Futures Analysis in the Digital Age

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Introduction

Two strong and opposed currents which help define the current state of international politics are the speed of technological development driven by computing and micro-processors and all that this entails, and the difficulties that modern national governments have in keeping up with these developments. The pace of technical change driven by computing, and still (probably) governed by Moore's Law (the doubling or processor speed every 18 months) or other advances in computer engineering, is blistering.[1] This technological change has impacts which are both surprising (that is, they exceed the initial presumed use of the technology) and which also cause clear changes in social and cultural behaviours: see for instance the much-discussed impact of 'fake news' in social media on politics in the UK or the US.[2] Yet at the same time, for governments to deploy major capital military systems—still a requirement in an age where peer competition is alive and well—takes decades, and government IT projects are often just as slow and notoriously inept.[3] Western governments still lag behind some smaller states in developing effective cyber-security and cyber-warfare units, and may be basing the function of these units "on threats that are speculative and frequently exaggerated and over-simplified."[4] If the nation state is to continue to serve as the central form of organisation for the well-being of its citizens, then the state needs to adapt to deal with threats which emerge (arguably) more quickly then they have done before in history. As the Australian Defence Science and Technology Office (DSTO) put it, states must be able to "examine the wider socio-economic and strategic global factors that shape the long-term future and its impact on emerging trends in science and technology."[5] They must be able to do this rationally, systematically, and in a policy-relevant way. Horizon scanning and futures methodologies are a potentially important tool to help modern governments to remain prepared for these emerging from this rapid technological innovation and change. Getting this right is a key requirement of intelligence analysis in the digital age…and for

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[1] UK MoD: 'Strategic Trends Programme Future Operating Environment 2035 First Edition', 2015.

[2] Tom Simonite: 'Moore's Law Is Dead. Now What?', *MIT Technology Review*, 2016, pp. 1–5.

[3] David Thornton: "DoD acquisition 'slow by design,' can't handle cybersecurity defense", *Federal News Radio*, 24 October 2017. https://federalnewsradio.com/cybersecurity-2017/2017/10/dod-acquisition-slow-by-design-cant-handle-cybersecurity-defense/

[4] Laura Reston: 'How Russia Weaponizes Fake News', *New Republic*, 2017, pp. 6–9.

[5] Mark Sexton: 'U.K. Cybersecurity Strategy and Active Cyber Defence – Issues and Risks', *Journal of Cyber Policy*, Vol. 1, No. 2, 2016, p. 223.

whatever "age" comes next.

While the use of the term varies between governments and organisations, we can define horizon scanning as a series of structured analytical methods which all the systematic examination of information to identify potential threats, risks, emerging issues and opportunities, usually in a time frame beyond that which is normally covered by intelligence organisations or government policy teams.[6] These methods by themselves are unlikely to eliminate intelligence surprise—which is likely an inevitable fact of life in the intelligence world[7]—but may increase the efficiency of intelligence organisations and functions. Horizon Scanning methodologies—like any intelligence method—contain flaws which, depending on the organisational structures and cultures in which they are set, may or may not prevent them from having their desired effects.

This article will focus on how the UK Ministry of Defence (MoD) has embedded futures methodology into its doctrinal and acquisitions processes, via conceptual products and experimental exercises meant to prepare UK Armed Forces for the perceived "future character of conflict."[8] This is not the only useful example one might seize on, but is one with remarkable breadth in government, and significant open publication of findings, making it a suitable example to examine.

Intelligence in its broad definition can benefit many different branches and functions of government—for instance, in the UK departments as varied as Work & Pensions and the National Health Service have intelligence units[9]—and likewise futures methods can be useful across government. Indeed, it is in various non-security related branches of government that futures methodologies are likely the most widespread, in areas such as environment, development, science and technology, and education.[10] Such a limitation is necessary to limit the scope of a very broad and still-emerging field, but also because it is in the national security realm that we deal most directly existential questions of state survival and life or death questions. Terms such as foresight, horizon scanning, and futures will be used interchangeably throughout this article. This is perhaps a weakness in the field, as one professional has noted "there is a lack of a common understanding within the Horizon Scanning and Futures community

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[6] This definition an adaption of the UK definition as provided by Jon Day in UK Cabinet Office: "Review of Cross-Government Horizon Scanning", p. 2.

[7] Richard K. Betts: "Analysis, War, and Decision: Why Intelligence Failures Are Inevitable," *World Politics,* Vol. 31, No. 1, 1978, pp. 61-89.

[8] UK MoD: 'The Future Character of Conflict' (Shrivenham, UK., 2010).

[9] Owen Hughes: "NHS Digital turns to 'ethical hackers' with new £20m cyber security unit", *Digital Health,* 27 Nov 2017, accessed at https://www.digitalhealth.net/2017/11/nhs-digital-turns-ethical-hackers-new-20m-cyber-security-unit/

[10] Kerstin Cuhls: "Lessons for policy-making from Foresight in Non-European Countries Policy Paper by the Research, Innovation, and Science Policy Experts (RISE)", European Commission, 2015.

and a common language. The various disciplines that have contributed to Horizon Scanning have resulted in a variety of views of what it is."[11] As this chapter will describe, while futures and foresight work uses a variety of techniques, almost all are variations on a theme of first analysing trends in a divergent set of fields, selecting the most significant or likely to change, and from these extrapolating factually-grounding, but essentially fictional, scenarios.[12] Accordingly the differences between the terms lacks more than superficial significance.

This chapter focuses on the UK MoD's futures and horizon scanning systems. This is instructive for its own sake when considering major British defence acquisitions projects over the next decade or more, but may also be useful when considering how other states view the range of potential futures for which they must prepare. Britain is an interesting case as it is a significant mid-sized state with global economic *and* security interests—it maintains a large and capable expeditionary armed forces which has been deployed frequently across Africa and Eurasia. It has initiated futures and horizon scanning work across most of its very large bureaucracy. And it has helpfully released (or at least not classified) a very broad swathe of documents concerning its horizon-scanning processes, including internal critiques as various efforts have failed over time. We can, looking at the UK, identify better than many other state examples the actual impact of horizon scanning on policy-makers and policy. While other states maintain important horizon scanning and futures functions—Singapore being a world leader[13]—the very broad reach of the UK MoD's "horizons" shows the extent to which modern powers must work to understand the world in which they will compete.

The UK Defence Horizon Scanning Programme

The UK military has thoroughly embraced horizon scanning and scenario generation as the basis for its capability and force development process—arguably, HM Forces are pace-setters in their robust futures/scenarios thinking on technology, certainly as it applies to national defence. This is a clear acknowledgement of a three-fold problem; the current quick pace of technological change; the often very long timelines of defence acquisitions even (or especially) in these new fields; and the squeezed defence budgets which put pressure on defence to get things right (as there is no more money if they get it wrong). That the MoD should be the government leader in the field is not completely surprising in light of the diffuse and shorter-term nature of horizon scanning in other government departments: The MoD is the most security-focused ministry with

[11] John Carney: 'The Ten Commandments of Horizon Scanning', Government Office for Science Foresight, 2018, https://foresightprojects.blog.gov.uk/2018/03/08/the-ten-commandments-of-horizon-scanning/.
[12] Seng Boey, Peter Dortmans, and J. Nicholson: 'Forward 2035 DSTO Foresight Study', 2014, i.
[13] Government of Singapore: "Risk Analysis and Horizon Scanning Centre," accessed 23 March 2018, https://www.nscs.gov.sg/public/content.aspx?sid=22.

the greatest need for very-long-term scanning. They are also, arguably, most immediately and acutely affected by any technological surprise.

The pressure on the military's longstanding way of warfighting is keenly sensed, and "success against complex and diverse threats that exploit pervasive information requires us to do things differently" one product notes.[14] In a conscious attempt to counter this, horizon scanning, and scenario-based products, are produced through all levels of planning, with the aim of preparing HM Forces for the "future shocks" that are presumed to be inevitable. The British military way of integrating these scenario-based planning tools across the forces is not without problems. It does, however, stand as a remarkably coherent effort to prepare the military for the future warfighting environment in a digital age which presents a "new geometry"[15] of the battlefield, conditioned by prevalence of remote & autonomous systems (RAS), stand-off fires, and high-intensity information warfare.

Mimicking the whole of government, horizon scanning in the MoD is spread across a number of organisations and locations. One key location is the Defence Science and Technology Laboratories (DSTL), an executive agency of the MoD, which maintains robust technology-focused horizon scanning. Specifically, DSTL conducts "technology watch" with a specific application, or set of applications in mind, and usually, a good understanding of the set of relevant technologies. DSTL also conducts horizon scanning to identify technologies which have not previously been considered relevant, and to "propose the possible value of developments that are being made for non-defence applications."[16] Overall, the aim of DSTL work is to provide a "simple yet systematic and efficient process for stimulating creative new solutions and for avoiding technological surprise", underlining its well-defined science and technology focus.[17] What DSTL does not do in the first instance is integrate the technological horizon scanning with futures work in social, political or demographic field. To that we must turn to DCDC, and an integrated structure of futures work tied, principally, to what and how the MoD should acquire new technologies and evolve the "conceptual component" necessary to employ these "physical component[s]" optimally.[18] Not just the technology, but the whole human environment in which the technology will be employed.

The basis of the UK's defence horizon scanning is a connected system of products which stress

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[14] 'The Report of the Iraq Inquiry,' *op.cit.*

[15] Anthony King: "Future Small Units and the Urban", Agile Warrior Conference, Worthington Gunner, 22 Feb 2018. With permission.

[16] UK MoD: "JCN 1/17 Future Force Concept", 2017, V, para 2.

[17] Holland Smith, David & T. Strong, Gillian: "Science and technology horizon scanning: opening the pathways for innovation", 2018, p. 4.

[18] British Army: "Army Doctrine Publication - Operations", 2010, pp. 2–7.

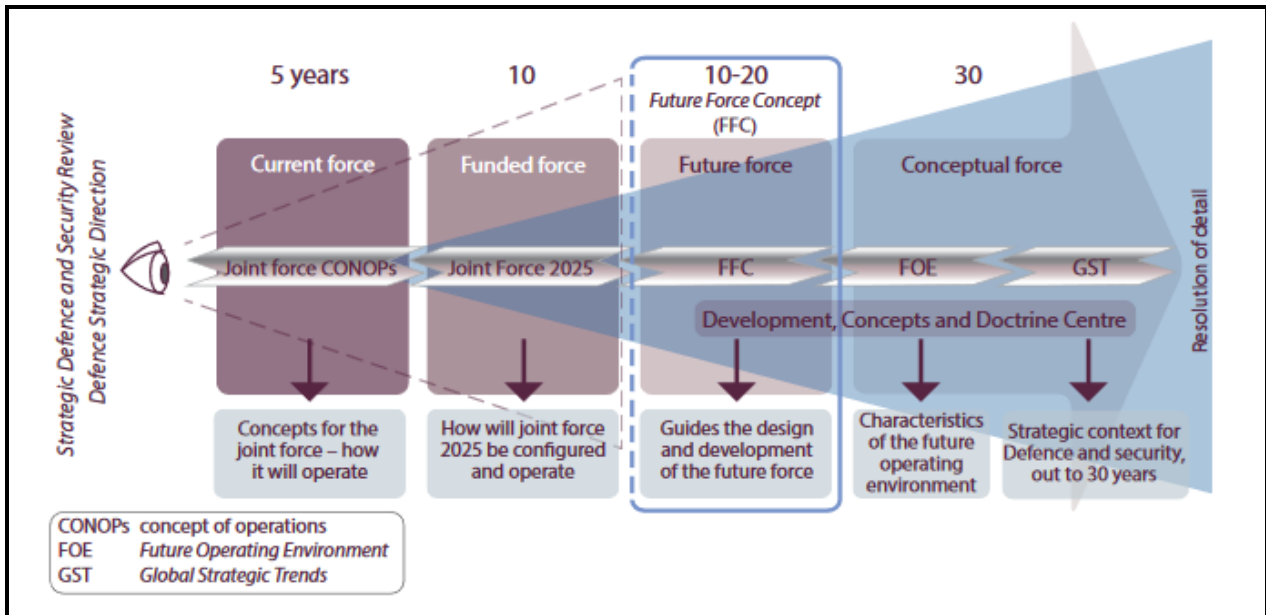from the present to 30 years and more, as depicted at Figure 1.

Figure 1: UK Armed Forces Horizon Scanning System

The graph is best read from right to left—from the most distance and least certain to the most immediate on the left, and we are interested here in the grey blocks in the middle: Global Strategic Trends (GS), Future Operating Environment (FOE) and Future Force Concept (FFC), key products generated to provide a coherent, MoD-wide agreed view on realistic future scenarios. The whole system is initiated by the Director Joint Force Development which gives direction to DCDC—the MoD's "think tank"—to begin DCDC on the process of developing.[19] The whole programme is on a rolling 5-year renewal timeline.

Global Strategic Trends

A critical fact in understanding this futures system is that it is inherently tied to funding (as it likely would be within *any* government): all UK Defence spending begins by being joint, that is, across all three of the services. Money trickles down to the services when they can convince the Joint Force Development Command that their plans suit those concepts, which have been developed jointly. Hence, there needs to be a conceptually sound, agreed view of how conflict is evolving and how the UK fits into that future environment. The outcomes of this process are important, as some capital equipment will remain in service for 35 years or more—such as the UK's *Elizabeth*-class aircraft carriers—after decades of development. The capabilities that new equipment must possess need to be considered in light of what they will bring not just into the

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[19] Interview, Paul Norman, DCDC, 12 February 2018, Shrivenham, UK

"current force" but indeed some *future* "future force."[20]

Since 2001, DCDC has been producing its landmark publication, *Global Strategic Trends* (GST). GST "describes a strategic context for those in the Ministry of Defence (MoD) and wider Government who are involved in developing long-term plans, policies and capabilities…it describes those phenomena that could have a significant impact on the future and combines these differing perspectives to produce a multifaceted picture of possible outcomes."[21] The impetus to start publication was driven by the 1998 Security and Defence Review, which noted that "Defence planning is a long term business. Major equipment takes years to develop and typically have lives of twenty-five years or more… We cannot predict the future but if we are to meet it confidently we must have a clear long-term view of our objectives and how we expect defence to contribute to them."[22] It placed a premium then on both operating more jointly and taking into account future scenarios: Global Strategic Trends was begun in 2001, publishing the first edition in 2003.[23] It is currently in its fifth edition, and is produced without classification so it can receive the broadest utility across government.

While it is a defence product, GST now serves as the longest-term and broadest-based horizon scan produced in the British Government, and its drafters expect it to contribute to the production of the periodical National Security Strategies and the National Risk Register, though the links to do so are not formalised and this impact has not always materialised.[24] The production of GST follows the standard methodologies of futures and scenario development. The process begins with a review of previous data, an analysis of gaps and new research topics, a drafting of initial research papers, mapping of topics, consultation, writing and consolidation.[25] The entire process receives considerable engagement with those outside MoD, from academia, business and government both domestically and internationally. In so doing, "we have deliberately attempted to avoid a single, subjective perspective."[26] The document makes liberal use of scenario narratives and other classic horizon scanning tools. It presents its data both thematically and regionally. The themes include items as diverse as gender, urbanisation, corruption and the environment, and the themes cover the entire globe. Throughout, the process is "red-teamed" to cross-check judgements via alternative analysis.[27] While the entire GST is clearly too long to summarise adequately here, a small snippet of its key judgements provides

[20] Interview, B1, UK OF-4, London, 13 Jan 2018.
[21] UK MoD: "Strategic Trends Programme: Global Strategic Trends - Out to 2045" (Shrivenham, UK., 2014), vii.
[22] HM Government: "Strategic Defence Review 1998", 1998, paras 12–15.
[23] Interview, B1, UK OF-4, London, 13 Jan 2018.
[24] Interview, Paul Norman, DCDC, 12 Feb 2018, Shrivenham, UK
[25] UK MoD: "Global Strategic Trends", *op.cit.,* pp. xxiv.
[26] Ibid., vii.
[27] Interview, Paul Norman, DCDC, 12 Feb 2018, Shrivenham, UK

an indicative sense of the whole:

> Technology is highly likely to change our working environment. By 2045, robots or
> "unmanned systems" (able to carry out complex tasks without a human operator's
> direct involvement) are likely to be as ubiquitous as computers are today.
> Machines are likely to become more sophisticated and lifelike. We could also see
> robots used in many more areas of work and society, including caring roles,
> customer-service, surgery and in combat.[28]

The paper further describes the "significant challenges resulting from population growth,
migration, greater demand for energy, climate change, continuing globalisation, rabid
urbanisation and the exponential rate of change in readily available technologies."[29] One can
see that GST provides broad-based judgements not purely primed for defence needs, but
instead covering the whole of the human experience. Accordingly, the next DCDC horizon
scanning product, the Future Operating Environment (FOE) is needed to focus down the
analysis to make it more relevant to the development of future force structures.

The FOE makes up the other half of the "Conceptual Force" and its far-distant horizon. The
previous edition of the document was titled *The Future Character of Conflict* and it may be the
case that this title captures more clearly the function of the document.[30] The FOE restricts itself
to 20 years outlook, and makes a point of noting that, realistically, "some characteristics of the
future operating environment in 2035 are likely to be similar to those apparent today."[31] A short
section on robotics highlights the contrast of the purpose of FOE in comparison to GST:

> The proliferation of automated systems, and their use by a variety of actors, will
> spawn a diverse range of applications across all environments in 2035…
> Automated combat systems are likely to be developed along two different paths:
> high-end, multi-role, exquisite capabilities that seek to emulate and potentially
> replace high-end manned systems; and low-end systems that are highly
> specialised and limited to one or two missions… Defence will need
> to make exploiting emerging technology and capability in automated systems a
> priority, as well as countering our opponents' systems. [32]

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[28] UK MoD: "Global Strategic Trends", *op.cit.,* pp. xiv; UK MoD: "A Guide To Red Teaming: DCDC Guidance Note." Shrivenham, DCDC, 2010.
[29] UK MoD: "Strategic Trends Programme Future Operating Environment 2035 First Edition", p. 1.
[30] UK MoD: "The Future Character of Conflict", Shrivenham, DCDC, 2010.
[31] UK MoD: "Strategic Trends Programme Future Operating Environment 2035 First Edition".
[32] Ibid, p. 32.

FOE, we can see, focuses uniquely on how the developments noted in GST will affect the ability of UK armed forces in future warfare. Working from the FOE documents, it is then the turn of the single services to convert the very-long term conceptual horizon into a product that can helps force and capability planning for the "Future Force" in the 10 to 20-year horizon. For the Army, the key process is that of the Agile Warrior exercises. Agile Warrior is the army's "intellectual programme to test an alternative force structures based upon the future operating environment derived from DCDC."[33] The guidance given to HQ army to generate Agile Warrior comes in the form of "master questions" rather than specific direction. These master questions would be like those issued for the 2014 iteration of Agile Warrior: "what contributions will land forces make to the full range of potential mission sets? What capabilities will land forces require to deliver operational success in the future" and "what balance of affordable capabilities is required by land forces to deliver operational success?"[34] Agile Warrior starts with Defence Concepts and Doctrine Centre (DCDC) publications to set the social and political context of potential future environments, as well as the potentially disruptive or highly innovative technologies identified by DSTL and other partners (currently Robotics, AI and machine learning, human augmentation, directed energy weapons, EM Pulse weapons, and improved materials[35]) and integrates them to how the army fights to see how the army will need to adapt. The futures scenario currently envisioned by Agile Warrior states:

> We should expect to fight in a contested Electro-Magnetic Spectrum (EMS) environment, often in complex terrain, amongst the people, and with pervasive and usually less than accurate media… The proliferation of cheap, accurate missiles will mean that massed formations, large immobile HQs, and supply areas are targeted. Our adversaries will have different, often shocking ethical frameworks and may employ both Remote or Robotic and Autonomous Systems (RAS) lethally before NATO. We will be able to augment the human, physically and cognitively.[36]

We can follow through here the judgements on robotics moving to a very specific point about their use in warfare; the scenario is more concrete and focused on land warfare, allowing Army HQ to design a "Conceptual Force" for testing and experimentation. This is the titular "Conceptual Land Force 2035", which in Feb 2018 received support for further experimentation. This experimentation will focus on smaller combined arms combat teams, brigades and divisions (up to a third smaller than the legacy organisations the British army has operated more-or-less

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[33] UK Army HQ: "Agile Warrior Quarterly", Volume 1, 2018, p. 1.
[34] UK Army HQ: "Horizon Scanning and Futures Updates 4", May 2014.
[35] Ibid.
[36] Army HQ: CF(L)35, 1* Draft,

since the Second World War) with significant augmentation.

Conceptual Force (Land) 2035 thus results as the army's view of how it should adapt to fight in likely future, the outcome of a years-long series of futures and scenario generating workshops and events which begins with Global Strategic Trends. Feeding back up to Joint Force level, the Army's Conceptual Force meets the work of the other two services where it is joined into a Joint Concept Note called the "Future Force Concept", now directed as the joint vision of the armed forces out to 20 years. Within the Army, CF(L) and its subsequent experimentation leading to actual change in how the army does its business—possibly. The requirement is that customer— in this case, the General Staff--agree to make the radical changes suggested by this horizon scanning and futures process, and that it satisfies joint command, and that it gets funding.

Potential Weaknesses to Futures Work

As one business scholar has noted, despite much research on strategic foresight and its methodologies, we still have little concrete data on its impact and value overall.[37] One review of UK government horizon scanning and futures has pointed out that Britain has a long tradition of horizon scanning in government, "but there were still gaps because of the way that we structured ourselves. Some of the main difficulties in trying to predict risk were looking robustly enough at where we would be in the future, predicting malign combinations of circumstances, and identifying the unintended consequences of apparently benign developments…"[38] In short, the problem is horizon scanning *effectively* is very hard no matter what. Policy customers, short on time and big on advice which adds value, seem to be aware of this. Comments in 2012 by Chairman of the JIC Sir John Day, in his review of cross-government horizon scanning, suggest why it is DCDC who have taken the central position in government horizon scanning instead of central government, noting:

> Barriers to [use of horizon scanning] lie at multiple levels. Horizon scanning
> activity is often self-tasked or commissioned with a limited understanding of what
> it might be used to inform…. Ministers and senior officials are often accused of
> being too focused on tactical issues and it can be a challenge to find time to
> engage them on issues which might not impact for anything up to 50 years, if at
> all. Horizon scanning products are often lengthy, and poorly presented, making
> them harder to digest and easier to ignore. It is also rare for them to include policy

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[37] Riccardo Vecchiato: "Strategic planning and organizational flexibility in turbulent environments", *Foresight*, Vol. 17, No. 3, 2015, p. 258.
[38] Bishop, Hines, and Collins, *op.cit.*

implications or an analysis of how the information presented could be used to
inform decision making.[39]

Agreeing with this, studies of UK and Australian horizon scanning efforts have found that it is not
well-tasked, that is it does not align well with the priorities of the decision-makers or the rest of
the institutional processes. Products of horizon scanning have encountered officials who cannot
engage with uncertainty, suspend disbelief and maintain an open mind. This has led to a lack of
meaningful evaluation of horizon scanning outputs, which have not demonstrated how they
could be used to inform decision-making.[40] All of this suggests horizon scanning still struggles
to demonstrate its utility to its core audience, and in a budget-driven world this failure to connect
spells failure.

Questionable Impact

Other, well-understood "analytical pathologies" get in the way of futures work. It is most likely the
case that horizon scans will fall foul of the same problem encountered by intelligence analysts
producing warning intelligence, as outlined by Erik J Dahl: if policy makers are not
psychologically receptive towards a particular threat, then warnings, no matter how specific, will
not cause them to take preventative action. Success comes only in the instance of high policy-
maker receptivity—then, only highly specific warnings will cause them to shift their mindset and
take action. Dahl calls this the paradox of strategic warning, and suggests that the critical factor
is not "the presence or absence of brilliant analysts, or the organisation of intelligence agencies,
but rather the availability of precise intelligence and receptive policymakers."[41] Director of Central
Intelligence Richard Helms said "it is not enough to ring the bell…you've got to make sure the
other guy hears it."[42] Dahl effectively argues that this can never happen. Since futures scenarios
are by definition indefinite and imprecise—indeed, they consciously use fictional narratives to
illustrate their scenarios—they may be very easily dismissed.

One might counter that futures work is what prepares policy makers for the possibility of some of
those future threats—it helps make them more receptive by priming them to what might
otherwise be dismissed as outlandish possibilities. But made aware of the rise of a new
technology, but with only some indications of how it could be used, it may be too much to expect

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[39] UK Cabinet Office: "Review of Cross-Government Horizon Scanning", p. 2.
[40] K. Garnett et al.: "Integrating Horizon Scanning and Strategic Risk Prioritisation Using a Weight of
Evidence Framework to Inform Policy Decisions", *Science of the Total Environment,* Vol. 560*,* 2016, p. 83.
[41] Erik J Dahl: *Intelligence and Surprise Attack.* Washington, DC: Georgetown University Press, 2013, p.
25.
[42] Tim Wiener: *Legacy of Ashes.* London: Allen Lane, 2007, p. 479.

policy-makers to adjust resources to a distant threat as yet unrealised (and maybe never to be realised). This observation was seconded by one UK senior officer, who believed it was a major obstacle to new capabilities development: "Everyone wants more and expects it to tell them the answer when in fact it just simply points you in a broad direction. The analogy is that we take information and with SMEs turn it into intelligence, in the [Force Development] world we need to take evidence and turn it into [force development] options. It's the intellectual leap that puts people off."[43] Some scholars on horizon scanning agree with this critique in general, noting that (especially as regards new technological trends) the information gathered about them frequently comes from fringe sources in the first instance, and "tends to lack conventional measures of credibility and authority to sufficiently influence policy making."[44] Consequently, horizon scans on new technologies are viewed with lower levels of confidence as a source of evidence for policy development.[45]

Technological determinism

A problem cited frequently in discussion of futurology is the tight focus on the impact of technology to the expense of other factors, or technological determinism.[46] British historian and strategist Sir Lawrence Freedman, in his recent history of *The Future of War* notes how studies of future war over the last century have focused on new weapons and how they can be deployed in war-winning knock-out-blow strategies, but "far less thought was given to the consequences of a first blow…or how a war's course might be increasingly determined by non-military factors, including the formation and breaking of alliances, underlying economic or demographic strength or the public's readiness to make sacrifices and tolerate casualties."[47] Militaries, Freedman has noted, have had a tendency to focus on large capital systems, rather than fully exploring the impact or use of the smaller or more mundane (but no less disruptive) technological systems.[48] Militaries focus on building the Death Star, one commentator has noted, rather than the much less vulnerable and far more useful droid.[49]

A reasonable counter-argument is that modern horizon-scanning makes use of a wide range of

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[43] Interview, C1, UK Senior Officer, 19 March 2018.
[44] Garnett et al.: *op.cit.*.
[45] Wendy L. Schultz: "The Cultural Contradictions of Managing Change: Using Horizon Scanning in an Evidence-based Policy Context", *Foresight,* Vol. 8, no. 4, 2006, pp. 3–12, https://doi.org/10.1108/14636680610681996.
[46] Ben Anderson and Paul Stoneman: "Predicting the Socio-Technical Future (and Other Myths)", *ICT Futures: Delivering Pervasive, Real-Time and Secure Services*, ed. Paul Warren, John Davies, and David Brown (Chichester: John Wiley & Sons, 2008), p. 3.
[47] Lawrence Freedman: *The Future of War: A History.* London: Allen Lane, 2017, pp. xvii–xviii.
[48] Freedman: *op.cit.,* p. 240; Paul Shawcross: "This Isn't the Petition Response You're Looking For", *Wired*, 2013, https://www.wired.com/2013/01/white-house-death-star/.
[49] Freedman: *op.cit.,* p. 240.

tools and does, like the MoD's GST, start by considering social and demographic trends. Unfortunately, historically prediction and forecasting in these domains has also been highly inaccurate and prone to hyperbole (based on linear projections of trends) both positive and negative.[50] In large part this is because most experts are remarkably bad at prediction—and it is experts we turn to to help build our futures scenarios. As we know from the work of Philp Tetlock and the IARPA "Good Judgement Project", the aptitude to be an accurate forecaster is relatively rare[51], and we might then conclude that these qualities unlikely to prevail in the large bureaucratic environment which underlies an organization as large as the British civil service and its military. Our 30-year predictions are—we might judge simply by looking at the very poor base-rates of analytical accuracy—unlikely to be particularly accurate.

It is easy to note that while social and demographic trends feature heavily in GST, below that level the place of technology in the scans becomes more central. The predominant focus on technology (perhaps a comfortable space for soldiers) may not be particularly comfortable in the long run. As science fiction author (and inventor of the term "cyberspace") suggested, "the street finds its own uses for things."[52] That is, technologies rarely end up doing what their creators think they will do, or what initial observers think they will do. The creation of the iPhone is a case in point. It is one of the most disruptive pieces of technology of the last 20 years, but its underlying technology (capacitive touch screens, GPS modules, accelerometers, lithium-ion batteries and micro-processors) had all existed for many years before they were combined into the juggernaut that is the iPhone.[53] No one, not even (and famously) those in the technology and computing business, thought that it would have any effect on the market (Steve Jobs aside…).[54] And yet it has been transformative not just in the smartphone market, but culturally. Understanding of each of those technologies by a horizon scanner would have been unlikely to foresee the iPhone or its effects, because these were cumulation of the non-linear behaviour of millions of people in a cultural and behavioural sphere, not a technological one. People and societies co-adapt to new technologies, and rarely do new technologies fundamentally change social functions—we use iPhones to enhance or change social behaviours of long standing (communicating and being social), rather than it causing entirely new behaviours.[55] It is not unreasonable to project that the same goes for military technologies. Indeed, one Canadian Forces officer noted that Agile Warrior's focus on technology risked dazzling the analysts

[50] Dan Gardner: *Future Babble.* New York: Random House, 2010, pp. 22–25.
[51] Philip Tetlock and Dan Gardner: *Superforecasting: The Art and Science of Prediction*. London: Random House, 2015, pp. 16–19.
[52] William Gibson: *Burning Chrome.* New York: Ace Books, 1987.
[53] Jason Griffith: "'The Problem with Experts - Why Uber, Tesla and the iPhone Are Disruptive Innovations", *Medium*, 2015, https://medium.com/snappea-design/the-problem-with-experts-why-uber-tesla-and-the-iphone-are-disruptive-innovations-54a03ea7c1fd.
[54] Tetlock and Gardner: *op.cit.*, p. 46.
[55] Anderson and Stoneman: *op.cit.*, pp. 4–5.

involved, and that warfare "is still (as it always has been) about massing combat power at the decisive time and space, and all adversary efforts will be about stopping that mass."[56] New technologies will not change war; war will co-adapt with it.

Resilience as Key

Despite our best efforts, it is likely that forecasts of potential futures will remain largely unrepresentative of the future that actually comes to pass. Tetlock determined that prediction beyond five years dropped to an accuracy no better than chance—simply the result of the butterfly effect in non-linear systems.[57] Taleb notes, as has Tetlock, Gardner and others, that the prediction record on political and economic events by most forecasters are so poor as to be pointless.[58]   This raises questions about what states achieve out of their efforts at horizon scanning and scenario development. Writing in the year 2000, before the serious exogenous shock of the 9/11 attacks, one CIA wit wrote, in a small act of intellectual rebellion, "…I'm not sure what 2010 will look like, but I'm sure that it will be very little like we expect, so we should plan accordingly."[59] Facetious though it may be, this quotation portrays a truth: your scenario planning will not prepare you for the strange directions the future takes, and that means you must be ready to adapt to change.

Unsure and worried about the future, we have a propensity to seek prediction beyond the actual ability to predict.[60] We are naturally drawn to forecasting as the solution rather than looking backwards, perhaps because we overestimate how different the future will be from now. This may be part of the what Christopher Andrew has called "Historical Attention Span Deficit Disorder"[61], where policy-makers not only do not know much history but fail to perceive its significance to policy. With such a mindset, futures scenarios may seem more realistic than to someone with a deeper and longer historical knowledge, or a good understanding of the weakness of forecasts. Basing future force decisions on horizon scanning inherits into that force all the errors of the futures work that precedes it.[62]

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[56] Interview, Lt. Col. Shane Gifford, Canadian Land Warfare Centre, in Winterbourne Gunner, Salisbury UK, 21 Feb 2018.
[57] Tetlock and Gardner: *op.cit.*, p. 244.
[58] Nassim Nicholas Taleb: *The Black Swan: The Impact of the Highly Improbable*, Revised. London, 2010, p. xxiv.
[59] Tetlock and Gardner: *op.cit.,* p. 243.
[60] Richard Danzig: "Driving in the Dark: Ten Propositions About Prediction and National Security". Washngton DC, Centre for a New American Security, 2011, pp. 9–10.
[61] Christopher Andrew: "Reflections on Intelligence Historiography Since 1939", in *National Intelligence Systems: Current Research and Future Prospects*, ed. Wilhelm Agrell and Gregory F Treverton. Cambridge, Cambridge University Press, 2009, p. 55.
[62] Danzig: *op.cit.*, p. 17.

This does not argue against horizon scanning efforts, but suggests the product be use for different purposes. It may be that horizon scanning fits into the older maxim frequently attributed to Dwight D. Eisenhower, that "peace-time plans are of no particular value, but peace-time planning is indispensable."[63] What should most beneficially result from futures work is a raised awareness of *where* risk may lie, rather than the nature of the risk itself. This should lead planning staffs to weigh resilience and flexibility over the hope that the right piece of equipment is purchased or the right policy pursued. Danzig's paper from the Center for a New American Security offers a series of rules which follow from the initial assumption that no future forecast is likely to come to pass with any fidelity:

- "Accelerate Tempo – and Delay Some Decisions."
- "Increase the Agility of Production Processes."
- "Prioritize Equipment That Is Most Adaptable."
- "Build More for the Short Term."
- "Nurture Diversity; Create Competition."[64]

Taken together, these argue against major investments in single answers to forecasted areas of challenge, and preparation of a wider range of unforecast events more common to the digital age. The Future Force Concept seems to acknowledge that a key hurdle is simply *quicker adaptation to change,* noting that "to exploit the increasing pace of technological change, we must become more institutionally agile in our acquisitions system."[65] It was noted in the Agile Warrior conference that armies excel at buying and maintaining capital systems, and that this was *not* the way to handle the fielding of new AI and robotics systems, which will need to be quick purchase and quick turn-over, effectively disposable, systems.[66] The Australian army seems to acknowledge the need for competition of ideas in its experimentation on UAVs, having issued fixed-wing UAVs to all regular, reserve and even cadet units to see who could come up with the most interesting concepts for their use. "It is only once we put these systems in soldiers' hands that we will truly discover the breadth of missions we could use them for", said Australian Maj Gen Toohey, though this understates the genius of issuing them to teenaged cadets to see what the youngest population with the fewest preconceptions might come up with.[67] One British

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[63] Letter from Dwight Eisenhower to Hamilton Fish Armstrong, 31 December, 1950. In Louis Galambos et al (eds): *The Papers of Dwight David Eisenhower, Volume XI*. Baltimore, MD: Johns Hopkins University Press, 1984, p. 1516.
[64] Danzig: *op.cit.,* pp. 18–28.
[65] UK MoD: 'JCN 1/17 Future Force Concept'.
[66] Agile Warrior Conference: 20-22 February 2018, Winterbourne Gunner, Saisbury, UK.
[67] Major General Kathryn Toohey: Head Land Capability speech to Defence and Security Equipment International, London, 11 September 2017. Accessed at https://www.army.gov.au/our-work/speeches-

officer made a telling observation which further supports Danzig's rules, noting that "we spend too much time trying to figure out if it's better to paint our vehicles tan or green—where will we fight most in the future, deserts or forests?—but this is irrelevant. What matters is how quick you can paint them red when you're told you'll be fighting on *Mars*."[68] This officer's choice of Mars as the future destination may partly be in jest, but it makes a significant point: horizon scanning techniques do not predict the future, only offer a very few selections from amongst the infinite number of possibilities. This is some endorsement to the ideas behind the British Army's experimental CF(L) 35, which above all is meant to be a more responsive, agile and adaptable force, better able to cope with new forms of warfare. Ability to quickly adapt to change as suggested by Danzig, *Truppenführung*, and many other sources, is the most frequent lesson in the history of forecasting the future. Military conservatism, and its close partner bureaucratic inertia, may be the nemesis of this need for resiliency. The challenge is therefore to balance the ability and agility to change with the caution and wisdom to adapt wisely. This is no small challenge.

Conclusion

Horizon scanning and futures methods offer us potentially very powerful tools to help cope with the inherent uncertainty of the future. A look at how the British Government and the military have embraced horizon scanning shows the variety of approaches that can be taken and the significant outcomes the process can have. We must however always remain sceptical of what horizon scanning scenarios can teach us. It is highly unlikely that the future war envisioned by the Agile Warrior programme, as one example only, will come to pass. But the act of inquiry itself, when done with valid data and careful methods, may tune staffs and decision-makers to the most critical uncertainties. Should the futures process cause governments to better prepare for the changes brought by the digital age, then it has accomplished its central goal.

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and-transcripts/robotics-and-autonomous-systems-smart-machines-address-to-the, accessed 23/03/2018.
[68] Interview, B1, UK OF-4, London, 04 Jan 2018.