a crucial role here, tasked with the challenge of optimally allocating the existing resources (Box 8) to the updated force development priorities (Box 9), to generate a feasible and sustainable Force Development Plan (Box 15).

This user case illustrates how the process model can tackle challenges posed by changes in strategic commitments without a corresponding increase in budget. By thoroughly analysing and creatively addressing the identified capacity gaps, the model ensures that new commitments can be handled in a resource-efficient manner.

4.3 User Case 3: New Alliance Concepts

NATO has introduced a new future operating concept, labelled "NATO Future Force Model 2.0" or "NFFM 2.0". This change necessitates adjustments to a nation's forces to align with this new strategy. How should the force development plan respond to this shift?

1) Updated Strategic and Operational Concepts: NATO's new 'NFFM 2.0' concept is integrated into our Strategic and Operational Concepts (Box 3). This updated concept may require changes in operational methods, technological utilisation, or capability and capacity allocations.

2) Revised Operational Contexts: Given the new concept, there will be alterations in the Operational Contexts (Box 5) of our forces. This could result in different expectations regarding force employment, engagement strategies, and geographical deployment.

3) New Capability/Capacity Requirements: The change in strategic and operational concepts will necessitate re-evaluating Capability/Capacity Requirements (Box 10). Our forces must be capable of executing operations as per the new 'NFFM 2.0' concept, highlighting the need to adapt capabilities or capacities to meet this standard.

4) Capability and Concurrency Analysis: A fresh Capability and Concurrency Analysis (Box 11) is executed, providing insights into possible capability/capacity gaps (Box 12) that arise from the adjustments needed to accommodate 'NFFM 2.0'.

5) Force Development Options: Based on the identified gaps, multiple Force Development Options (Box 13) are explored. These might involve changes in training, acquisition of new technologies, or modifications in force structures, all aiming to ensure compatibility with 'NFFM 2.0'.

6) Balance of Investment Analysis: Once Force Development Options are proposed, a Balance of Investment Analysis (Box 14) is carried out, considering the available Resource Constraints (Box 8) and Force Development Priorities (Box 9). This analysis proposes an economically viable plan to adapt to 'NFFM 2.0'.

This user case underscores how the process model can effectively respond to changes in alliance concepts, ensuring our forces remain aligned with NATO's evolving operational strategies. The process model enables an agile approach, making certain that changes in alliance concepts are incorporated and addressed in a financially sustainable manner.

4.4 User Case 4: Out of Area Threats

Strategic threats often evolve beyond traditional geographical borders in a rapidly changing global environment. As such, a developing regional power bordering our overseas territory has commenced signalling a new expansionist vision. The following scenario describes how this paradigm shift influences establishment of a national force structure and corresponding resource allocations.

1) New Government Commitment and Requirement: In response to a comprehensive regional security analysis, the government directs the establishment of a more substantial, permanent military presence in an overseas territory. This new commitment, materialising in Box 2 of our model, in this example calls for an infantry battalion, a reconnaissance company, and a utility helicopter detachment to be deployed. Though the government's requirement centres on maintaining this presence rather than addressing a specific threat, it creates a new operational context in Box 5, leading to a new capacity demand in Box 10.

2) Operational Context and Capacity Demand: Assumptions regarding baseline force development analyses allow us to make informed decisions based on established operational contexts (Box 5) and planned future force (Box 7). The government's request adds an extra layer to the existing operational context, necessitating a more comprehensive capacity analysis than a conventional capability analysis.

3) Capacity Analysis and Gap Identification: Capacity analysis, undertaken in Box 11, enables us to assess the availability probability of the force element types in this new commitment. Using different tools and techniques, such as concurrency and readiness, this analysis provides insights into our ability to meet demands with existing resources. For example, there may be a policy requirement for 80% confidence that required force elements will be available when needed. Any discrepancy between this policy requirement and projected availability will constitute a capacity gap, signalling potential risks to the national force structure.

4) Addressing Shortfalls and Force Development Options: A capacity gap in any of the three force element types triggers an exploration of force structure augmentation options (Box 13). This phase could also encompass infrastructural development considerations, like new base establishments. The data generated may warrant a rerun of the capacity analysis to determine the scope of proposed options.

5) Affordability and Investment Balance: The developed options and their affordability are examined in the BoI stage (Box 14). If the FD plan must operate within the confines of existing resource limits (Box 8), potential offsetting programme cuts may be devised, sending the analysis back to boxes 11, 12, and 13 for reassessment.

6) Finalising the Plan and Leadership Priorities: The final selection of new program elements and any offsetting cuts will abide by the leadership's established priorities (Box 9), guiding the revised plan's formulation (Box 15).

By adhering to the model's information flow, it's essential to remember that this process isn't a strict sequence of events, but a flexible, adaptable mechanism that allows for feedback loops and revisions when necessary. Therefore, this iterative process ultimately assists in creating a robust and agile plan that can effectively address and adapt to evolving global threats.

4.5 User Case 5: Increased Commitment to NATO – Implications for National Force Structure

Understanding Changes: In the dynamic landscape of international alliances, such as NATO, new requirements can suddenly emerge, reshaping national defence strategies. In this user case, the NATO Defence Planning Process (NDPP) necessitates that member nations contribute more to the collective defence pool. This shift will have consequences for the national force structure.

1) The Emergence of New Commitments (Box 2): Due to increased NATO requirements, which have led to new NATO capability targets which require consideration in this nation's planning process. These obligations could range from more additional combat units requested, an increase in logistical support, increased training of pilots to meet NATO force standards, all based on NATO's requirements. This fundamental shift is not in line with this nation's current operational context, necessitating a reassessment of capacity (Box 5).

2) Capacity Analysis (Box 11): With the increase of commitments, there is a need to revisit the demands on both capacity and capability. Undertaking a comprehensive capacity analysis, using tools and techniques described in detail in the SAS-164 report's Annex D, we can determine whether our existing forces can meet these additional demands. Success in this analysis is measured by our ability to identify how we fulfil both our national and NATO requirements.

3) Identifying Capacity Gaps (Box 11): We then draw a comparison between our policy requirements, such as a specific confidence level in force availability, and the projected availability from our analysis. Should our current force structure prove insufficient in meeting the heightened NATO demands, the model guides us towards exploring options to augment our force structure (Box 13). These options could span from increasing or forces which are offered to NATO as being NATO deployable, upgrading training or procuring additional force elements (both personnel and equipment).

4) Affordability (Box 14): Before we implement these adjustments to our force structure, we must balance them against affordability. If our force development plan is restricted by existing budgetary constraints, we might need to develop offsetting program cuts. This would necessitate a return to Boxes 11, 12, and 13, re-evaluating the projected demands and the feasible options for capacity enhancement.

5) Leadership Priorities and Revised Plan (Box 15): Finally, we select new program elements and any compensatory cuts according to leadership priorities. A revised plan will be developed that aligns with these priorities, considering the increased NATO commitments and the consequential implications for our national force structure.

This user case underscores the flexibility and applicability of our force development model in response to evolving international commitments and alliance requirements. By systematically following this process, we can balance our national defence objectives with our international commitments, ensuring a resilient and adaptable force structure.

4.6 User Case 6: Reviewing National Resilience

In this scenario, the government has requested a review of national resilience as defined under NATO Article 3. This task is broader than the traditional scope of the defence department, crossing into the domains of civil contingency planning, crisis management, and infrastructure protection, only to name a few. This simplified description of a comprehensive national defence planning process illustrates the flexibility of the model to be applied in various national contexts. Despite this, the principles of the national force development model can be leveraged to guide the analysis.

1) Stage 1: Identifying the New Requirement: The review request from the government represents a new strategic directive, reflected in Box 2 (Government's Vision and Strategic Directives). Here, the focus is on assessing the capacity and capabilities of various national resources to respond to crises and maintain function, rather than on specific military capabilities.
2) Stage 2: Defining the Operational Context: The review translates into a new operational context in Box 5 (Strategic and Operational Concepts), which includes not just military but also non-military factors. This may involve engaging with non-traditional stakeholders during the FD process. It calls for a thorough understanding of the country's critical infrastructure, emergency response capacities, supply chain robustness, and more, all of which form part of the national resilience picture.
3) Stage 3: Establishing Capacity Requirements: In Box 10 (Capability and Capacity Requirements), the national resilience review is interpreted in terms of the capacities required to maintain key functions in times of crisis. This could include, for example, the capacity of health services to handle a large-scale emergency or the resilience of energy infrastructures to disruption.
4) Stage 4: Analysing the Current State and Projected Gaps: The Capability and Concurrency Analysis (Box 11) will evaluate how well the current and planned capacities (Box 7) meet the defined requirements. If discrepancies are identified - areas where the nation's resilience may fall short - these will appear as gaps in Box 12 (Capability and Capacity Gaps).
5) Stage 5: Exploring Development Options: The results of the analysis will then inform the identification of Force Development Options in Box 13. For a national resilience review, this could involve a variety of initiatives, ranging from infrastructure upgrades and reinforcement of supply chains to enhanced training programs for emergency responders.
6) Stage 6: Balancing Investment: The options identified are subject to a BoI Analysis in Box 14, considering Resource Constraints (Box 8) and FD Priorities (Box 9). The aim is to balance the need for improved national resilience with available resources, prioritising the most impactful and feasible measures.
7) Stage 7: Updating the Force Development Plan: Based on this analysis and the government's priorities, a revised force development plan is formulated (Box 15). This plan reflects the necessary adjustments and enhancements identified to improve national resilience under the scope of NATO Article 3.

The broader remit of the national resilience review exemplifies how the force development model can be applied beyond traditional military planning, encompassing broader elements of security and resilience in a holistic manner.

5.0 CONCLUSIONS

5.1 Summary of Key Findings

This paper encapsulates, the principal findings from the SAS-164 Research Task Group (RTG) report [1], focusing on investigating Force Development (FD) in the context of the 21st century challenges. The analysis demonstrated that the SAS-164 model provides a structured framework for understanding and addressing capacity and capability gaps within a nation's military force, playing an instrumental role in facilitating informed decision-making. Central to this understanding is the model's adaptability to different operational contexts and the nuanced interplay between strategic, financial, and political factors, aligning with the RTG research question: "Is the TTCP process model still fit for purpose given 21st century challenges?"

5.2 Practical Implications

The model's flexibility has been illustrated through six distinct user cases. From managing baseline situations involving aging assets and emergent technologies, to addressing out-of-area threats, building partner capacity, and meeting increased NATO demands, the SAS-164 model has shown potential. It offers the flexibility to reassess and recalibrate according to shifting circumstances, aligning with the evolving security landscape. This adaptability is a core strength, showcasing the model's potential implications in the evolving security landscape.

Moreover, the model's iterative nature allows for continuous refinement of force structures, adjusting them to fit the constraints of budgetary restrictions or changes in strategic priorities. The user cases demonstrate how the model can be practically applied to manage various scenarios, providing invaluable insight for future strategic decision-making. A notable recommendation arising from the RTG is the establishment of a community of interest to foster knowledge and expertise sharing among alliance members in the FD domain, thereby nurturing a cooperative approach towards addressing the evolving challenges of FD and avoiding national staffs from developing processes in a vacuum.

5.3 Limitations and Future Research

As with any model, the SAS-164 proposed model is not without its limitations. It primarily focuses on military force planning, which, although significant, is just one part of a country's broader national security agenda. While it provides a solid framework for military force planning, the model could benefit from further refinement to accommodate a more comprehensive view of national security, including aspects of economic, societal, and environmental resilience. This will also require engaging with range of different stakeholders and SME skills which, although not impossible, may impact on the analytical teams and models used to support FD.

The efficacy of any implementation of the model is potentially limited by the quality and accuracy of the data fed into it, and the tools used to conduct analyses. Weaknesses here may skew the outcomes, leading to suboptimal planning decisions. However, such shortcomings are not shortcomings of the model itself, but of the implementation. Future enabling research could explore methods of improving data collection and analysis, as well as methods of decision making in the face of high levels of uncertainty to enhance the model's utility. However, it must also be recognised that different defence institutions will implement the model differently at the detail level to reflect their institutional cultures, organisations, and levels of resource. That such variation is possible is a positive feature of the SAS-164 model, and not a weakness.

Lastly, while the model considers policy requirements and strategic priorities, it does not explicitly address political factors, which can significantly influence force planning decisions. Future iterations of the model could consider incorporating a mechanism to account for these factors, aligning with the discussion on new cross-domain concepts and the changing nature of threats, as discussed in the introduction.

In conclusion, the SAS-164 model provides a valuable framework for force development amidst the complex and rapidly evolving security environment of the 21st century. This has been achieved through synthesising elements from distinct national force planning processes that are rarely shared between nations and never appear within the public domain. This led the RTG to conclude that there is a common fundamental architecture that is being followed and which is distilled in the SAS-164 report and summarised here. Despite any limitations, the model's strengths lie in its flexibility, adaptability, and potential for customization. The Task Group's final recommendation underscores the establishment of a community of interest among alliance members in the FD domain, aiming to foster a continuous exchange of knowledge and expertise. By recognizing these strengths, understanding its limitations, and committing to its effective implementation, the SAS-164 proposed model holds significant potential to enhance and standardize national and international military planning efforts, thereby encouraging nations and stakeholders to critically evaluate and potentially enhance their FD processes.

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