Accepting Uncertainty?
A Contemporary Methodology for Capability Development

by Peter Layton

FOREWORD

The changes in the International security environment that have occurred over the past two decades are readily apparent to all observers. These changes ensure that the types of threat scenarios that the ADF can expect to confront in the coming years will always remain uncertain. Uncertainty will thus present a significant problem to those trying to determine and prioritise future capabilities that are needed to be developed for the ADF. Given this assured uncertainty, traditional scenario-based methods of capability development planning may need to be re-examined in an attempt to determine the best means of future capability requirements determination.

This paper proposes the use of scenario matrix planning as a tool to assist in the development of capability requirement guidance. Rather than trying to predict the future and build a force to meet that prediction, scenario matrix planning is presented as a means by which, via the development of a number of possible future scenarios, likely trends and possibilities for the future are described. These trends and their probabilities are then used, in conjunction with other inputs to the requirements process, to guide the development of capabilities that will best meet national needs. In an uncertain and volatile security scenario, all available tools must be employed to ensure optimum response from the ADF. The use of scenario matrix planning is one more tool that must be experimented with to ascertain its efficacy and further usage.

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The single theme that characterises the security environment that we will experience over the next decades is uncertainty.

Senator the Hon. Robert Hill
Minister for Defence[1]

INTRODUCTION

Most contemporary defence force development planners rely on the traditional strategic planning approach built around the fundamental assumption that the future of a business can be predicted accurately enough to choose a clear strategic direction for it.[2] This conventional strategic planning methodology performs adequately when extrapolating from the present, or when dealing with incremental change within the existing strategic perspective, but the methodology deals less well with dynamic systems in which unexpected events occur. The international system of states has become such a dynamic system, being notable for unpredicted events and unforeseen circumstances; uncertainty is now certain.

The long-term strategic forecasts used by most governments over the last 15 years as the basis for defence force development decisions did not predict the fall of the Berlin Wall; the end of the Cold War; the 1991 Iraq War; the numerous humanitarian interventions in the 1990s; the September 11 attacks and the continuing terrorist attacks including Bali; or the recent wars in Afghanistan and Iraq. Many of these forecasts were often published within two to three years of the unpredicted events, some only months before. Alan Gyngell wrote of representing the Office of National Assessments at a massive US conference, discussing the future of the Soviet Union in 1988, and observed that 'the astonishing thing in retrospect was that not one of us came close to predicting that just 12 months later the Berlin Wall would be torn down... and that within three years the Soviet Union itself would cease to exist'.[3]

The result of basing force development on an anticipated future is that if these specific circumstances do not occur, the force acquired may be less than optimum with evident operational shortcomings. Moreover, time and resources will have been squandered preparing for an eventuality that does not occur, while staving resources from creating forces that are actually needed. While the Australian Defence Force has acquitted itself well in recent years in Cambodia, Somalia, Rwanda, Timor, Afghanistan, the Middle East and the Solomon Islands, it would be difficult to argue that the force structure developed using the traditional force development methodology has proven completely suitable in undertaking these operations. The Australian Government has also been reported as being disappointed that the electronic warfare equipment fitted to the F-111 aircraft, and the limited Army mechanised forces available, constrained force deployment options to the Middle East. Moreover, these were operations of choice, not necessity, and therefore allowed rapid acquisitions and the sending abroad of only those limited forces that were suitable for the situation. In earlier times, Australia had a stark example of the dangers of creating an armed force for an envisaged future strategic situation that did not eventuate when the nation fought Japanese forces in the grim days of 1942. The inter-war emphasis on acquiring warships to be based in Singapore in support of coalition naval operations proved completely inappropriate to the actual circumstances eventually pertaining.

Some consider that recent experience indicates that present balanced force structure is sufficient for future strategic circumstances, and there is no need to make a decision to alter the fundamental basis for ADF force development; maintenance of the force-in-being is a sufficient and pragmatic response. However, critics inside and outside Defence assail that the force-in-being has significant shortcomings that need addressing.[4] Moreover, the Government seemingly agreeing has now decided to change the current force structure balance by early retirement of two FFGs, the F-111 strike aircraft and two new-mine countermeasures vessels, while acquiring new large amphibious ships and a chemical, biological and radiological (CBR) incident response capability. The balance in the force structure continually evolves; the balanced force structure in the 1960s had aircraft carriers and land-based medium-range surface-to-air missiles, but no submarines. There is no enduring balance that can be set and left to itself in perpetuity.

National economic and population constraints rule out the option of developing a defence force sufficiently large and well-equipped to meet all possible circumstances. Defence budgets must always compete against other priorities for government expenditure, such as education and health, and the overall national fiscal strategy. Defence has been considered by successive governments as an important national priority, but the Government notes that the nation should not spend on defence 'more than is necessary'.[5] As well as funding, defence forces-in-being built around people are also shaped by the ability and willingness of a nation to man a defence force. Nations with small populations cannot realistically consider creating numerically large forces even if funding permits; Brunei and Kuwait are both wealthy states but could not man everything their wealth could acquire. The availability of resources, whether funding or population, acts as a significant constraint on ability of nation to have a defence force permanently ready to meet any possible situation.

Force development involves planning, under uncertainty, to provide capabilities to meet contemporary challenges and circumstances while working within an economic framework that necessitates making choices.[6] Strategic circumstances will inevitably change, making necessary a force development planning methodology that provides a smooth growth path into the uncertain future, and has processes in place that take into account the rapidly evolving international environment. Force development methodologies should not be based on the premise of possessing near-perfect foresight, but should rather make use of the certainty of uncertainty.

An approach to defence force development planning is proposed that embraces this uncertainty, in harmony with Senator Hill's assessment of the pivotal role of uncertainty in our future strategic environment. The force development methodology is then in tune, not diametrically opposed, to the central characteristic of our time. This paper seeks to demonstrate the scenario matrix strategic planning methodology by applying this methodology to the problem of ADF force development strategy in a manner that builds on previous Defence planning approaches and force development determinants. This planning methodology has been long-used by Royal Dutch Shell, allowing the company to uniquely handle the discontinuance in the oil industry.[7] In the late 1990s, the US Coast Guard also began using scenario matrix methodologies for strategic planning, and was accordingly noticeably better able to manage the strategic shocks of the September 11 terrorist attacks than other major US Federal Services.[8]

In understanding the applicability to defence force development planning of a methodology constructed around an acceptance of uncertainty, it is first necessary to gain an understanding of both the underlying reason for, and the nature of, uncertainty in the international system.

COMPLEX ADAPTIVE SYSTEMS

Unexpected events are an intrinsic, inherent feature of the contemporary international system, best understood if this system is conceived as a complex adaptive system composed of a network of state and non-state actors. Complex adaptive systems are characterised as being a set of interrelated parts, with each part an autonomous agent able to take actions that can impact other agents. The interrelationships between agents creates the system, the capacity of these agents to break with routines and initiate unfamiliar actions makes the system complex, and the capacity of these agents to collectively evolve to cope with new challenges makes the total system an adaptive complex system.[9]

Complexity theory has four basic premises. Firstly, the parts of a complex adaptive system can self-organise into an orderly whole. Secondly, self-adaptive systems are composed of learning entities able to self-adapt to changing circumstances. Thirdly, small, seemingly minor events can give rise to large and unexpected outcomes as popularised by the term 'butterfly effect', where rhetorically a butterfly flapping its wings in Brazil creates a hurricane in India. Lastly, even the slightest change in initial conditions can lead to very different outcomes for a complex adaptive system.[10]

Complexity theory reveals that outcomes cannot be foreseen by simply summing together a system's units and their interactions as these relationships are generally non-linear, making the outcomes of many actions unintended, extending over time into many areas, and having multiple effects.[11] The description of the international system as a complex adaptive system does not directly lead to prediction or policy prescriptions as it is inherently impossible to anticipate precisely how the international system will organise, what path it will

follow, or whether a large outcome will occur, for even the slightest change in an initial condition can result in an enormous change.[12] The general pattern and contours of the international system can be discerned by analysis, but complexity theory informs us that there are strict limits to how much this analysis can provide an accurate prediction of the future. Instead, an ability to undertake strategic planning under conditions of uncertainty is necessary.[13]

UNCERTAINTY LEVELS

Traditionally defence strategists have underestimated uncertainty in order to describe a vision of future events sufficiently precise for force development planning. The difficulty arises in that underestimating uncertainty can lead to strategies that neither defend against threats, nor take advantage of the opportunities higher levels of uncertainty provide. At the other extreme, decision-makers confused by uncertainty may abandon analytic rigour and base decisions on instinct. Instincts are based on past experiences, but the future will not necessarily be like the past, thus instinct may lead to decisions that make situations worse or that have unintended consequences.[14] Devising successful strategies requires ascertaining how uncertain the environment is with four levels of uncertainty identified.[15]

a. *Level One.* At this level, the residual uncertainty is irrelevant to making strategic decisions, as robust analysis shows only a single possible future with change linear and evolutionary.

b. *Level Two.* The future will follow one of a few discrete scenarios, and while analysis can not identify which particular outcome will eventuate, it may help establish probabilities.

c. *Level Three.* While there are only a few dimensions of uncertainty, analysis is unable to reduce the future to a limited number of discrete scenarios. A range of futures along a continuum for each identified dimension can be identified, although with a limited number of key variables defining this range.

d. *Level Four.* The numerous dimensions of uncertainty interact, making it impossible to determine a range of potential outcomes or scenarios, or identify the relevant variables that will define the future.

In applying these various uncertainty levels against the complex adaptive system model of the international system it is apparent that Level One is too simplistic as there are many possible futures, not just one. Level Two is similarly afflicted in that the future, being non-linear and subject to 'butterfly' effects, cannot be reduced to only a few alternatives. However, the chaotic vision of Level Four also seems inappropriate, as there are certain dimensions or parameters from the present that carry on into the future, including US pre-eminence and the process of globalisation. Accordingly, Level Three uncertainty seems the best type of uncertainty to base security planning on, with contemporary defence requirements appearing to lie somewhere along a range of needs from transnational terrorism to US-led coalitions fighting major interstate wars. This particular level of uncertainty means little can be accurately predicted on the basis of past events, but that it is possible to examine the present and discern important existing and emerging trends.[16] The pervasiveness of uncertainty in the international system should not be over emphasised to the extent of creating strategic paralysis, as there are some aspects such as strong trends, enduring interests, and relationships that are not particularly uncertain.[17] A range of possible futures can be determined, although which specific scenario will eventuate is unable to be ascertained.

SCENARIO MATRIX PLANNING METHODOLOGY

The scenario matrix methodology factors in, rather than ignores, the Level Three type of uncertainty characteristic of the contemporary international system within which the ADF functions. This methodology differs from alternatives such as contingency planning that examines one key uncertainty at a time, or sensitivity analysis that examines the impact of changing one variable a small amount. The scenario matrix methodology also differs from simulation modelling that can be used to examine multiple variables, but which has shortcomings in that many possible future changes contain elements not easily captured in formal mathematical models.

Scenario matrix planning examines the combined impact of various uncertainties through changing multiple variables at a time and exploring extremes to gain insights on the possibilities in between.[18] In so doing, the strategic level issues informing force development planning are illuminated. The scenario matrix planning methodology uses two chosen key uncertainties as axis to derive four quadrants, each an alternative future scenario qualitatively different from the others in a logical, non-random way.[19]

Axis Selection. The specific two key uncertainties used here are derived from the 2000 Defence White Paper's judgment that the process of globalisation and the primacy of the US are the two principal trends shaping Australia's strategic environment.[20] These two trends are then transformed into two distinct drivers, which will have different impacts depending on which combination of drivers eventuates. The vertical axis of the four quadrant matrix (Figure 1) spans the degree to which the US remains involved in the international system, and the horizontal axis spans the degree to which globalisation and economic interdependence continues to grow.

Vertical Axis Driver. The US dominates the international system in many fields, but especially in the security dimension with plans to spend more on defence in forthcoming years than all other nations combined.[21] Given this overwhelming, relative US defence force funding, the degree to which the US remains involved in international affairs will largely shape future international security. The extremes of the vertical axis used in the future scenario matrix move from the US withdrawing from international affairs and becoming once more isolationist, to the US creating a global empire and thus becoming very deeply involved in world affairs. American historian Victor Davis Hanson recently observed that it is still uncertain if the last 60 years of US global involvement was historically abnormal, as the US may yet revert back to its preceding 160 years of isolationist policies.[22] Political scientist David Hendrickson argues the converse; that the US could be on the path of establishing an empire.[23] The vertical axis, in being built around the major determining feature of international security, directly relates to the recently articulated Australian national interest objective of security.[24]

Horizontal Axis Driver. The other axis measures the degree of globalisation from the extreme of a single, all-encompassing global market to a breakdown of the globalisation process. The outstanding feature of political economy for the last 50 years has been the progressive international economic integration between states that has deepened and developed into a broad globalisation process. This growing interdependence between states has gradually changed the economic basis of a state's military power from being solely domestic to being partly foreign. The national wealth essential to build the armed forces necessary for national security is now being created to a sizeable extent through a state's involvement in international trade, global financial markets and foreign investment. The resources necessary for military strength are moving from being under the state's command to being controlled by the global market. States are more vulnerable because of their dependence on imported materials and dual-use technology, and by the dependence of the state's production base on general international trade in goods, finance and services.[25]

International economic relationships have emerged as a new instrument for states to manage international affairs in a manner that enhances global security.[26] Although trade and financial linkages may only be able to deter very modest interstate clashes, their main impact appears to be creating a substitute method for resolving conflict; multiple economic interactions provide states with another medium to signal intentions and resolve, reducing both uncertainty and the possibilities of miscommunication.[27] States do not willingly seek to damage trading relations, preferring instead good political relations that sustain economic interactions and do not jeopardise economic growth objectives.[28] The horizontal axis used in the matrix reflects the present importance

of globalisation and economic interdependence to defence matters while also directly relating to the articulated Australian national interest goal of prosperity.[29]

The two variables of US involvement in the world and the degree of globalisation and economic integration are specific and critical, but the degree to which they will impact the future is uncertain, with a range of possible outcomes for each variable anticipated. These two uncertainties are combined to form a matrix encompassing four possible future worlds described in Figure 1. The descriptions of the four possible future worlds in Figure 1 focus on their defence and security, and political economy characteristics.
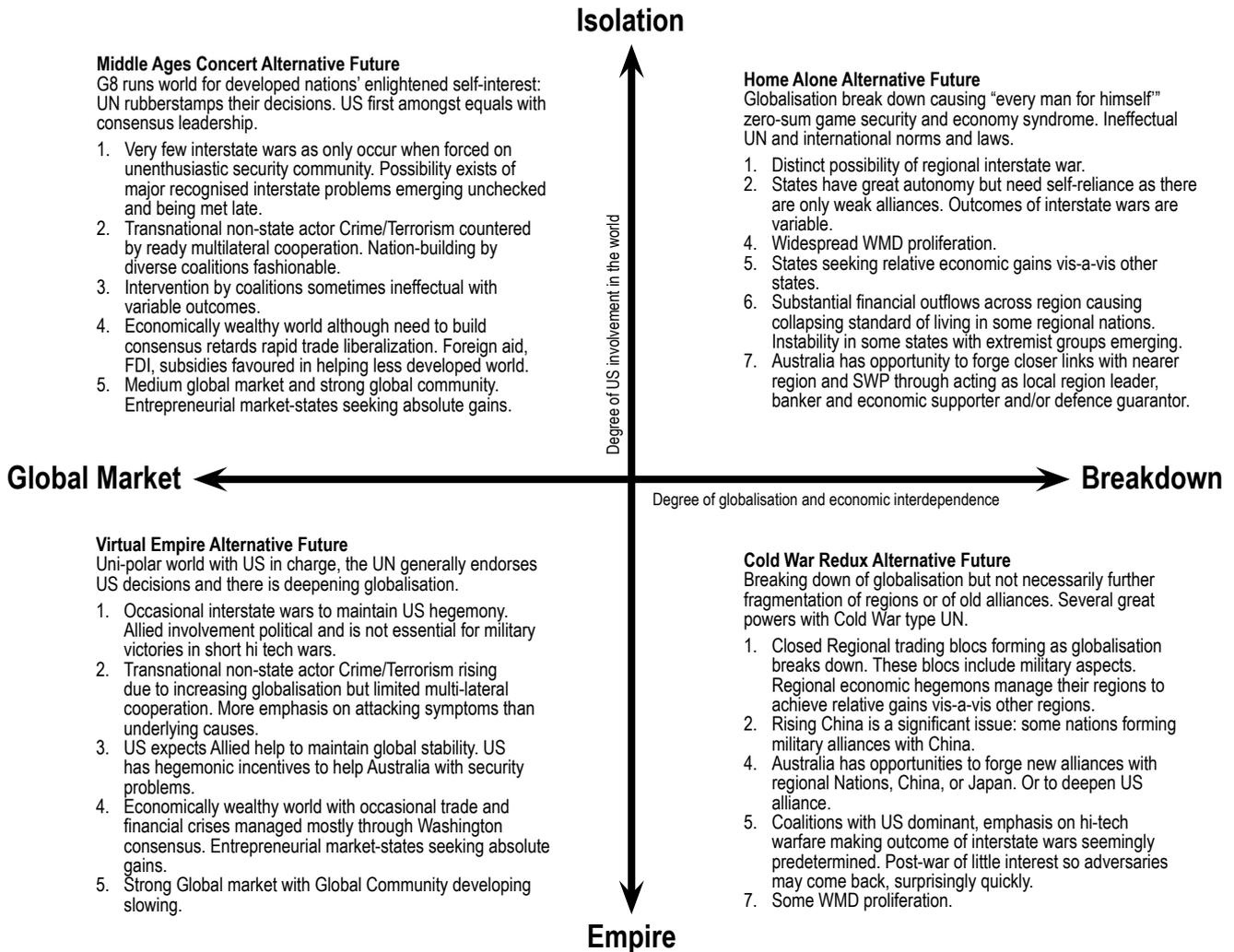
Isolation

Middle Ages Concert Alternative Future
G8 runs world for developed nations' enlightened self-interest: UN rubberstamps their decisions. US first amongst equals with consensus leadership.

1. Very few interstate wars as only occur when forced on unenthusiastic security community. Possibility exists of major recognised interstate problems emerging unchecked and being met late.
2. Transnational non-state actor Crime/Terrorism countered by ready multilateral cooperation. Nation-building by diverse coalitions fashionable.
3. Intervention by coalitions sometimes ineffectual with variable outcomes.
4. Economically wealthy world although need to build consensus retards rapid trade liberalization. Foreign aid, FDI, subsidies favoured in helping less developed world.
5. Medium global market and strong global community. Entrepreneurial market-states seeking absolute gains.

Home Alone Alternative Future
Globalisation break down causing "every man for himself" zero-sum game security and economy syndrome. Ineffectual UN and international norms and laws.

1. Distinct possibility of regional interstate war.
2. States have great autonomy but need self-reliance as there are only weak alliances. Outcomes of interstate wars are variable.
4. Widespread WMD proliferation.
5. States seeking relative economic gains vis-a-vis other states.
6. Substantial financial outflows across region causing collapsing standard of living in some regional nations. Instability in some states with extremist groups emerging.
7. Australia has opportunity to forge closer links with nearer region and SWP through acting as local region leader, banker and economic supporter and/or defence guarantor.

Degree of US involvement in the world

Global Market ← → Breakdown

Degree of globalisation and economic interdependence

Virtual Empire Alternative Future
Uni-polar world with US in charge, the UN generally endorses US decisions and there is deepening globalisation.

1. Occasional interstate wars to maintain US hegemony. Allied involvement political and is not essential for military victories in short hi tech wars.
2. Transnational non-state actor Crime/Terrorism rising due to increasing globalisation but limited multi-lateral cooperation. More emphasis on attacking symptoms than underlying causes.
3. US expects Allied help to maintain global stability. US has hegemonic incentives to help Australia with security problems.
4. Economically wealthy world with occasional trade and financial crises managed mostly through Washington consensus. Entrepreneurial market-states seeking absolute gains.
5. Strong Global market with Global Community developing slowing.

Cold War Redux Alternative Future
Breaking down of globalisation but not necessarily further fragmentation of regions or of old alliances. Several great powers with Cold War type UN.

1. Closed Regional trading blocs forming as globalisation breaks down. These blocs include military aspects. Regional economic hegemons manage their regions to achieve relative gains vis-a-vis other regions.
2. Rising China is a significant issue: some nations forming military alliances with China.
4. Australia has opportunities to forge new alliances with regional Nations, China, or Japan. Or to deepen US alliance.
5. Coalitions with US dominant, emphasis on hi-tech warfare making outcome of interstate wars seemingly predetermined. Post-war of little interest so adversaries may come back, surprisingly quickly.
7. Some WMD proliferation.

Empire

Figure 1: Scenario Matrix Alternative Future Descriptions

Importantly, the four scenarios are simply images of alternative possible worlds based on identified critical variables and should be considered only exploratory, not predictive. The alternative scenario approach is needed not to predict the future, but rather to help policy makers think about the future.

A Dynamic International System. The extremes noted in the matrix are not viewed as likely outcomes; rather they are deliberately chosen to explore the issues between them, giving this matrix some longer-term durability. When the perspectives of the world observed in recent Department of Foreign Affairs and Trade (DFAT) White Papers and Defence updates are mapped onto the matrix, these appreciations of international relations taken over the last 15 years remain within the matrix's bounds. This is diagrammatically illustrated in Figure 2, which also reveals the dynamic nature of contemporary internal relations. The matrix provides a more durable understanding of how international conditions may evolve than may be initially apparent.

The 1987 Defence White Paper assessed that Australia's security ultimately depended on the superpower balance, and that the US expected Australia to adopt a self-reliant defence posture. The 1994 Defence White paper observed a newly fluid and complex post-Cold War world, characterised by shifting relationships between the major regional powers, Asian economic and political changes, and the US unwilling to seek or accept the primary responsibility for regional security. The 1997 DFAT White Paper considered that the most profound influence on Australian foreign policy was globalisation, and that the relationships with China, the US, Japan and Indonesia were key to regional security. The 2000 Defence White Paper contemplated an international environment now fashioned by US primacy, global acceptance of this, deepening globalisation, and the rising importance of the UN and China. In 2003, the DFAT White Paper and Defence Update held important US dominance of the international system, the acceptance by the US of an activist global security role, and the improved stability of major power relations. Now in 2004, the world is changing again as, constrained by the debilitating war in Iraq, the US moves towards reduced global intervention, while globalisation continues, albeit with some detractors and concerns over bi-lateral trade agreements.

Security Issues in the Four Worlds. There are some common themes across the four alternative futures. In two worlds, non-state actor threats predominate, whereas the other two feature principally state actor threats, with the level of the threat varying principally with the degree of globalisation and economic integration. In all worlds, having a stable and prosperous region is useful, although for differing reasons. Alliances are similarly useful in all worlds, although in the Home Alone world alliances could be less reliable with realistic fears of abandonment. In two worlds the US–Australia alliance is central, but in the other two the alliance, while useful, has less importance.

Preferred Worlds. From a state-centric security perspective, the worlds on the matrix's left side are preferred: Virtual Empire and Middle Ages Concert.[30] In these worlds, the survival of the Australian State is not in doubt as there are no serious interstate threats evident. Australia's only contribution to interstate warfare operations is participation in a modest and pragmatic manner in coalitions led by the US or others. This contrasts with the Home Alone and Cold War Redux scenarios where state actor threats predominate, with the Home Alone scenario particularly stressing. On the left side of the matrix, security would become more human-centric, with the principal issues being major criminal and terrorist transnational non-state actor threats arising from, or making use of, failing states. These matters appear more readily managed by Australia in concert with allies and partners than the larger state threats apparent in the Home Alone and Cold War Redux scenarios; where Australia's relatively small economic and population base could thwart successful outcomes. However, while comparatively more benign from a state-centric security perspective, the Virtual Empire and Middle Ages Concert worlds could produce some nasty shocks. In these worlds, the disaster of the World Trade Center attacks could be occasionally repeated with the possibility of terrorist groups escalating to some form of nuclear, biological, chemical or radiological attack.

All four alternative future worlds created by the matrix require varying levels of ADF involvement to maintain Australian security. The scenario matrix methodology does not attempt to predict which of the four future worlds is the most, or the least likely; instead assuming all four are equally likely. The four scenarios form the context within which the strategy that guides Australian defence force development can be devised. The scenarios encompass the decision space of Australian defence force development, and in so doing give an understanding of the potential force development requirements space, the metrics for assessing the utility of various force development alternatives, and the trade-offs between alternatives that might be made.[31]
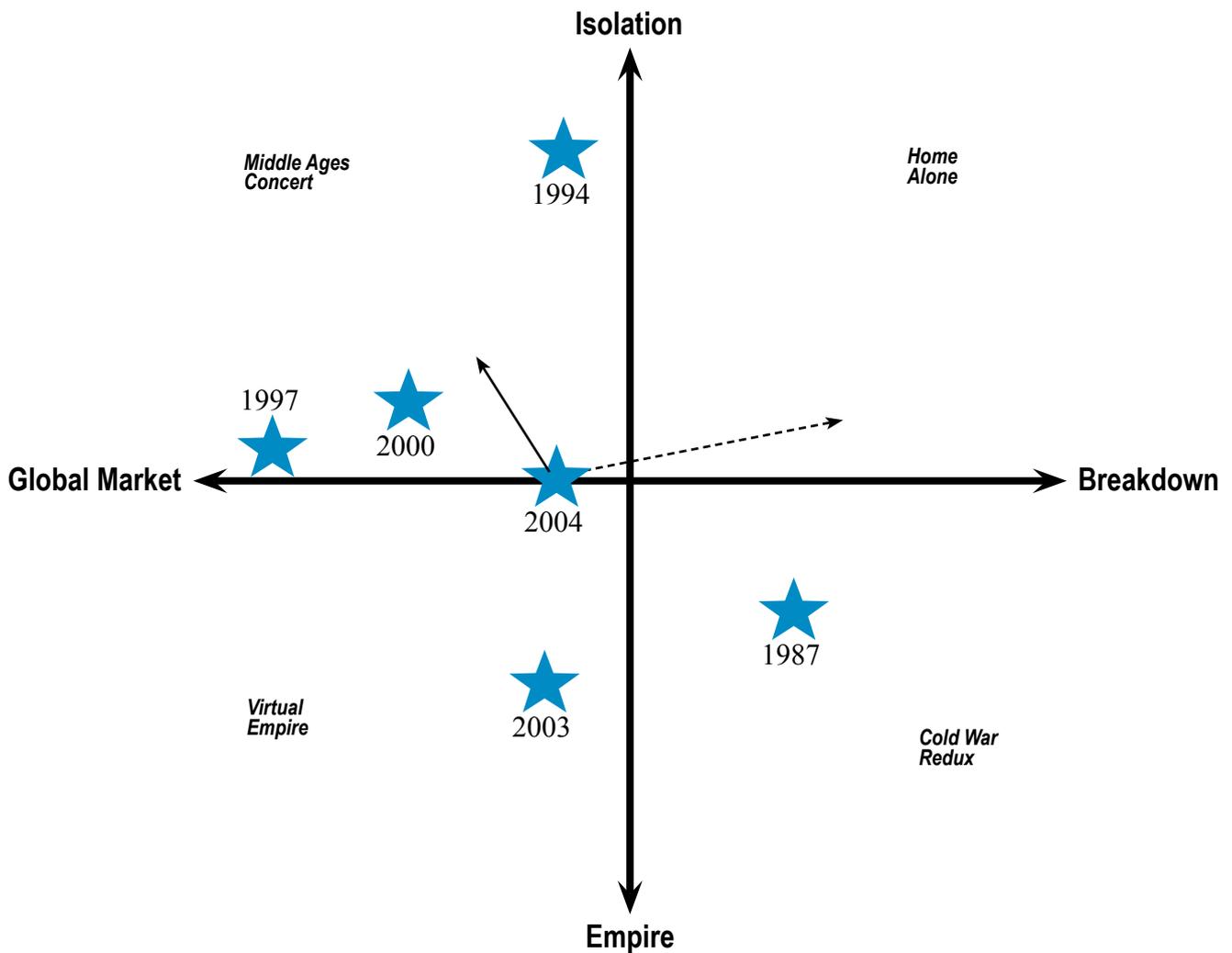
Figure 2: Australian Government Perspectives Mapped onto the Figure 1 Matrix

RESOURCE CONSTRAINTS THAT SHAPE FORCE STRUCTURE

The structure of a nation's armed forces is determined by factors other than simply the envisaged needs as illuminated by the alternative future methodology. A defence force is designed and created to meet anticipated circumstances, but is constrained and shaped by the resources a nation has available and is willing to expend on defence. Two resource areas of particular importance are the magnitude of the long-term funding a nation is willing to commit, and the ability of a nation to man a defence force. Australian defence budgets and the country's ability to satisfy the ADF workforce needs over the longer-term are issues that appear more certain than the turbulent external international political environment examined previously. These issues are discussed before combining the three elements—budgets, manning and the future international environment—in discussing an overall approach to force development.

BUDGETS

In Australia, defence budgets have had, through several governments of both major political parties, considerable stability with no major change expected given the similar defence policies of the major parties. Combat operations are funded using specific, tied, supplementary funding and, in not significantly impacting long-term force development funding, may be considered separately and are not discussed further.

The perceptions of a security threat to Australia have been steadily declining over the last 30 years as indicated by public polls, which in 1969 indicated 52 per cent of Australia's population were concerned, to recently where only 34 per cent had such worries.[32] While in the last 30 years there have been some peaks in public threat perceptions, the overall downward trend is unambiguous with no significant change caused by the East Timor intervention, the September 11 attacks, or the Bali bombing. Defence budgets appear to reflect this, with a steady decline in the percentage of GDP allocated to Defence, declining relatively smoothly from 3.3 per cent in 1969[33] to about 1.96 per cent in the 2002–2003 budget, and projected in Defence Budget Papers to fall to 1.83 per cent in 2006–2007.[34]

In noticeable contrast, while these threat and GDP measures have declined, defence spending as a proportion of total Federal Government outlays has been remarkably stable. Since the end of the large defence spending associated with Australian involvement in the Vietnam War, the defence budget has consistently remained in a tight band between 8–9 per cent of total outlays.[35] The present government has continued this 30 year trend, with defence in the 2002–2003 budget representing 8.8 per cent of Commonwealth spending, although this figure is slightly high as it includes some supplementation for combat operations.[36]

Davis observes that defence budgets generally tend to fluctuate up or down based on the perceived sense of threat or, in the absence of an obvious threat, the need to maintain the long-term health of the armed forces.[37] In examining long-term Australian Federal budgets, it is apparent that the principal driver in Defence budgets is the maintenance of the ADF. It is also evident that Defence could reasonably expect Defence allocations will remain in the 8–9 per cent Federal Government outlay band, unless there is a major change in threat perceptions, economically constraining force development alternatives, but giving some planning certainty.

MANNING

With the national workforce of 2020 having already been born, there is only limited uncertainty regarding Australia's demographic future. Force development will be constrained by the impact of the important long-term, and apparently unavoidable, changes in the structural characteristics of the Australian population. Demographics and force development are both long-term processes; the 2002 decision to acquire the Joint Strike Fighter aircraft will see the aircraft entering service in 2015 and remaining until about 2045. Demographic projections over this period indicate a slowing in the growth of the Australian workforce concurrent with a significant aging of the population, with migration not appearing a viable solution to these problems.[38]

Workforce growth from 1970 to 2000 was about 2.1 per cent annually but is now slowing markedly; in 2010 is estimated to drop to 0.47 per cent, and turning negative beyond 2019.[39] This combined with an aging population will impact the future ADF in a number of interlocking ways.

- Firstly, a general national labour shortage will develop unless the 55–64 age group labour force participation rate increases significantly.[40]
- Secondly, over the next 30 years there will be a marked reduction in the 15–29 year age group and an increase of the 30–54 year age group with the average workforce age rising some seven years between 2000 and 2020 to about 41.[41]
- Thirdly, competition for new entrants to the workforce in the 15–24 year age group—the primary ADF recruitment target group—will increase markedly as new workforce entrants decrease as a proportion of the workforce.

The combination of these demographic changes means that the future ADF will have much greater difficulty than now of attracting recruits, that the average age of the ADF can be expected to grow markedly, and that retaining staff will become progressively more difficult.

These demographic changes could also have serious national economic impacts with adverse impacts on Defence budgets. The forthcoming 50 per cent increase in the age group of 55 to 64-year-olds is arguably the biggest change in the structure of the Australian economy since World War II and will create significant adverse

pressures on the Federal Budget, especially through increasing aged pensions and health care costs.[42] Later this decade the Federal Budget will be negatively impacted by increasing aged care and health costs, eventually growing to place the budget $40 billion in deficit annually by 2042, or five per cent of GDP. Compared to Defence's GDP share of around 1.8 per cent, this is a sizeable figure.[43]

Compounding this, the overall tax base will grow at a slower rate. Workforce growth from 1970 to 2000 was about 2.1 per cent per year, but in the next 30 years this slows markedly and is estimated by the Department of Treasury to reach 0.6 per cent in the 2010s, 0.2 per cent in the 2020s, and 0.1 per cent in the 2030s. This cuts Australian economic growth from 3.1 per cent in 2000 to an estimated 2.3 per cent in the 2010s, and dropping below 2.0 per cent beyond 2020.[44]

These factors can be expected to lead to significant competition within the wider Australian community for government funding and people. The demands for educated, intelligent and fit people may be intense after 2010 as the overall workforce pool becomes stagnant; competition for people will become zero sum, with one employer's gain being another's loss. Security is necessary to safeguard the nation's prosperity, but defence spending in itself does not create the wealth necessary to fund defence. Instead, people working outside Defence produce the necessary prosperity. In Australia's wider economic best interests, the future defence force structure should therefore be effective with the minimum dedicated staff, and be created in a way that spends the maximum amount within the national economy, thereby being subject to taxation able to offset the inescapable growing aged population budget deficit.

A ROBUST FORCE DEVELOPMENT STRATEGY

A robust Australian force development strategy would meet the different challenges of the four possible worlds identified with their differences in alliances, state-based threats, and non-state actor threats set against the constraints of limited budgets and demographic changes. A robust strategy differs from the traditional strategic planning approach in that it does not presuppose an ability to identify the most, or least, likely outcomes. Instead, it seeks to build an organisation that resembles a market, with a population of strategies that cover a broad array of possibilities and evolve over time, with some succeeding and some failing.[45] A robust strategy is not an 'optimum' strategy, this being inherently impossible in an uncertain environment (except in retrospect), but instead seeks to meet strategic needs within a limited resource base by being designed to evolve over time as strategic circumstances change.

A defence force consists of people organised in a particular manner and equipped with various devices of differing complexity; addressing only equipment aspects is insufficient. The application of a robust strategy to the problem of defence force development needs to be based around three principal and interrelated areas: Manning, Organisational Structure, and Force Structure.

MANNING: FEWER PEOPLE, MORE ROBOTS

The most certain issue facing defence in the longer-term in managing all four scenarios is the impact of demographics. The future force structure must be sufficiently effective in all alternative futures while utilising the minimum numbers of personnel who will be, on average, considerably older than previously. In all four worlds, the shrewd application of technology appears able to compensate for many of the problems created by demographic changes through enhancing the productivity of each ADF member.

Technology needs to be applied in a way that moves the ADF from a force structure built around undertaking combat operations using people, to one constructed around using machines that significantly enhance the productivity of each member. In adopting this approach the ADF, when modernising, would acquire platforms, equipment and systems which were, wherever practical, unmanned or at least minimally manned. This approach needs also to be applied to maintenance and training functions as these, whether performed by ADF personnel or contractors, still involve using the Australian workforce with its demographic dilemmas.

Over the next few decades the ADF will be manned by 'middle-age warriors' making reliance on cerebral, rather than physical, skills preferable. Forty-year-olds are physically not as robust or versatile as 20-year-olds, and this

needs to be considered in building the next ADF. The upside is that older personnel should join the force with a high level of maturity, be well- educated, experienced in several fields, and consider innovation and lateral thinking normal. Demographics also suggest the ADF of 2020 will have a male/female balance much closer than now to the Australian community—up to some 45 per cent of the ADF could be female. Reserve forces may become central, however, working for the ADF on the occasional weekends implies combat systems acquired by the ADF are easy to use and maintain, and as much as possible automated. This combination of fewer, older, well-educated personnel composed of more female and reserve staff would be less suited for some force structure designs such as a large, infantry-heavy Army based in the more remote areas of Northern Australia. However, such personnel attributes would be compatible with a force structure emphasising expendable robots, unmanned combat systems operated remotely from the battlefield, and minimally manned platforms.

Automation is less practical for some land force operations that require appreciable numbers of personnel, and for this personnel may need to be sought offshore. Peacekeeping and nation-building operations could occur to varying degrees in all four worlds, however, such operations are inherently resistant to robotisation and instead require large numbers of suitably trained, equipped and disciplined people. In our region, the South-West Pacific Islands have the reverse demographic problem to Australia and have large numbers of young males possibly suitable for recruitment. Fiji is already a source of soldiers for the UK Armed Forces with some 2000 serving in the British Army. Fijians are experienced and proven in peacekeeping operations, and are also now being sought by private companies for security duties in Iraq. An alternative would be to use alliance relationships and transfer certain personnel-intensive roles to those nations without demographic shortfalls.

ORGANISATIONAL STRUCTURE: NETWORKED AND OPEN

In all scenarios, there are significant benefits in the ADF being able to make use of 'whole of government' and 'whole of society' resources. Donald Rumsfeld drawing on recent US experience notes:

> …wars in the twenty-first century …increasingly require all elements of national power: economic, diplomatic, financial, law enforcement, intelligence, and both overt and covert military operations. Clausewitz said, 'War is a continuation of politics by other means'. In this century, more of those means may not be military.[46]

The particular participants anticipated to be involved in future conflicts is impossible to predetermine, however, contemporary management theories suggest that in such uncertain external environments, an organisation's internal structure should emphasise the ability to network with external agencies.[47] The ADF needs to develop an open organisational structure with appropriately trained staff, suitable technical resources, and matching doctrine and culture to allow the optimum interface and networking with a wide range of external agencies, organisations and resources. In this the ADF would be reflecting Australian civil society that, in embracing the information age, is becoming externally and internally, widely and deeply networked in all senses.

The ADF structure and organisation needs to be open and networked not just with domestic agencies but also internationally. Conflicts have come to involve interactions between extraordinarily diverse mixes of local and international armed forces, UN agencies, non-governmental organisations, contractors and private security companies.[48] Connecting with and leveraging off local, national and global governments, non-government organisations, industries, and societies appears consistently useful whether in managing state or non-state actor violence. The great diversity of actors possible in future conflicts compels the ADF to embrace a networked organisational structure open to the world and able to make best use of external resources.

In all worlds, a broadening of security relationships to include multiple countries is beneficial, as Australia's reliance on a single alliance for defence assistance is inherently fragile. Moreover, in attempting to move towards the left side of the scenario matrix (Figure 1), that is to the preferred future where interstate warfare becomes improbable, establishing stable, durable security relationships with multiple regional and more distant nations is an important step. The nudging of the international system towards the preferred future is being supported in a meaningful way by the steady increase in international agreements between Australia and other nations

to combat terrorism.[49] These agreements provide a good basis for security cooperation and collaboration in an important area, but could be deepened to become more multi-dimensional and thus more robust. Singapore's multiple, deep relationships established with Australia, New Zealand, Taiwan, the US, France and recently India, provides a regional example of the breadth, depth and diversity possible in defence relationships. Thailand provides another example in having security relationships with both China and the US, in conjunction with the Treaty of Amity and Cooperation with other ASEAN states.

FORCE STRUCTURE: WIDER AND THINNER, WITH HEDGES

The ADF's force structure needs to be broadened to provide the flexibility needed to be able to manage the four possible worlds, not just one or two; forces structured only for the defence of Australia or for expeditionary forces are insufficient. The scenarios indicate that the future could see a deepening of the transnational non-state actor threat trends simultaneously with a continuation of the 50 year trend of reducing interstate conflict or conversely, a reversal of this with a return to interstate rivalries and tensions.[50] The precise direction remains unclear, thus both possibilities need to be hedged against. Contemporary challenges, especially those posed by non-state actors, go beyond those that have traditionally been the focus of attention in defence force planning.[51] Minister Hill recently observed that while Defence policy has focused on developing a force structure for the Defence of Australia: 'two matters—terrorism and the spread of weapons of mass destruction, including to terrorists—have emerged to new prominence and created strategic uncertainty'.[52]

The ADF's future force development plans, largely based on defending Australia against conventional military threats, now arguably over-hedge against a resumption of the threat of conventional war, at the expense of not hedging against other possible and emerging problems, especially those posed by transnational non-state actors. The present force development plans balance the force against the needs of past threats, not the requirements of future problems, requiring a new balance to be struck.

In this force development strategy, numbers are now much less important than having a breadth of capabilities to hedge against an uncertain future, with this breadth now able to be afforded through making the ADF's force structure thinner. In the later half of the Cold War, Australia embraced President Nixon's 1969 Guam Doctrine decree that allies were responsible for their own national defence, and accordingly built a defence force able to fight a short interstate war using technically advanced air, maritime and land forces. The notional adversary was envisaged as a defence force almost a mirror image of the ADF, with future warfare conceived as symmetrical. In the post-Cold War world, however, with regional nations maintaining only numerically small force elements suitable for inter-state wars, the defence force does not need to be a perpetuation of the Cold War's narrow and deep structure intended to counter a symmetrical force. In the modern world, this force structure only allows adversaries to subtly manoeuvre around the defenders, attacking where and when the defences are weakest. To counter today's indirect attackers, a defence force needs broad capabilities that importantly can be affordably thin, as the threats are not massed armies, navies and air forces needing countering by Australia alone.[53]

Instead of having a few deep capabilities, the force structure needs to change to be composed of many different, thin capabilities. Examples of current deep capabilities include the overlapping air defence, anti-ship, anti-submarine, ground defence and land force fire support capabilities scattered amongst two or sometimes all three Services. This approach was eminently sensible in an era of preparing only for conventional war, but could now be reduced in depth to provide resources for broadening the force structure into new areas of need.

Network Centric Demands. A broad, thin, heterogeneous defence force structure has become practical as new information technology and advanced mobile communication systems allows defence forces to become significantly more efficient and effective through electronically networking internally and with external agencies and groups.[54] Across all the force elements, investment would need to be made to change the focus from being platform-centric to being network-centric. In enabling a broad thin force structure to function adequately, interconnecting the force through all-channel networking becomes an essential structural characteristic.[55] Additionally, this network would need to be open to allow connection to external agencies, organisations and allies to allow these assets to be accessed and leveraged off.

FORCE STRUCTURE SUB-STRATEGIES

The envisaged broad-thin force structure would incorporate elements appropriate to all scenarios and some relevant only in one or two scenarios. The envisaged robust force development strategy features five nested sub-strategies comprising firstly, two 'no-regrets' sub-strategies that possess utility across all four scenarios; and secondly, three hedging sub-strategies useful in only some future worlds, but needed to provide the capacity and the growth path to handle the type of uncertainty identified across the four future worlds.

Regional Security No-Regrets Sub-Strategy. In all scenarios, possessing the ability to contribute to regional security allows the local defence environment to be favourably shaped for the longer term. A nation's security is always more assured when surrounded by friendly, stable and prosperous neighbours. In some scenarios, the primary rationale driving contribution to regional security would be to meet potential state-based threat challenges through pro-actively undercutting any potential adversary pressure on nearer nations. In other scenarios the principal concern may be meeting transnational non-state actor threats by ensuring such groups do not gain direct or indirect support in neighbouring countries.

Experimentation No-Regrets Sub-Strategy. Given resource constraints, the ADF cannot shape the international security environment the way the US military can, rather the ADF must act in accordance with the environment, seizing opportunities presented and responding in a well-timed manner to emerging threats. This resource-imposed strategic posture, combined with the international system's uncertainty level, favours investments in organisational capabilities designed to keep options open for some four per cent of the ADF future force development, and experimentation process that allows innovations to be quickly embraced if successful and external circumstances favour.[56] An experimentation methodology based around rapid prototyping can harness the 'butterfly effect' of chaos theories to allow small investments to nudge organisations into transforming and evolving to meet emerging circumstances. The methodology involves developing and trialing leading-edge, operational prototypes in a manner that allows the timely introduction of small numbers into service if necessary and if additional funding allows.[57] Strategic adaptiveness is created so that the ADF can be readily repositioned for a moderate cost over a period of a few years as conditions change.[58] The organisation becomes less vulnerable to, and more able to take advantage of, unforeseen change; however, achieving this level of adaptiveness is not resource-free. Based on international and commercial experience, the financial investment envisaged in experimentation and rapid prototyping is some four per cent of the ADF future force development budget.[59]

Hedging Sub-Strategies Concept. Strategic circumstances will change and the force development planning methodology must reflect this. Hedging sub-strategies provide the force structure with the ability and the processes to develop to meet new circumstances, however, they do increase costs as not all hedges will prove necessary as the international system evolves. A robust package of hedging sub-strategies should be considered a portfolio of real options and just as with financial options, the greater the uncertainty, the greater their value.[60] Hedging sub-strategies should minimise expenditure and long-term commitment, spending only limited funds until the direction the future is evolving towards becomes more certain. When evidence accumulates that the international system is developing in ways that changes the range of possible alternative futures, then the overall force development strategy should be modified to reflect this change by either expanding or contracting particular hedging sub-strategies. Importantly, strategic planning using the scenario matrix approach is dynamic, not static, and requires regular attention be paid to monitoring the environment for changes that could trigger shifts in the international system. Trigger points in the scenarios developed in the matrix could include a breakthrough or breakdown in the World Trade Organisation, or an US election campaign where an isolationist stance by a contender found significant resonance with the US public. Such developments would provide early warning that the international system was developing in new directions and that the hedging sub-strategies may need review.

Specific Hedged Domains. In examining the four worlds, the overall force structure can be usefully segmented into four broad functional domains. The regional-security domain, common to all worlds, has been discussed earlier. The other three domains are only appropriate to some worlds and therefore should be managed using hedging approaches; these three domains are as follows:

a. ***Defence of Australia.*** This domain is applicable to the future worlds of Home Alone, where it would be the prime ADF function, and Cold War Redux, a scenario reminiscent of 1980s circumstances.

b. ***Niche Forces for Coalition Operations.*** Niche forces to contribute to coalition operations are important in Middle Ages Concert, Virtual Empire and to a lesser extent in Cold War Redux. In Virtual Empire and Middle Ages Concert the aim of coalition operations would be to maintain global stability; in Cold War Redux preventing alliance abandonment by the US would drive Australian participation.

c. ***Managing Transnational Non-State Actors.*** This functional domain is important in the Middle Ages Concert and Virtual Empire future worlds. A national capacity to undertake this function is also necessary in Cold War Redux and Home Alone, but being a less severe threat could be readily managed by non-Defence agencies.

Hedged Domain Approach. With the prospect of inter-state conflict in our region being low[61] and the assessed likelihood of needing ADF operations in defence of Australia also low,[62] the defence of Australia would primarily involve maintaining deterrence and a timely expansion capacity. In the other domains, the primary focus would be on being able to meet credible short-warning tasks, with a secondary task of maintaining a capacity to expand if circumstances require. This extends the application of the force posture concepts initially elaborated in the 1994 White Paper for Defence of Australia tasks to niche forces and managing transnational non-state actors.[63] This accords with the 2003 Defence assessment that: 'for the foreseeable future, any ADF operations are likely to occur within the context of regional contingencies, the War on Terror, efforts to counter the proliferation of weapons of mass destruction (WMD) or to otherwise enhance global security and stability'.[64]

FUNDING: BALANCE OF INVESTMENT APPROACH

The principles annunciated can guide the allocation of force development funding through determining the balance of investment against the various sub-strategies. Such an approach avoids having a platform-centric focus too early in the budget allocation process, allowing improved resources-to-need matching. The overall aim is to devise a force better prepared for the uncertainty endemic in the contemporary international environment. Translating funding directly to particular platforms based on intuition alone risks preparing for an unknown future on the basis of individual past experiences that may prove outdated.

The identified high-level functional domains can guide investment allocation based on the number of future worlds the domain has utility in. The exception is the domain of experimentation using rapid prototyping (termed R&D in the diagram) which is allocated four per cent of the budget for reasons explained earlier in the paper. The number of domains each functional domain has utility in is explained in the earlier paragraph titled: 'Specific Hedged Domains'. The overall balance of investment is diagrammatically illustrated below:
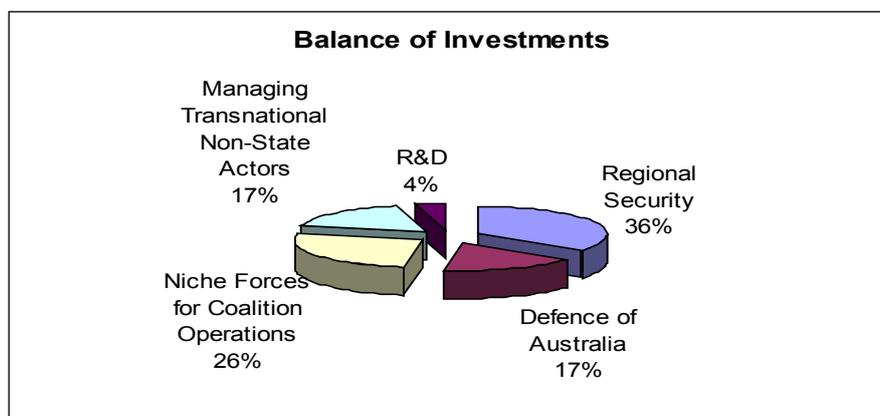

Figure 3. Balance of Investment

Those domains which are not useful in all scenarios need to be funded in a way that do not make unnecessarily long-term financial commitments that crowd out funding alternatives that could become critical as the international system evolves. In an uncertain world, strategy is really about creating options and opening up new choices, not shutting them down.[65] In general, the more strategic options generated the better, because there are then more potential strategies created to address future uncertainties. Flexibility can be implemented in strategic options in several ways, including embedding intrinsic flexibility that allows easily scaling the commitment up or down; financial flexibility, involving hedged investments or risk sharing with partners; or organisational flexibility that can exploit developments in a rapid and smart manner.[66]

ILLUSTRATIVE APPLICATION OF PRINCIPLES TO THE ADF

Regional Security. In this domain, the activities involved would vary from contributing to regional security through alliances and burden sharing, to participation in regional peace support operations or humanitarian interventions. Regional security operations generally favour deployable forces, doctrinal and technical interoperability with neighbours, the ability for equipment and personnel to operate for extended periods from remote locations, and appropriate logistic, maintenance and support systems. Hugh White considers that a third force, 'firm power', lying between the soft power of aid and the hard power of armed force, would best meet the problems of the immediate neighbourhood of South-West Pacific.[67] Conversely, in contributing to South-East Asian security more traditional military forces may be preferable.

Defence of Australia. The type of force required is well understood from the considerable body of work undertaken in the 1980s and 1990s, with the important elements being air and naval forces to deny the air and sea approaches to Australia, and mobile land forces to respond effectively to incursions.[68] Lower domain costs could be achieved if the present policy of deterrence by denial, that calls for maintaining a force of comparatively numerous and expensive defensive assets, was changed to a policy of deterrence by punishment using a lower-cost force composed of small numbers of offensive systems.[69]

Niche Forces. Niche forces can be additive or complementary; be combat units or support forces; or be intended for pre-war, war, or post-war employment. Additive niche forces have utility principally in conjunction with a larger force and may be lower in cost, but being less important may provide Australia less political leverage. Complementary niche forces are an alternative, albeit possibly more expensive, but in being more operationally useful in coalition activities would make Australia more valuable as a partner. The particular states involved in the coalition operations in which these niche forces would participate vary between the different alternate futures; in some the US dominates, in others not.

Transnational Non-State Actors. In the traditional state-centric construct of the international system non-state actors had no role, however, the process of globalisation now allows non-state actors to have system-wide impacts. Globalisation involves the creation, over intercontinental distances of multi-dimensional networks, of interdependent relationships of capital, goods, information, ideas, and people.[70] The networks created allow external non-state actors to penetrate the sovereign space of states for many different purposes, some occasionally harmful. The September 11 attacks demonstrated that non-state actors operating within a globalised environment can be as coercive and fear inducing as states, although the survival of the state being attacked is not directly threatened.[71] The attacks also revealed that military power, framed in the context of managing state-based threats, could be ineffective in defending against non-state actor threats.

The nature of non-state actor threats favours enhancing defensive and incident reaction measures, and sharply improving threat intelligence collection, surveillance, reconnaissance and monitoring to allow defensive activities to be both timely and effective. These measures are similar to those suggested in earlier 'low-level conflict' studies for contingencies common in some respects to contemporary concerns about non-state actors using terrorist tactics.[72]

Such activities may need to be undertaken across the whole network of interactions and relationships, stretching from their support base to their intended target area. These networks extend in time and space, being

both global and persistent, and are not geographically and time constrained in the same manner as traditional defence forces are. New strategic dilemmas are therefore posed for international law, the sovereignty of states and the maintenance of legitimacy when applying force against terrorist groups. Offensive operations may be restricted to unconventional operations using highly focused force, including using precision attack and Special Forces.[73] Additionally, countering hostile transnational non-state actor networks may also involve peacekeeping and nation-building in those failed or weak states where terrorist groups and their affiliates breed and receive support from.[74] Attention also needs to be given to reacting to attacks from non-state actors using WMD, for while the likelihood of this may be low, the consequences may be very serious, making having an ability to minimise the impact important.[75]

CONCLUSION

The strategic planning methodology of scenario matrixes appears to have considerable potential for ADF force development. The future direction of international relations has historically proven difficult to predict, with unexpected surprises frequent and numerous. Uncertainty is endemic in the international system, but can be bounded, analysed and taken advantage of if appropriate force development strategic planning tools are used.

The scenario matrix methodology does not seek to predict the future but instead, by revealing the future's inherent possibilities, allows a robust force development strategy to be devised, composed of several interlinked no-regrets and hedging sub-strategies. Strategic circumstances will change and this force development planning methodology incorporates processes that can accommodate an evolving international environment, lessening the possibility of being unpleasantly surprised by unexpected situations. The future is not predetermined being dynamic, puzzling, unclear, obscure and above all else, uncertain. Uncertainty—the central, undeniable characteristic of the contemporary international system—should be harnessed to guide the development of the Australian Defence Force.

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