Multilevel Adaptive Architecture for Strategic Defence Planning

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Abstract

Strategy and defence planning for national security must be fit for purpose and future-proof if state polities are to meet the challenges and uncertainties of the 2020s and beyond. This paper proposes that the design of a multilevel architecture and an adaptive approach for defence planning can be usefully informed by complex adaptive systems thinking. Defence planning is the range of activities that constitute preparations for the defence of a state in an inherently uncertain future. Developing a durable defence planning system requires institutions and an architecture that are fundamentally contextual, visionary, reflexive, integrative, functional, multilevel and adaptive. A complex adaptive systems perspective serves as a foundation for the development of an adaptive planning approach; the purpose of which would be to transform defence planning into an integrated process that is responsive to the rapidly changing strategic landscape. Significantly, as a way of thinking a strategic adaptive framework complements rather than replaces existing defence planning structures and processes. Achieving effective defence planning requires a paradigm shift in the pattern of thinking: away from the view that systems are largely predictable and controllable, toward a view that recognises their intrinsic complexity and dynamics, and that addresses deep uncertainties.

Keywords

defence planning, complex adaptive systems, adaptive planning, multilevel, uncertainty, strategic, systems thinking

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Introduction

> Strategy is a system of expedients; it is more than a mere scholarly discipline. It is the translation of knowledge to practical life, the improvement of the original leading thought in accordance with continually changing situations. It is the art of acting under the pressure of the most difficult conditions.
>
> (von Moltke 1871, in Hughes 1993: 124)

Regardless of how we define strategy, Chief of the Prussian General Staff Field Marshal Helmuth von Moltke the Elder's 1871 description recognises that strategy is a system capable of learning and adapting in order to fit changing conditions. Professor of war studies Lawrence Freedman (2013: x) describes strategy as a process of thinking about actions in advance, in light of our goals and capacities. Strategy is about maintaining a balance between the desired objectives (ends) and the use of realistic methods (ways) and available resources (means) to achieve them. Freedman adds that a strategy is much more than a plan. A plan assumes a sequence of events that allows us to move in an orderly way with confidence from one state of affairs to another; whereas strategy 'is required when others might frustrate one's plans because they have different and possibly opposing interests and concerns' (Freedman 2013: xi). In Freedman's view, strategy is necessarily adaptive due to the inherent unpredictability of human affairs. The process of moving toward a desired end state evolves through a series of intermediary states, each one different to what was anticipated at the start. This requires a reappraisal and modification of the original strategy, including the ultimate objectives themselves (Freedman 2013: xi).

Of course, the term 'strategy' means different things in different contexts. It is generally used to refer to what is essential in the long term rather than less important in the short term, to address causes rather than symptoms, 'to see woods rather than trees', as Freedman puts it (2013: ix). There is no agreed-upon definition of strategy. Nevertheless, it is useful at the outset to have a clear understanding of what strategy is and how it relates to policy, planning and management.

According to the United Kingdom (UK) Defence Doctrine (Ministry of Defence 2014: 7), policy articulates a choice leading to a course of action proposed or adopted by a government in pursuit of political outcomes and objectives. Policy is a statement of intent, or a commitment to act. Whereas strategy 'is creating and orchestrating the instruments[1] of [national] power in support of long-term policy objectives' (Ministry of Defence 2014: 7). In other words, policy and strategy are interdependent. 'Policy only works if there is a credible strategy to deliver it and strategy demands an achievable policy end-state' (Ministry of Defence 2014: 8). Strategy supports policy and decision making at the strategic level, which the in the UK Defence Doctrine is defined as 'the level at which national resources are allocated to achieve the government's policy goals (set against a backdrop of both national and international imperatives)' (Ministry of Defence 2014: 20).[2]

Strategy is the process of balancing methods and resources in support of achieving policy objectives. Planning is the process of determining in advance what objectives should be achieved and how. That is, achieved by what approaches (alternative courses of action), when (the timing of intended actions), by whom (which actors and organisations), by what methods, tactics, operations and strategies, at what cost in terms of resources (political will, public support, funding, materiel, personnel and so forth), and through what institutions (rules and arrangements)? Planning also anticipates changes, problems and successes. To this we must add the monitoring of implementation actions, evaluation of results and the necessary management feedbacks that modify not only the plan but also the planning process itself. Like strategy, planning is about learning and adapting; it is an iterative and reflexive process.

In defence and other contexts, planning is a function of the overall management process. It provides a basis for other management functions, including organising, coordinating, staffing, leading and directing, and monitoring and controlling the activities of the organisation and the use of available resources to reach stated goals (Stojkovic and Dahl 2007: 8; Ratchev 2009: 24). In defence organisations, management is situated between the formulation of defence policy at the highest levels of command and government, and actual command and control of the military forces and civil defence (Bucur-Marcu 2009: 5; Holmes and McConville 2011: xi). For Hari Bucur-Marcu (2009: 4), a former defence planner with the Romanian General Staff, the notion of defence management encapsulates the idea that defence organisations need to turn defence policies into practice; in doing so, they need to develop appropriate and sustainable planning mechanisms, support systems and infrastructure. It follows that defence planning is the foundation for decision making in defence organisations, an integral component of defence policy making and the core defence management process (Tagarev 2009: 48).

[1] The UK Defence Doctrine considers these three instruments of power to be diplomatic, economic and military, underpinned by information.

[2] NATO defines strategic level as 'The level at which a nation or group of nations determines national or multinational security objectives and deploys national, including military, resources to achieve them' (NATO 2017: LEX–8).

Strategy and defence planning must be fit for purpose and future-proof if state polities[3] are to meet the challenges and uncertainties of the 2020s and beyond. This paper proposes that the design of a multilevel framework and adaptive approach for strategic defence planning can be guided by complex adaptive systems thinking. Following this introduction, in order to understand the *problématique* or complex of issues associated with defence planning, the paper considers the nature and purpose of defence planning in the context of a state polity; the inherent uncertainty and seemingly unsolvable or 'wicked' problems that characterise defence planning; the types of shocks defence planning must deal with; and the strategic levels and feedbacks that provide the context for the design of a multilevel framework for defence planning. Next, the functions of such a framework, its design and key architectural elements are described. The paper then proposes that the design of architecture for defence planning can be usefully informed by systems thinking and a complex adaptive systems perspective. Subsequently, it suggests an adaptive planning approach as a framework for strategic defence planning: a framework that complements rather than replaces existing defence planning structures and processes. Finally, the conclusion is presented as a basis for further discussions regarding the design and development of adaptive defence planning. First, what precisely is 'defence planning'?

Defence Planning

According to the strategic thinker Colin Gray (2014: 4), defence planning is the range of activities that constitute purposeful preparations for the defence of a polity in the future. All polities are obliged to plan, that is, make systematic provision for their security and defence in a future that probably will contain dangers. As Gray states, defence choices have to be applied 'in support of ideas about a future quantity and quality of a national security that always contains much more than a military component' (p. 5). Defence planning, while predominantly focused on the military, also includes non-military thought and activities. In Gray's view, defence planning relates to and covers the following activities, which need to be considered as continuous processes: preparation of military advice relevant to the feasibility of options for political choice as policy; selection and design of grand and military strategies; design, making and administration of military programmes; preparation of military plans; coordination with complementary social, economic and political/diplomatic programmes and activities; gathering and assessment of intelligence bearing on possible risks and threats to the polity; and cooperation with allies and co-belligerents, if not necessarily friends (Gray 2014: 4).

Todor Tagarev (2009: 48), a former Minister of Defence of Bulgaria, considers that the purpose of defence planning, particularly long-term defence planning, is to define the means, including the future force structure, that would allow defence institutions to deal

[3] In this paper, the terms 'polity' and 'polities' are used in the sense of a coherent, politically-organised structure with a distinct identity, regardless of the context-specific form of governance (e.g. self, collaborative or hierarchical), institutional arrangements, and interactions between the governing system and the system-to-be-governed (Kooiman et al. 2008: 3-9). According to Ferguson and Mansbach (1996), 'A polity (or political authority) has a distinct identity; a capacity to mobilize persons and their resources for political purposes, that is, for value satisfaction; and a degree of institutionalization and hierarchy (leaders and constituents)' (p. 34). There are many types of polities, including state (e.g. Ireland) or non-state (e.g. Islamic State), multilevel (e.g. the European Union) and multilateral (e.g. NATO).

effectively with likely future challenges. In Tagarev's view, defence planning encompasses the main planning disciplines of force planning, armaments, logistics, command, control and communications (C3), resource planning, civil-military emergency planning and, in some cases, nuclear planning. Force planning, which deals with the creation and maintenance of military capabilities (U.S. Department of Defense 2011), is considered a central process that synchronises all other planning disciplines (Tagarev 2009: 49). Other closely related disciplines include air defence planning, standardisation, intelligence, operational planning and force generation (Tagarev 2009: 48).

There is a strong temporal dimension to defence planning. According to Tagarev (2009: 49-52), in most mature defence management systems it is possible to distinguish three defence planning horizons and their respective processes. First, the long-term planning horizon of approximately 10-15 years or more for which planners attempt to foresee defence requirements by analysing trends in the evolution of the security environment; trends including threats and challenges, the role of alliances and their policies, security and defence strategies, and emerging technologies. Second, long-term defence planning guides the medium-term planning or programming process, which has a horizon of approximately four to eight years. The main purpose of medium-term planning is to guarantee that the actual defence management activities (e.g., reorganisation, recruitment, training, procurement and spending) serve to achieve defence policy objectives and develop the future force structure and capabilities. Third, short-term planning serves to detail the first one or two years of the medium-term plan or programme.[4] However, there is no universally accepted time period associated with long-term defence planning (Stojkovic and Dahl 2007: 10).

In their examination of long-term defence planning, Stojkovic and Dahl (2007: 11) observe that short-term views tend to dominate the defence debate. Although strategic situations change rapidly, the building of defence capabilities and expertise take time. Therefore, all defence planning at the strategic level must take the long-term view. Furthermore, as Gray (2014) points out, defence planners and their political leaderships are tasked with providing security and defence in the short-term in a manner that avoids promoting insecurity in the medium- and long-term: 'It is a persisting, unavoidable truth about national security and defence planning that security in the future is always incalculably hostage to decisions made today for today and the near-term' (p. 7). Clearly, a balance must be struck between short-termism and long-termism in any defence planning framework.

Modern defence planning frameworks and processes must be capable of addressing the multiplication and intensification of connections, acceleration of processes and interactions, crossing of scales and blurring of boundaries, emergence of novel threats and opportunities, as well as a deeper and more pervasive uncertainty that characterise the 21st century world. Traditional dichotomies become less distinct and more mixed or hybridised. For example, the blurring of lines between war and politics, peace and crisis, national and international security, internal and external threats, state and non-state actors, combatants and civilians, conventional warfare and irregular (unconventional, asymmetric, fourth-generation, hybrid,

[4] For comparison, the current NATO Defence Planning Process (NDPP) framework – Document PO(2016)0655 (INV), 24 October 2016, Private Office of the NATO Secretary General – has a four-year planning cycle based on three time horizons: the long-term of 20 or more years in the future, the medium term of seven to 19 years and the short term of up to six years (NATO 2018).

cyber, lawfare, information and so forth) warfare (Chifu 2018: Chapter 3). Defence organisations must operate in a complex, dynamic and increasingly ambiguous environment that demands continuous adaptation of the defence planning process and its objectives. Defence planners are required to deal with a highly uncertain future driven by changes in climate, technology, politics and socio-economic conditions, and corresponding societal and policy responses (Maier et al. 2016: 154).

Uncertainty

As Gray (2014: vii) emphasises, the purpose of strategy and defence planning for national security is to deal with the challenge of inherent uncertainty about the future. Fundamentally, defence planning aims to limit the condition of uncertainty (Breitenbauch and Jakobsson 2018: 255). Uncertainty is not simply the absence of knowledge; it can prevail in situations in which ample information is available (Walker et al. 2013a: 395). It is worth considering what uncertainty entails given that there are different types of uncertainty and different conceptual approaches to thinking about it. We can do this by considering the different nature, level and location of uncertainties (Zandvoort et al. 2018: 101).

According to Zandvoort et al. (2018: 101), three natures of uncertainty can be distinguished: ontic, epistemic and ambiguous uncertainty. Ontic uncertainty is also referred to as variability, irreducible uncertainty, stochastic uncertainty, aleatory uncertainty, random uncertainty, fundamental uncertainty or chance. Ontic uncertainty arises from variability in system dynamics and human behaviour. It is inherently unpredictable and irreducible, regardless of improved understanding of the system or behaviour over time. An example of ontic uncertainty would be the uncertainties about future peace and stability of the Central and Eastern Mediterranean regions. Such regional security is unpredictable and cannot be accounted for through simplification due to the complex nonlinear dynamics that arise from interactions between different social, economic, political, cultural, technological and environmental systems. There will always be intrinsic uncertainty in defence planning due to variability, randomness and unknowable phenomena.

Epistemic uncertainty, also referred to as reducible uncertainty, subjective uncertainty or knowledge uncertainty, is due to incomplete, imprecise or incorrect knowledge about a system or other knowable phenomena. Epistemic uncertainty arises from a lack of data, poor quality information, or insufficient understanding or measurement (modelling) of the system. Essentially, epistemic uncertainty refers to what one could know, but do not know due to a lack of adequate knowledge about past, present or future events or situations. It leads to unreliability. The imperfection of knowledge can be reduced by increasing the amount or quality of knowledge, reducing error or correcting current knowledge (Zandvoort et al. 2018: 101). An example of epistemic uncertainty would be the determination by decision makers of the probable future political and military intentions of a neighbouring state toward a particular territory: planners could reduce uncertainty by identifying gaps and weaknesses in knowledge needed for defence planning, and then undertaking efforts to increase information and improve knowledge.

Brugnach et al. (2008: 4) consider ambiguity to be a third nature of uncertainty. Ambiguity results from the simultaneous presence of multiple frames of reference about a certain

phenomenon. In other words, ambiguity is an irreducible uncertainty or confusion resulting not from a lack of knowledge, but from many actors voicing many different but equally valid interpretations of a situation. Ambiguity isn't about not knowing enough, but about knowing differently (Zandvoort et al. 2018: 1010). An example of ambiguity would be the existence of a diversity of actors with wide range of different knowledge and perceptions regarding the security of a polity's external borders, introducing uncertainty into long-term defence planning. Planners' strategies for dealing with ambiguity may aim to integrate different frames, negotiate a mutually acceptable frame (a single way of knowing (Zandvoort et al. 2018: 103)), or find a workable relation between the different actors and their views (Brugnach et al. 2008: 4).

According to Zandvoort et al. (2018: 102), the level of uncertainty refers to the degree of certainty that can be achieved in a given situation. For practical purposes, a number of different intermediate levels[5] can be distinguished between the extremities of complete certainty and complete uncertainty or total ignorance. The location or source of uncertainty is where an uncertainty manifests itself in the data, model, assessment, or the real-world system or subsystem being represented by the model, depending on the specific planning context and its dynamics (Zandvoort et al. 2018: 102 & 109).

In many policy and planning circles, analysis and advice have traditionally been based on the assumption that the future can be predicted with some degree of certainty (Walker et al. 2013b: 957). There has been a tendency to produce 'optimal' plans aimed at achieving and maintaining a singular or static 'stable' state of affairs that remains at or near to equilibrium. However, the performance of plans optimised for a single or small number of 'most likely' hypothesised futures can deteriorate rapidly due to small deviations from the future hypothesised, let alone when faced with consequences of surprise (Walker et al. 2013b: 957). The real world is comprised of complex social (including economic, political and cultural), technological, environmental and ecological systems that are continuously changing as they interact. Stability is not a static condition, but a dynamic condition involving multiple equilibria and a 'regime' or set of coexisting system states – some of which may be far from equilibrium – in which a system persists and behaves in the same general way. Relative to these equilibria, through a series of incremental adjustments we call 'adaptations', the system progressively self-organises and self-stabilises along an evolutionary development trajectory (path) with multiple possible outcomes (Scollick 2016: 34, 59-70, 89-90). In other words, there are multiple plausible futures (Maier et al. 2016: 154). This intrinsic unpredictability significantly increases the potential for uncertainty.

Planning and decision making for the future involve anticipating change. With global complexity, such anticipation is becoming increasingly difficult, 'creating anxiety when we seek to conform short-term decisions to long-term objectives or to prepare for rare events' (Marchau et al. 2019: 1). Strategy and defence planning are purposed with meeting the challenge of uncertainty about the future (Gray 2014: vii). Therefore, defence planners must cope with and account for unavoidable uncertainties arising from variability, inadequate knowledge and ambiguity about the state of the world and human behaviour. However, as Marchau et al. point out, many important planning problems faced by decision makers are

[5] Walker et al. (2013a: 396-397) define five levels of uncertainty with regard to the knowledge assumed about the various aspects of a problem.

characterised by a high degree of uncertainty about the future that cannot be reduced by gathering more information or statistical analysis. The uncertainties are unknowable at the present time. Such situations have been characterized as having 'deep uncertainty' (Marchau et al. 2019: 1-20). As discussed by Kwakkel et al. (2016: 1), decision making under deep uncertainty is a particular type of 'wicked problem'.

Wicked Problems

Design theorists Horst Rittel and Melvin Webber described 'wicked problems' in their seminal 1973 paper, much of which has relevance to defence planning today (Blackham 2007; Gray 2014: 57, 120). Planning, policy making and, consequently, decision making are generally characterised by ill-defined problems and solutions that are inherently 'wicked' rather than clearly defined or 'tame' (Rittel and Webber 1973: 16). According to Rittel and Webber, wicked problems have at least ten characteristics as follows:

It is not possible to arrive at a definitive formulation of a wicked problem because the comprehensive knowledge needed to understand the problem depends to a large extent upon the ideas for solving it. That is, the processes of formulating (defining and structuring) the problem and solving the problem are interwoven and interactive. Different problem framings[6] will result in different preferred solutions, and vice versa (Kwakkel et al. 2016: 1).

Wicked problems have no stopping rule. In other words, there is no clear end-point when the problem solver knows that the solution is reached due to the complexity, dynamics and interactions of open systems that give rise to wicked problems. The problem solver stops work on the problem for considerations external to the problem, such as running out of time, money or patience. Problem solvers and decision makers must judge when to stop based on subjective criteria such as the solution is 'good enough' or 'the best that can be achieved within the limitations of the project' (Rittel and Webber 1973: 162).

There are no true or false answers for wicked planning problems. Solutions are rather 'good or bad' or, more likely, 'better or worse' or simply 'good enough' (Rittel and Webber 1973: 163). Different problem solvers apply different individual or group perspectives, values, ideological preferences, biases, assumptions and objectives resulting in a variety of subjective and normative judgements about wicked problems and the 'correctness' of potential solutions.

There is no immediate and no ultimate test of a solution to a wicked problem. Following implementation of a solution to a wicked problem, tests may not demonstrate its

[6] Brugnach et al. (2008: 3) understand 'frames' as sense-making devices that mediate the interpretation of reality by adding meaning to a decision situation. Therefore, the same situation can be framed in multiple, equally valid ways. Frames significantly affect how meaning is inferred and how a situation is understood. According to Nisbet and Mooney (2007: 56), frames organise central ideas and serve to define a problem relative to core values and assumptions. They pare complex issues down by giving some aspects greater emphasis and allow stakeholders to rapidly identify why an issue matters, who might be responsible, and what the response should be. Brugnach et al. state that 'framing' is an interactive process through which the meaning of a situation is negotiated among different actors, and in which actors are actively engaged in developing an understanding of problems and alternative solutions.

effectiveness and validity because any solution will itself generate consequences over an extended period of time. Furthermore, 'these consequences may themselves prove so undesirable as to negate any and all benefits of the original decision—*and this cannot be determined in advance*' (Moore 2011: 23, emphasis in original).

Every solution to a wicked problem is a one-off because there is no opportunity to learn by trial and error. Every implemented solution has longer-term consequences and each leaves 'traces' that are effectively irreversible. As Rittel and Webber (1973) put it, 'One cannot build a freeway to see how it works, and then easily correct it after unsatisfactory performance' (p. 163). Furthermore, 'every attempt to reverse a decision or to correct for the undesired consequences poses another set of wicked problems, which are in turn subject to the same dilemmas' (p. 163). In other words, implementing solutions to a wicked problem changes the problem. As Moore (2011) states with regard to defence intelligence problems, 'real solutions cannot be practiced; there are no "dry runs"' (p. 23).

There are no criteria that enable one to prove that all potential solutions to a wicked problem have been identified and considered. Usually, many potential solutions arise in pursuit of a wicked problem and many more are never conceived. It is then a matter of judgement whether one should try to enlarge the available set of potential solutions or not, and which of these solutions should be pursued and implemented (Rittel and Webber 1973: 164).

Every wicked problem is essentially unique. 'There are no *classes* of wicked problems in the sense that principles of solution can be developed to fit *all* members of a class' (Rittel and Webber 1973: 164, emphases in original). Compared to the technical world, in the world of policy and planning, every situation is likely to be unique. This uniqueness and the particularities of each wicked problem that emerges tend to override the commonalities with other wicked problems already dealt with. Furthermore, transferring technical ways of thinking into policy and planning could be harmful in the sense that 'solutions' might be applied to seemingly familiar problems that are quite incompatible with them (Rittel and Webber 1973: 165).

Wicked problems are nested. Each wicked problem can be described as the 'symptom' of another higher level problem. In effect, there is no 'natural' level of a wicked problem. '[T]he higher the level of a problem's formulation, the broader and more general it becomes: and the more difficult it becomes to do something about it' (Rittel and Webber 1973: 165). Incremental solutions may attack a problem at too low a level, possibly making it more difficult to deal with a higher level problem and, overall, making things worse.

A wicked problem can be explained in numerous ways according to each individual's worldview. The choice of the most plausible explanation then determines the nature of the solution. 'In other words, how problems are perceived determines the kinds of solutions that are proposed' (Moore 2011: 27).

Planners and policy makers have no right to be wrong. Unlike scientists, they 'are liable for the consequences of the actions they generate' (Rittel and Webber 1973: 167): actions that affect many people who would incur a high cost of failure.

Rittel and Webber's (1973) summing-up still rings true today:

> 'We are thus led to conclude that the problems that planners must deal with are wicked and incorrigible ones, for they defy efforts to delineate their boundaries and to identify their causes, and thus to expose their problematic nature. The planner who works with open systems is caught up in the ambiguity of their causal webs. Moreover, his would-be solutions are confounded by a still further set of dilemmas posed by the growing pluralism of the contemporary publics, whose valuations of his proposals are judged against an array of different and contradicting scales' (p. 167).

Planners and policy makers in the field of defence are required to deal with wicked problems concerning diverse contexts in situations characterised by deep uncertainty in which multiple perspectives are expressed and multiple 'truths' can coexist. Wicked problems are incomplete, defying attempts to define and structure (formulate) the problem and to identify and consider all potential solutions. Wicked problems involve contradictions due to the participation in the framing process of multiple decision makers and problem solvers (policy makers, planners, advisers and other stakeholders) with different worldviews, sometimes conflicting values and divergent ideas regarding the formulation of the problem or approaches to its solution (Marchau et al. 2019: 2). Wicked problems have no definite point at which a solution is reached. Solutions to wicked problems are relative, not absolute, and based on subjective and normative judgements. Solutions cannot be rehearsed or tested. Past decisions and actions regarding solutions are difficult if not impossible to reverse. Therefore, solutions have an enduring influence that changes the problem with potential to produce unforeseen and profound consequences, including even more wicked problems. Every wicked problem is unique and, consequently, requires a unique approach to resolving it. Wicked problems tend not to exist in isolation: they exhibit nested hierarchies in which a particular problem at one level is interconnected and interacts with a problem at a higher level. In that sense, a wicked problem is an aspect or 'symptom' of a broader, longer-term problem. There is a cost attached to failure in dealing with wicked problems in defence; defence planners and policy makers are liable for the consequences of the plans and policies they generate.

The future is inherently unpredictable and unknowable. Defence planning is conducted under conditions of deep uncertainty about the future. Therefore, defence planning is substantially a matter of educated guesswork (Gray 2014: 2-3). The practical challenge for defence planning and its principal tool, strategy, is how to proceed in the persistent and inescapable context of uncertainty. As Gray (2014: 11, 27) puts it, defence planning needs to be 'sufficiently correct' regarding issues that might prove to be important for future security. Those issues include dealing with future shocks.

Surprise is Unavoidable

As Gray's (2007) Maxim 39 states, 'Surprise is unavoidable, but its effect is not' (p. 158). In other words, surprises will happen regardless of one's best efforts to collect and interpret intelligence. It is simply impossible to achieve a surprise-free context for defence policy,

planning and strategy. However, it is possible through planning to make preparations so that the effects of surprise do as little harm as possible.

It is quite certain that the future will produce shocks, that is, sudden and often surprising disturbances that affect interconnected social, economic, political, cultural, technological and ecological systems at and across different levels and scales. Examples of prominent shocks – as seen from a European perspective – occurring since 2008 include:

- Nagorno-Karabakh war (September to November 2020)
- Large-scale Belarusian pro-democracy protests in the aftermath of the presidential election (August 2020)
- China's imposition of the Hong Kong national security law (June 2020)
- COVID-19 pandemic (January to April 2020)
- Australian bushfire crisis (June 2019 to May 2020)
- Election of Donald Trump as President of the United States (November 2016)
- Brexit referendum in the United Kingdom (June 2016)
- Russia's war against Ukraine in the Donbas (April 2014)
- Russia's annexation of Ukraine's Crimea (February to March 2014)
- 'Euromaidan' protests and the Ukrainian Revolution of Dignity (November 2013 to February 2014)
- Start of the Syrian civil war (March 2011)
- Great East Japan Earthquake and tsunami plus Fukushima Daiichi nuclear disaster (March 2011)
- Russia's invasion of Georgia's South Ossetia and Abkhazia (August 2008)
- Lehman Brothers bank collapse (September 2008) turning a largely American financial crisis into the global financial and economic crisis

In addition to the above examples, there are the numerous periodic natural shocks or 'disasters', including floods, tropical cyclones, volcanic eruptions, earthquakes, tsunamis and droughts that also qualify as prominent shocks with implications for both civil and military defence. For example, the Mount Pinatubo eruption (June 1991), European floods of the Danube, Elbe and Vltava river systems (August-September 2002), Indian Ocean earthquake and tsunami (December 2004), and Hurricane Katrina and the impact on New Orleans (August 2005).

Gray (2014: 99-101) discusses the utility of the concept of strategic shock,[7] that is, a category of surprise that has exceptionally severe implications and possible consequences. In other words, a 'game-changer' at the strategic level. The concept is also discussed by Anton (2013, 2014). However, in order to circumvent the need for additional categorisations of shock on, for example, the operational or policy level, here we simply use the term 'shock' to convey the sense of surprise with profound consequences regardless of order of magnitude. Furthermore, as Vosman (2015) observes, perceptions of shock are relative; in the few weeks following Russia's aggression in Ukraine in 2014:

[7] It is worth noting that the Government of Ireland's 2015 White Paper on Defence and 2019 Update both use the term 'strategic shock'. It is used to refer to surprises with system-wide or transnational impact that tend to emerge from gaps in knowledge that cannot yet be identified or quantified.

> ‘Although the events in Crimea and subsequently in Eastern Ukraine were a surprise to Estonia, it was neither a paralyzing shock nor a paradigm-changing black swan event as it appears to have been in many capitals. Moscow’s power projection ability as well as willingness to use military force for its foreign policy objective, [...] its exercise scenarios and rearmament programs have been well known to Estonia’ (p. 13).

Strategic Level of Defence Planning

In the overall context of serving the political domain and defence policy, defence planning deals with not only the military domain but also the political-military interface. It may also address civil defence and other non-military policy considerations directly. In doing so, defence planning must consider the different nested levels of military (and broadly similar or equivalent levels of non-military) organisation and behaviour: technical, tactical, operational, strategic and cross-cutting institutional level (Sukman 2016). However, the main focus of defence planning is on providing guidance to decision makers and preparing strategies, plans and programmes at the political, institutional, strategic and operational level. The challenge for military leaders at the strategic level is to actualise defence policy by translating political guidance into strategic military objectives and generate, deploy and sustain a military force by applying the full range of national or multinational resources (NATO 2017: 3–1).

Defence planning is tasked with determining what objectives should be achieved and how, by whom and at what cost. Defence strategy guides the building, arrangement and putting into operation of the instruments of national or, in the case of NATO, collective multinational power to achieve governmental or intergovernmental policy objectives. In other words, strategy links planning to implementation. In turn, implementation processes are reflexively linked back through learning to planning. Overall, these processes form feedbacks both at and across different levels of organisation in the military domain (likewise in the parallel and interacting non-military civil defence domain). Furthermore, this set of feedbacks interacts with the policy and learning feedbacks at the political-military interface. Together, these feedbacks are important in defining the internal dynamics of the defence planning system. They provide a kernel for the design of a multilevel framework for national defence planning.

Defence Planning Framework Functions

The processes of defence planning necessarily take place within some kind of structure or framework that includes both the civil (ministry or department of defence) and military (armed forces or defence forces) elements of the overall defence organisation. According to the Australian Government’s (2010) Department of Defence, the purpose of the strategy-led planning framework is to organise, harmonise, synchronise and integrate the higher-level functions of the defence planning system as follows:

Formulation, implementation and development of strategy, that is, balancing ends, ways and means.

Provision of strategic guidance to assist decision makers translate government policy directions into processes and plans across the defence organisation, enabling the organisation to achieve its vision.

Provision of strategic advice and feedback to government to inform and modify defence policy.

Strategic planning for operations, that is, the processes and actions that convert strategic-level guidance into operational-level planning.

Strategic planning to guide international engagement, that is, the processes and actions conducted by the defence organisation to shape the strategic environment in ways that further national interests, and to prepare for and support operations in a multilateral environment.

Strategic planning to guide preparedness management, that is, the processes and actions to ensure that the defence organisation is ready to respond to government direction regarding anticipated military operations and is capable of sustaining these operations.

Capability development, that is, the processes and actions that convert strategic guidance into defence capability by defining, gaining government approval for and acquiring capabilities that are employed by the defence organisation in accordance with strategic priorities while remaining within approved resource levels.

Defence budgeting planning, that is, the defence organisation's internal budget processes that provide for the allocation of resources, aligned with the government's strategic priorities, budgeting and financial management.

These functions are complex, dynamic and interdependent. Processes operate at and across different spatial and temporal scales as well as levels of organisation. The relationships, interactions and feedbacks between different components of the planning system tend to be non-linear. Planning processes are generally disposed toward integrated approaches, rendering organisational and institutional boundaries effectively indeterminate ('fuzzy'). Delivery of outcomes is contingent upon dealing with rapid change, deep uncertainty, wicked problems, surprises and shocks. Therefore, planning frameworks that are linear, inflexible, siloed and unresponsive are mismatched with their *raison d'être*, which is to assist key decision makers to make wise strategic choices by defining and linking the various strategic components and dimensions (Australian Government 2006: 5). Instead, defence planning requires an architecture – a coherent conceptual structure – that is designed to be multilevel and adaptive.

Designing Architecture for Defence Planning

Strategy and defence planning constitute a system or subsystem nested within the broader defence system of the polity. Developing a defence planning system that is suitable and enduring requires institutions (rules and arrangements) and an architecture (framework for processes) that are fundamentally contextual, visionary, reflexive, integrative, functional,

multilevel and adaptive. These key architectural elements are expanded upon in the following paragraphs. The term 'architecture' is used to convey a coherent conceptual structure or framework that is carefully designed and constructed.

Context matters. On the one hand, strategy and associated planning architectures need to deal with higher levels of abstraction, that is, ideas, concepts, principles, doctrine,[8] representations and generalisations that are broadly applicable and partially independent of context. On the other hand, many elements of defence planning are context dependent and reflexive: the context shapes decision making, which shapes the context. Planning is influenced by a variety of internal and external factors associated with specific circumstances, events, locations, and spatial and temporal scales. Planning outcomes are generally shaped by a mix of interacting political, institutional, economic, social, cultural, technological, environmental and historical factors. These factors are dynamic and thus contexts change over time. Furthermore, as described above, defence planning takes place in the context of inherent uncertainty.

Defence planning requires vision. According to the Oxford University Press (2020), vision is 'the ability to think about or plan the future with imagination or wisdom' or 'a mental image of what the future will or could be like'. In other words, vision is forethought or foresight. It is central to strategy and defence planning. Vision can be understood in two senses. First, in the sense of envisioning the aims and strategic objectives of the defence organisation, that is, a collective image to guide it. Second, in the sense of reflecting on achieving objectives, in which planning deliberately confronts its own image with the benefit of hindsight.

This leads to the reflexive aspect of architecture in which defence planners continuously engage in developing competencies, including through systemic deliberation; self-awareness, self-understanding and self-critical reflection about planning processes, uncertainties, unintended consequences of previous attempts to steer defence, and possible alternatives; and multi-loop learning processes that entail modification of goals, decision making and learning itself in the light of experience. Another important reflexive competence is 'creative destruction' (Schumpeter 1994 [1942]: 83-84) which, in this case, refers to a coupled process of deconstruction of implicit visions and expectations and conjoint reconstruction of various alternative but more explicit and coherent views on the future (Truffer et al. 2008).

Integration is at the forefront of contemporary military thinking.[9] The joint, multi-domain and multinational action that characterise the military and other instruments of national power and their utility require a defence planning architecture that addresses integration (Ministry of Defence 2014). In other words, an approach to systemic coherence that involves multi-actor collaboration to coordinate, integrate (combine) and reconcile disparate aspects of the defence organisation, defence planning system and their interactions. In order to be

[8] Doctrine sets out the fundamental principles by which the military forces guide their actions in support of objectives (NATO 2017: LEX–5).

[9] See, for example, the speech by General Sir Patrick Sanders, Commander of the UK's Strategic Command delivered to the *Chief of the Air Staff's Air and Space Power Conference 2020* on July 15, 2020, https://www.gov.uk/government/speeches/commander-strategic-command-general-sir-patrick-sanders-speech-at-the-air-and-space-power-conference.

effective, architecture for defence planning must accommodate different types and degrees of integration appropriate to the specific context and suite of circumstances. Here, 'integration' is understood to mean a medium to long-term process, or set of processes, leading to a more holistic and coherent entity. That is, an integrated outcome. Integration entails harmonising the different dimensions and perspectives that make up the defence organisation and its planning component. However, an over-integrated architecture in which distinct parts are fully or too tightly linked may be neither necessary nor advantageous. Some degree of fragmentation, referred to variously as institutional diversity, decentralisation or polycentricity, may be beneficial, for example, by increasing innovation, experimentation, customisation and overall performance (Biermann et al. 2020: 168-170).

Strategy and defence planning depend on the performance of multiple overlapping and interacting functions by different actors at different levels of organisation across the defence system, and the coordination of their activities. Therefore, the design of architecture for defence planning needs to reflect and respond to the dynamic pattern of functionality across changing contexts. The goal of good design may follow architect Louis Sullivan's (1947 [1896]) dictum that 'form ever follows function'. This is the design principle that the actual or intended use or purpose of something should determine its form, structure or organisation. In other words, design as an expression of function. Alternatively, design may adopt architect Frank Lloyd Wright's (2005 [1943]) integrative notion that 'form and function are one' (p. 146) in the sense that they 'become one in design and execution' (p. 338). That is, design as an integrated whole or system in which function neither necessarily precedes nor follows form. Nevertheless, design for defence planning is unlikely to be based on purely functional criteria. It will nearly always be subject to a variety of preconceived ideas, models, conventions, political realities and other constraints about what constitutes ideal structures, institutions and processes for defence planning. Le Corbusier (2007 [1924] wrote that 'architecture is a "matter of relationships," a "pure creation of the mind"' (p. 97). In this constructivist sense, architecture may be described as a strategic interrelationship between form and function that is mediated through power and knowledge.

In terms of authority and decision making, 'multilevel' refers to arrangements and processes in which power, competencies and responsibilities are not monopolised by one level of actors and institutions. Instead, they are negotiated and shared between multiple interconnected levels in patterns that may be described as having vertical, horizontal and cross-cutting relationships. A multilevel approach calls for three axes or directions of coordination and integration. First, the horizontal coordination and integration of policy, strategy and planning between, for example, the defence ministry and general staff of the armed forces of a state polity. Second, vertical coordination and integration between the political, strategic and nested operational, tactical and technical levels of the polity's overall defence organisation. Third, cross-cutting or external coordination and integration between, for example, an EU member state polity's defence organisation and the EU's various military committees and agencies: Political and Security Committee (PSC), European Union Military Committee (EUMC), European Union Military Staff (EUMS) and its Military Planning and Conduct Capability (MPCC), and the European Defence Agency (EDA).[10]

[10] Or, in the case of NATO member state polities, with the North Atlantic Council (NAC), NATO Headquarters (International Staff), Military Committee (MC), Allied Command Operations (ACO), Allied Command Transformation (ACT) and agencies such as the NATO Standardization Office.

A key design challenge in developing a multilevel architecture is how to match the various institutional arrangements and processes at each level to the interconnected and interdependent levels both above and below. Each level has evolved its own characteristic structure, dynamics and functions; this is what makes it a distinct 'level' in a nested hierarchy (Garmestani et al. 2009). In order to facilitate the effective functioning of the defence system, it is essential to overcome mismatch or variance between the scale, speed, capacity or quality of a system component, process or function at one level of organisation and that at another level in the hierarchy. For example, the mismatch between planning processes at the political-strategic level of EU institutions and at the military-strategic level of operational headquarters that resulted in a less decisive operational posture by the EU Military Operation in Eastern Chad and North eastern Central African Republic (EUFOR Tchad/CAR) (Mattelaer 2008). Theoretically, bridging organisations have a role to play in spanning such discontinuities in defence planning by helping to resolve spatial, temporal or functional mismatches. Bridging organisations function as catalysts and facilitators of multilevel interactions, and as networks connecting multiple institutional and organisational levels. Bridging organisations have the potential to communicate across boundaries, create the flexibility and space for institutional innovations, and the capacity to deal with abrupt change and surprise (Olsson et al. 2007: 7, 10).

The term 'adaptive' refers to the ability of a complex system to adapt to different situations. More specifically, it refers to the capacity of the system's components (agents, or actors if they involve people, and processes) and their properties (structures, behaviours and functions) to individually or collectively make small, incremental changes (adjustments) in response to or anticipation of either internal or external changes and the resulting new conditions (Scollick 2016: 52). 'Adaptive' is also a term applied to various approaches that aim to respond to and shape system dynamics. For example, adaptive governance, adaptive planning and adaptive management are approaches that aim to improve and develop policies, plans and practices in the face of changing circumstances and deep uncertainty.

In order to make provision for a polity's security and defence, actors and institutions at every level of organisation need to adapt and work with rather than against the complexity, dynamics and diversity of the defence system. Therefore, we need a perspective that helps our understanding regarding the multilevel adaptive defence planning framework described above. This paper proposes that the design of architecture for strategic defence planning can be usefully informed by systems thinking and a complex adaptive systems perspective. Subsequently, the paper considers an adaptive planning approach as a framework for strategic defence planning: a framework that complements rather than replaces existing defence planning structures and processes.

Systems Thinking

The classical definition of a system is 'a set of objects together with relationships between the objects and between their attributes' (Hall and Fagen 1956: 18). Becker (2012: 48) proposes two additional qualifications: the definition of spatial or functional boundaries at different levels; and the identification of patterns between the sets of relationships, expressed as topological structures (e.g. networks, causal chains and feedback loops).

Pioneering systems thinker Russell Ackoff (1999) explicitly includes the notion of wholeness in his definition: 'A system is a whole that cannot be divided into independent parts without loss of its essential properties or functions' (p. 8). Here I use the following definition by Tett et al. (2011: 11), which captures the notion of complex patterns of interaction between different components:

> A system consists of parts and relationships or interactions among these parts; often contains feedback loops which create emergent properties additional to those of the individual parts and relationships; has boundaries in space and time, which define system extent and scale; has an internal state, which responds to internal dynamics and transboundary processes; and can contain a hierarchy of subsystems in which emergent properties of one level appear as relationships at the next higher level.

Regardless of definitional differences, the fundamental systems ideas (i.e. components and relationships, parts and wholes, boundaries, emergent properties and hierarchy) have not changed significantly over the years.

A complex systems approach can help with developing three social capabilities considered essential for success in achieving strategic policy objectives: preparedness to change, capacity to change and options for change (Huitric et al. 2009: 40). The hallmarks of complex systems approaches are their focus on the ways that order (pattern, arrangement, organisation, structure, form and so forth) emerges spontaneously rather than being imposed by design; and the fundamental role of interconnections among components. The concepts of emergence and interconnectedness are essential to understanding how complex systems change over time and under what conditions. Complex systems are of course ubiquitous in nature, society and technology.[11] Among them, there are complex systems of very different kinds that exhibit the qualities of coherence and persistence in the face of changing conditions. This is because, despite their differences, they each possess the ability to adapt. In other words, they all have the capacity to respond to changes in their environment and make adjustments (small changes), and learn from experience, in order to fit the new conditions. This subset of complex systems is collectively referred to as the complex adaptive systems or CAS (Holland 1995: 4).

Complex Adaptive Systems Perspective

Biological organisms, populations, ecosystems, the biosphere, human societies, social-ecological systems, corporations, business networks, economies, financial markets, healthcare systems, cities, sociotechnical systems, political systems, governance systems, international affairs, defence organisations, the military, defence planning, Moltkean strategy and warfare itself (Davis 2006: 203) are all examples of CAS. Such systems improve their chances of persistence and success through continuous experimentation, learning and evolutionary processes (Mitchell 2009: 13). The following paragraphs outline the fundamental properties of CAS.

[11] For an overview of complex systems see Holland 2014.

The key components of CAS are those entities that adapt or learn as they interact and, in doing so, confer complexity to the system (Levin 1992, 1998). These are often called 'agents' or, if they involve people, 'actors' because they play a role in or have some influence on the system (Walker and Salt 2006: 163). For example, the defence planning system comprises a diversity of actors, including both generalist and specialist military planners and, in some instances, civilian planners, as well as analysts, intelligence officers, specialised strategists and advisers, military historians, experts in capabilities, procurement and budgeting, political, police and security service liaison officers, communications and other technical specialists, and decision-making committees and sub-committees. Understanding CAS involves understanding the interconnectedness and interdependence between all system components; not only between agents, but also between the processes of interaction that link agents. CAS are open systems. That is, they continually interact with their external environment through transfer and exchange of information, energy, materials or people across permeable boundaries. The boundaries between a CAS and its environment are often complex, indeterminate ('fuzzy'), multiscale, spatially and temporally variable (Cumming and Collier 2005) and usually difficult to identify. For example, a defence planning system is both open to its policy environment regarding political direction and open to the different levels of the military system. However, it may be the case that the defence planning system's boundaries are not well-defined within the overall military structure or in relation to the political-military interface.

In CAS, the underlying relationships and processes of interaction, both among components in the system and between the system and its external environment, are inherently nonlinear.[12] For example, a very small disturbance may initiate dramatically large-scale and unpredictable effects (rather than linear rebound or recovery) across spatial and temporal scales. This can lead to phenomena such as thresholds, alternative stable states, cycles, phases and chaotic dynamics (Scheffer 2009). The stability and internal dynamics of CAS are governed by two important types of nonlinear interactions: stabilising feedbacks and amplifying feedbacks.[13] Feedback refers to a situation in which an effect influences its cause (Cumming 2011: 18). System stability and dynamics depend on the balance of both types of feedbacks as well as the types and frequencies of disturbances. Identifying and managing feedbacks both within the defence planning system and between it and other components of the overall defence organisation is essential to understanding and utilising defence planning.

CAS exhibit the phenomenon of path dependence.[14] During a system's development or evolution, its current state and trajectory depend on non-reversible events, disturbances, adaptations or decisions that occurred in its past. This is the idea that 'history matters' (David 2007). Likewise, the range of development opportunities and possible future states of

[12] CAS dynamics are not linearly dependent on the state variables that constitute the system, but are instead generated when one variable is affected disproportionately by another variable. In other words, the magnitude of the effects are not proportional to the magnitude of the causes (Scollick 2016: 41).

[13] According to Chapin et al. (2009b: 10), stabilising feedbacks inhibit or reduce fluctuations in process rates and, therefore, tend to stabilise the state of a system. Amplifying feedbacks augment changes in process rates and, therefore, tend to destabilise the state of a system.

[14] Path dependence is a consequence of the system's underlying nonlinear dynamics; the rules that guide localised interactions, including feedbacks, among individual components change as the system evolves and develops (Levin 1998: 433).

a system are influenced (i.e. enabled or constrained) by similar such conditions and occurrences during the present. In other words, alternative development trajectories and multiple outcomes (future system states and patterns of behaviour) are possible depending on 1) the historical legacies (lasting effects) and system memory of past events and conditions and the system's responses to them; and 2) the influences of current conditions, including chance events, and human agency. Therefore, CAS are endowed with intrinsic variability, unpredictability and persistent uncertainty. These conditions provide an ever-present background to the defence planning system and its development.

CAS are fundamentally capable of internal self-organisation: a process of reorganisation and pattern formation arising from nonlinear interactions among component agents, often in response to disturbances. Self-organisation occurs without any direction from a central or global controller, or imposition by external forces (Levin 1998: 432). Self-organisation plays a crucial role in the emergence of complexity: collective behaviours, patterns such as multiple levels of organisation and structure (e.g. a hierarchy of nested subsystems) and other system-level properties (e.g. network configurations and modular structures). The various kinds of self-organised patterns reflect the tendency of CAS to evolve toward order and increased complexity instead of toward disorder and less complexity (Kauffman 1993, 1995). The emergent properties influence how the whole system functions and interacts with its external environment. Understanding the role of self-organisation and harnessing its potentials is one of the pre-eminent challenges of defence management including as regards planning.

Higher order and whole system properties such as state, structure, capacity and behaviour cannot be explained or managed by considering components in isolation. Put simply, complexity emerges and CAS are more than the sum of their components. The spontaneous emergence of higher-order or higher-level properties is a key characteristic of many CAS. The concept of emergence refers to processes in which larger (macroscopic) scale patterns, structures, behaviours, functions and other significant system properties tend to arise from a combination of three key determinants acting at lower levels and smaller (microscopic) scales: 1) local interactions, according to simple rules, among individual components; 2) the responses of components and their interactions to changing conditions in the external environment; and 3) autonomous selection processes (Levin 1992, 1998). Thus, emergence and self-organisation, though different, are closely related processes in CAS. The concept of emergence is important because it explains how complex systems spontaneously acquire increasingly higher degrees of organisational complexity; it also explains how they begin to exhibit genuinely novel properties that in some sense transcend the properties of their components (Kim 1999: 3; Ratter 2012). Militaries are, of course, no stranger to the emergence of complexity. Understanding emergence is important both to managing the defence planning system and undertaking defence planning.

The occurrence of nonlinear dynamics and pattern formation over a range of scales and levels is another characteristic of CAS. On the one hand, phenomena ranging from individual agents and self-interest to subsystems and cooperative behaviour are integrated across scales of space, time and organisational complexity to form whole systems (Levin 2010b). On the other hand, these same phenomena, including whole systems, are distributed across scales in a discontinuous pattern. In other words, CAS may be arranged in discrete regimes

at different levels of organisation separated by thresholds or discontinuities (Garmestani et al. 2009). Each regime is defined by a particular set of self-organised agents, processes and properties that are deeply and dynamically interconnected, and which function over a discrete range (level or layer) of spatial, temporal and other scales. Thus, through the processes of self-organisation and emergence, CAS typically organise into multidimensional structural arrangements or configurations. These are usually described in terms of vertical 'hierarchical' (nested hierarchy) and horizontal 'distributed' relationships involving interdependent subsystems. In complex multiscale, multilevel systems, changes in structure and dynamics at one level of hierarchical organisation on one scale are influenced by changes in structure and dynamics at other levels and scales. Consequently, identifying nonlinear cross-linkages and interactions is essential for understanding many real-world CAS, including those that constitute a polity's defence system and its subsystems. The complexity of such cross-level and cross-scale dynamics means that a system's behaviour, potential trajectory and future state are generally unpredictable, resulting in persistent uncertainty.

CAS are fundamentally adaptive. 'Resilience' is the term used to describe a CAS's capacity to tolerate and deal with disturbance and change in ways that sustain the system's integrity, capacity for adaptation and options for future development and transformation in a rapidly changing and increasingly uncertain world (Scollick 2016). One particular aspect of resilience is the concept of adaptability or adaptive capacity. This is the ability of a CAS to make incremental adjustments to its structure and processes in response to or anticipation of changes in internal dynamics and external circumstances. Adaptability is primarily a function of the agency and capacity[15] of human actors in the system to respond to, create and shape change in an informed manner (Berkes et al. 2003). Therefore, adaptability is ultimately about decision making and the power and ability of individuals and groups to implement decisions regarding coping with change, shaping change, managing risk and exploiting new opportunities. According to Chapin et al. (2009b: 23), adaptability depends on four interrelated factors: 1) diversity, which provides the building blocks for adaptive responses; 2) capacity of actors to augment diversity by introducing novelty; 3) actors' willingness to experiment and innovate in order to test new learning and to explore new approaches; and 4) social capital (including social networks and institutions), bridging organisations and leadership. The defence planning system must plan for adaptiveness in a rapidly changing geopolitical landscape and military environment (Davis et al. 1996; Davis 2018). Therefore, the adaptability of the defence planning system itself is crucial. Based on this understanding, CAS theory and the concept of adaptability serve as a framework and foundation for the development of an adaptive planning approach.

Adaptive Planning Approach

According to Davis (2018: 374), strategic defence planning is required to undergo major 'transformational' changes in order to keep pace with the changing realities, understanding, events, leaders and political processes of the contemporary world. Therefore, defence planning processes need to emphasise planning for adaptiveness rather than for a particular vision of the future. In my opinion, the purpose of adopting an adaptive planning approach

[15] Here, the term 'agency' refers to the power and ability of actors to act independently and to make their own free choices. The term 'capacity' refers to the power and ability of actors to perform the choices they make.

and associated architecture would be to transform defence planning from a reactive and ad hoc basis to a proactive and sustainable one. An example of such an approach is the United States (US) Department of Defense's (DOD) Adaptive Planning approach.

In the wake of the Coalition invasion of Iraq in 2003, DOD thinking was that traditional deliberate or contingency planning for hypothetical or anticipated situations was insufficiently responsive to the rapidly changing strategic landscape and world events. Furthermore, contingency planning was largely disjointed from time-sensitive crisis action planning conducted in response to an imminent crisis. The 24-month contingency planning cycle was too long, too slow and too inflexible. 'Off the shelf' plans were static, difficult and slow to adapt, and often based on outdated assumptions, assessments, forces and circumstances. Furthermore, planning was largely sequential or linear with data compartmentalised and not readily accessible, resulting in a protracted process. The involvement of political leaderships came late in the planning process, meaning that they were presented with a single military option: a *fait accompli* that bound political decision making. Feasibility analyses and interagency involvement also occurred late in the process.

Therefore, to address these weaknesses in defence planning the DOD set out to create an Adaptive Planning (AP) approach that would significantly shorten the time taken to produce plans that could be regularly updated and rapidly adapted to speed up response times and increase flexibility; plans that presented multiple options and supported collaboration both horizontally and vertically (Klein 2007: 85-86). The first AP Roadmap was adopted by the DOD in 2005 as an approach to dealing with the accelerating pace and complexity of military operations and constantly changing strategic landscape (Hicks 2008: 16-17). According to strategic planner Colonel Robert Klein (2007):

> '*Adaptive Planning* is the joint capability to create and revise plans rapidly and systematically, as circumstances require. It occurs in a networked, collaborative environment, requires the regular involvement of senior leaders, and results in plans containing a range of viable options that can be adapted to defeat or deter an adversary to achieve national objectives. At full maturity, AP will form the backbone of a joint adaptive system supporting the development and execution of plans, preserving the best characteristics of present-day contingency and crisis planning with a common process' (p. 84, emphasis in original).

A second roadmap was adopted in 2008 in order to develop the AP approach into a broader, overarching system known as the Adaptive Planning and Execution (APEX) enterprise.[16] Nevertheless, the original 2005 AP Roadmap remains instructive.

As Klein (2007: 86-88) describes, rapid planning and greater efficiency are achieved through combining the best characteristics of contingency planning, crisis action planning and execution into an integrated AP process that includes:

Clear strategic guidance and iterative dialogue. The four-step AP process comprises strategic guidance, concept development, plan development and plan assessment. Though generally sequential, these steps may overlap in order to accelerate the overall process.

[16] See Chairman of the Joint Chiefs of Staff 2019.

Senior leaders are involved throughout by means of periodic reviews (called 'in-progress reviews' or 'IPRs'; see Dunkin 2017) integrated into the process. Late-stage reviews are key to facilitating adaptation by creating opportunities to revisit, refine, modify or amend strategic guidance and other early-stage planning outcomes. Such reviews ensure that the plan remains relevant to the situation and responsive to the political and military leaderships. In effect, the integrated reviews (IPRs) create feedback loops that turn strategic guidance into approved plans via a continuous cycle of adaptive development and assessment.

Integrated interagency and coalition planning. Today's complex operations demonstrate that strategic success requires a unified approach to planning. AP recognises that interagency (both military and civil elements of the polity) and coalition partners' considerations 'are intrinsic rather than optional and need to be integrated early in the process rather than as an afterthought once the military plan is complete' {Klein 2007: 87).

Integrated intelligence planning. In the AP approach, the intelligence campaign planning process is directly linked to contingency planning to ensure that changes in the global strategic environment continually inform plan development and assessment.

Embedded options. To make the design and development of plans more dynamic, AP features a number of embedded options each with branches and sequels (subsequent operations or phases) together with associated decision points and criteria. This 'menu of options' provides political and military leaderships with increased execution flexibility that anticipates and rapidly adapts.

Living plans. The plan assessment step represents a 'living' environment in which plans are refined, adapted, terminated or executed. In the AP approach, such living plans are maintained within a collaborative, virtual environment and are updated routinely to reflect changes in intelligence assessments, force readiness and management, transportation availability, guidance, assumptions and the strategic environment. Both automatic and manually evaluated triggers linked to real-time sources will alert leaders and planners to changes in critical conditions that warrant a revaluation of a plan's relevancy, feasibility and risk. Living plans provide a dynamic foundation for seamless transition to time-sensitive crisis planning.

Parallel planning in a network-centric, collaborative environment. Essentially, the AP (and subsequent APEX) approach employs information, information and communications technology, artificial intelligence and other emerging technologies to shorten the decision-making cycle and gain advantage. Plans, planning tools and databases are linked in a network-centric environment with an integrated architecture that enables parallel collaboration among geographically dispersed planners.

The evolution of the AP approach since 2005 has not been without issues or criticism. For example, a 2009 study of an experimental approach to incorporating interagency (involving State Department and USAID) perspectives into the development of strategic guidance for military planning at US European Command identified deficiencies including the lack of formal interagency collaboration and coordination mechanisms, and lack of codification of

such practices in DOD planning doctrine and policy guidance. Moreover, the compressed planning timelines in the AP approach 'complicated the accommodation of inputs from the interagency partners' (Earle 2012: 42). In another example, Lieutenant Colonel John Price (2012) of the US Air Force describes the DOD's transformation toward AP as having 'failed by almost any measure' and 'slowly dying' (p. 118). He attributes this failure to the prevailing institutional culture: 'Fixated on the virtues of planning, the military could not see that the desired outcomes depended on a revolution in strategic thinking, not strategic planning' (p. 118). Price concludes that the objectives of the AP transformation effort are even more relevant today than they were when the AP programme began. '[B]ut we stand little chance of reaching them without significantly changing our approach' (p. 130). Despite such drawbacks, RAND recently recommended that, in order to increase its likelihood of developing into a successful organisation, the US Space Force should adopt an adaptive planning approach to guide the service's future planning and implementation efforts (Spirtas et al. 2020: 102). Adaptive planning continues to be researched including, for example, in the field of cyber security (Tuovinen and Frilander 2019: 67-91). Furthermore, in 2019 researchers from RAND found that although the DOD's defence planning process is 'conceptually sound and normally capable of meeting the demands placed on it by senior leaders' (Mazarr et al. 2019: 31), in its implementation, the current system is 'insufficiently timely, flexible, adaptive, and robust' Mazarr et al. 2019: 32). It would appear, therefore, that much work has yet to be done, in the US and elsewhere, in order to develop and implement an adaptive planning approach to transform defence planning.

In an ideal situation, an adaptive planning approach would significantly shorten the time taken to produce high quality, multifunctional plans that could be regularly updated and rapidly adapted to speed up response times and increase flexibility. Such adaptive plans would present multiple options and support near-continuous collaboration, both in parallel (horizontally) and across multiple levels of organisation (vertically), using a common set of tools. Feedbacks from periodic assessments of plans and from interactions with political and military leaderships would enable 'learning by doing', adaptation, self-organisation and emergence and, therefore, continual development: an integrated process that provides a seamless transition between contingency and crisis action planning. Adaptive planning would generally proceed through arrangements that engage a diversity of stakeholders in processes of goal-setting, experimentation, implementation, monitoring, review, readjustment, revision and reorganisation. These processes are interdependent in the sense that the output from one step becomes the input for another. The next iteration of the same step is adjusted through feedbacks, changing the results. This may lead to a modified approach or to the development of alternative approaches based on learning.

Of course, the design for any such strategic adaptive framework for defence planning does not take place on a blank slate. A complex state of affairs already exists. A polity's defence organisation will always have some form of existing planning structure and processes. Klein (2007) advises that the transformation to an adaptive planning approach does not require complete elimination of current processes, but rather a mixture of new and existing ones: 'The Department of Defense must preserve the best characteristics of current processes and systems and apply them in unprecedented ways' (p. 86). New architectures and approaches need to be negotiated, taking into account the realities of the political and military landscape, if they are to be implemented. In this sense, the existing planning landscape

simultaneously constitutes a constraining and enabling environment. However, as a way of thinking, grounded in CAS theory and the concept of adaptability, a strategic adaptive framework complements rather than replaces existing defence planning structures and processes. With careful management, such thinking would reflexively and incrementally adapt the defence planning system over time. A transformation rather than a revolution.

Conclusion

A failure to understand and deal with the fundamental properties of complex adaptive systems can be detected as an underlying factor in the difficulties encountered during defence planning (see Brauss 2008: 35-37; Menon 2018; Young 2018: 1052). Real-world systems confront defence planners with so-called 'wicked problems' that are difficult to define, have no apparent solution and which tend to persist, posing a continual challenge and adding to deep uncertainty. Defence planning frameworks that are static, inflexible, siloed and unresponsive are mismatched with their *raison d'être*, which is to assist key decision makers to make wise strategic choices by defining and linking the various strategic components and dimensions (Australian Government 2006: 5). To be effective, defence planning systems must somehow reflect the complexity, dynamics, scale and diversity of the systems they deal with, as well as respond to rapid changes in those systems. Modern defence planning requires an architecture that is by design both multilevel and adaptive. Therefore, achieving effective strategic defence planning requires a cultural paradigm shift (Kuhn 1996 [1962]) in the predominant pattern of thinking: away from linear, reductionist, fragmentary and deterministic views of reality in which systems are viewed as largely predictable and controllable, toward a new pattern grounded in complex adaptive systems thinking. A complex adaptive systems approach is a process with three complementary aspects. First, it is a fundamental way of perceiving the world (worldview). Second, it is an organised way of thinking that enables individuals and groups across the defence organisation to understand and organise information about real-world phenomena. Third, it is a rational way of acting and dealing with the complexity and dynamics of real-world problems of security and defence. Complex adaptive systems theory and the concept of adaptability serve as a framework for an adaptive planning approach. This would seek to transform defence planning into an integrated process that is responsive to the rapidly changing strategic landscape and world events (Hicks 2008: 16-17). An adaptive planning approach and architecture have the potential to help transform strategic defence planning into an adaptive system that is responsive, flexible and capable of producing high quality multi-functional plans with multiple options.

> In preparing for battle I have always found that plans are useless, but planning is indispensable.
>
> (General Dwight D. Eisenhower, quoted in Nixon 1962: 235)

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