Programme Review

Martial Power Programme Update 2019
Insights into Military Views from RUSI’s Conferences

Peter Roberts
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Peter Roberts
188 years of independent thinking on defence and security

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Martial Power Programme Update 2019: Insights into Military Views from RUSI’s Conferences

Peter Roberts

SINCE JANUARY 2019, RUSI has convened and conducted outreach with more than 3,400 members of the defence establishment through conferences, roundtables, workshops, presentations and interviews on five continents. RUSI’s annual UK major conference programme has reviewed progress and development in the three UK armed forces, as well as with counterparts from other services across the world, including those from Russia, China and Iran. These engagements were organised by environments or thematically and many resulted in publication of associated conference reports, attached to this review as annexes. Examination of these as a single body of evidence leads to some interesting and, in some cases, noteworthy observations on themes and behaviours.

Grouping these into broad areas – examining the concept of operation; business, commercial considerations and technology; and alliances – this introduction outlines both the commonalities and differences between the services, with the aim of identifying areas of coherence and divergence (sometimes necessary as the different domains require different approaches in some circumstances). In many cases, the patterns and trends outlined below are only observable by examining the totality of the discussion and are not evident from individual conferences or interactions. That is not to say that individual services can solve any one of the issues raised alone, nor are they necessarily the sole responsibility of Joint Forces Command (now UK Strategic Command), or the Head Office of the Ministry of Defence (MoD). They will need, however, to be addressed if they are to be solved: this may be done in a business-as-usual format (for example, the MoD Head Office providing policy for implementation by one or more commands), or in more boutique fashion (for example, by reorganising areas of responsibility, as was recently done in the formation of UK Strategic Command¹). In many cases, individual services felt that another entity somewhere in the MoD would (must) be dealing with them, yet it is rarely clear who has the role.

Interestingly, each single service tends to see problems and not solutions, to be critical of its own performance and not to acknowledge its own progress. In many ways, and as articulated by the Chief of the General Staff and the First Sea Lord during their formal remarks at their respective RUSI conferences in 2019, each service of the armed forces is doing well in itself,

certainly in comparison to two or three years ago. There has been clear leadership from respective chiefs that has galvanised and focused efforts for force generation in their respective areas, specifically highlighted in the conference reports for the Land Warfare and Sea Power conferences. There is also a tendency for officers to focus on the grand issues of the day and to seek solutions for geopolitical tensions rather than just their own small part in them. Perhaps this is symptomatic of the military mind: an overwhelming desire to bring order to chaos on the battlefield translates itself to issues of grand strategy in peacetime because much of the day-to-day business cannot be controlled by officers’ own decisions. It might also be a sign of the frustrations of senior officers of an inability to solve the complex challenges of their own service during their short tenures in leadership positions, making them blame those above them for their own woes.

The paper is split into three areas: examining the concept of operation; business, commercial considerations and technology; and alliances.

The Concept of Operation

Each of the armed services has played heavily to the message of an era of constant competition, described by several chiefs as ‘the Grand Challenge’. They may describe it differently, but the re-emergence of a great power contest is heavily woven into the core narratives of each of the service’s central staffs. The exact lines of each service are perhaps tailored to their own domain, but nonetheless the idea of major warfighting has returned: albeit in discussion and not in force planning terms. To observers of this debate, there is a peculiar paradox that while the threat narrative is so starkly different from the environment described only five years ago, neither the forces each service has asked for, nor the personnel, has led to change. This is entirely consistent with the MoD Head Office position. Privately, many of the conferences’ participants explained this as founded on a belief that there was no political appetite for significant change, even where the threat demanded it.

While the overall UK military force design appears to be the same now as it was during the end of the counterinsurgency era of 2004–17, there is an acknowledged but unresolved issue around whether the UK might be able to meet contemporary threats. This point was made several times during the RUSI conferences, most notably by Frank Rose, Brad Roberts, Everett Dolman and Tom Karako during the Missile Defence Conference, and by Graeme Lamb, Sharon Weinberger, Eric Wesley and Anne Barbara Kunz during the RUSI Land Warfare Conference. None of the service chiefs, nor their staffs, acknowledge or have significant discussions about attrition in combat, and the subsequent need for replacements, reconstitution and recapitalisations. This is peculiar, given the detailed discussions they have individually over adversarial weapons systems, enemy risk tolerance, repair and replacement, and platform and personnel survivability (a central feature of the RUSI Airpower Conference in 2019). It is notable that politicians appear more willing to have such a discussion than their military counterparts.

Given that each of the front line commands remains hamstrung by constrained financial budgets, the core challenge facing each of the service chiefs is whether to use their assigned money to
generate a force to compete in the grey zone (‘the fight tonight’) or to generate one for use on major warfighting (‘the war tomorrow’) – well articulated in the remarks by Admiral Philip Jones during his Sea Power Conference speech.\(^2\) The two demands are often incompatible, in terms of training scenarios, funding, equipment and missions. This has led to a necessary, but unproven, assumption that generating a force for a high-intensity, major war allows it to flex into lower levels of conflict better than one designed the other way around. Each of the services continues to walk this tightrope with its respective force generation schemes.

Each force understands the restrictions imposed on it by their respective sizes in contrast to the organisations 10, 20 or 30 years ago, but there does not seem to be an adequate explanation of how a lack of numbers can meet current tasking and the preparations required to reorientate the whole force for potential great power competition – especially as part of a credible conventional deterrence capability. Historically, a greater number of platforms and formations allowed military forces to meet both objectives. Today, this is simply not possible. One might draw inference from the speeches by ministers\(^3\) and service chiefs\(^4\) during 2018 and 2019 that there has been recognition of this with an unspoken qualification of the roles of the armed forces: no speech during 2019 noted any requirement to ‘defeat’ an adversary; the new term is now to compete with adversaries (through ‘engagement’ and ‘constraint’ as key military roles). While it is not a clear policy position (the abrogation of the task of defeating an enemy) to pass such responsibility to the US military, it might be the only way in which the UK forces, as currently funded and configured, can match resources and tasking. This key tension, preparing for the ‘fight tonight’ or the ‘war tomorrow’, was common across all delegates and all engagements. Nor was there a clear indication that adequate direction and prioritisation was being received by individual services from MoD Head Office. Divergence in effort between delivery of missions today (by military commands) and the ambition of political statements (a full-spectrum military force, capable of delivering decisive action across the world) was clear and – more importantly – appeared to be detrimental to global force generation challenges.

In either case, it has been reassuring to hear each of the service chiefs (and their staffs) have wider discussions about how potential adversaries might determine their way of fighting (see the reports for the Sea Power 2019 and Land Warfare 2019 conferences).

Russia fights below the threshold for major conventional armed response on land, but challenges in a more orthodox fashion in the air and at sea, judging it cannot win against NATO ashore, but

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could do so at sea, and perhaps – given its air and missile defence capabilities – in the air as well. China, meanwhile, is using unconventional means in the China Seas, across the Pacific and in the Indian Ocean, with a growing presence in the Antarctic, Atlantic and Arctic. Iran is using proxies locally and is acting unconventionally in the Strait of Hormuz; there are similarities to the North Korean strategy of brinkmanship in more recent Iranian Republican Guard activities.\(^5\) This diversity of threat profiles, and a lack of clear direction and guidance from the MoD, leaves the single services with a dilemma, for what might work against Russia under the ice in the Arctic would be counterproductive in the South China Sea.\(^6\) In the land, air and maritime domains, the requirement for action and response on multiple axes is clear. Each domain has different requirements, contextual nuances and needs different levels of control. Indeed, given that a homogenous response would be self-defeating in each situation, each mission requires a high degree of preparation and specialisation. It is perhaps unfortunate then that the UK seems to be moving towards a single concept of force design, developed in a vacuum, that seeks the panacea of a ‘competitive edge’ of universal utility in delivering decisive effect: indirect, expeditionary, zero risk, and with clear objectives and timelines. The Royal Navy’s Future Force Operating Concept and the British Army’s Integrated Action work (highlighted at the respective conferences) underline this trend.

Within this concept of operation, the British Army and the RAF appear to be planning for dispersed concept of operations (in line with the US Multi-Domain Operations doctrine). Meanwhile, the Royal Navy is moving in the opposite direction, planning to concentrate the available naval forces around their new aircraft carriers to ensure adequate protection (a dubious proposition in itself) in the face of growing threats at sea or from land. Such divergence in approach is not necessarily problematic, but both ways of working do need to be properly resourced (in terms of connectivity) and tested in the face of a realistic opposition, capable of denying electronic connectivity either between dispersed units or between a naval task group and other force elements. There is no doubt that the British Army is significantly ahead of the other services in terms of understanding how it wants to fight an adversary, and of making the requisite preparations, acquisition, training and organisational transformations needed to deliver its plan. It is clear from the presentation by Brigadier James Martin and remarks by Lieutenant General Eric Wesley during the Land Warfare Conference in June 2019 that alignment of the British Army with US doctrine and with European (specifically French) concepts is notable. The alignment of fighting partnerships between the other two services and their Allied counterparts is less clear. Discussions and debate at the Airpower and Sea Power conference in 2019 were evidence of this. Subordinate formations are seeking ‘new’ roles: the Royal Marines as a grey-zone force; 16 Air Assault Brigade in urban warfare; and the F-35 fleet as strategic theatre access tools. This desire for specific roles is not new, but does occasionally confuse international observers – for example, in Scandinavia the expectations of the Royal Marines returning to their traditional role of reinforcing Norway (as articulated by British ministers in 2019,\(^7\)

\(^6\) Ibid.
and by the Norwegian prime minister in 2018) is at odds with the development of a force capable of meeting Russian ‘grey-zone’ challenges.

As is evident in each of the conference reports, all three services are dealing with issues of scale and availability of their forces. However, the presumptions of availability for individual tasks is of concern. The example of the F-35 perhaps best explains the situation. The RAF foresees its F-35 fleet conducting deep, penetrating ISR to enable strikes at high-value targets. The Royal Navy has a special place for the ship-borne F-35s to conduct protection of maritime assets and strikes against enemy naval targets, or ISR in advance of amphibious operations. The British Army expects the F-35s to replace the Tornado force in providing fires in support of troops-in-contact as close air support missions. Yet the UK only has 18 aircraft. The idea that even five would be available for one of the missions, given the F-35 fleet availability issues, is hopelessly optimistic. Which mission they support would be a high-level choice, but more importantly would mean that the other roles would not be fulfilled, leaving military plans in tatters unless alternative capabilities were made available. The official British position on this is unclear, but almost certainly would point to allies (the US military) to meet any deficit. As was clear from the respective RUSI conferences this year, similar evidence is available if one examines: the satellite bandwidth allocations each force is planning on having to enable operations; the cyber support commanders are expecting from a very ‘lean’ team in Cheltenham; or the tasking of nuclear submarines working under the ice against Russian submarines or being in a position to fire TLAMs (Tomahawk Land Attack Missiles) in the Gulf of Oman. In very general terms, each of the services is planning for support from their counterparts which is unlikely to be available. In short, coherence across the forces in the ways they plan to fight is absent.

Commercial Considerations and Technology

As a broad conclusion, one might say that the Levene reforms have empowered the fighting arms to progress their own respective domains and capabilities as they see fit. Now free from the shackles and process of the MoD, it is clear that the British Army and the Royal Navy are making impressive strides in developing approaches to data science, artificial intelligence, autonomous systems, innovative acquisition pathways and personnel numbers (see the Land Warfare and Sea Power conference reports). Yet it is also clear that the same reforms have allowed individual fighting services to abrogate responsibility of complex (and critical) issues to other commands, while still expecting delivery of the same level of support. As a result, those who are tasked to provide critical enablers for fighting lack, in many cases, the expertise or resources necessary to deliver what is asked of them. The lack of engagement by single services in these areas also means that provision is assumed in subsequent decisions and force employment plans. This lack of engagement in, for example, space or cyber has left searing gaps in expertise available in front

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line commands resulting in immature presumptions being introduced on what joint capabilities might deliver to their respective stove-piped force designs.

In many cases, the debate over technology has been obscuring more urgent topics in military debates. As noted at the Missile Defence Conference, fervent hopes exist across the armed forces for a commercially innnovated ‘silver bullet’ to appear as the saviour to the woes of funding and scale of military forces. Traditional defence companies are perceived to have failed to meet such hopes and expectations (unfunded), and military commanders are increasingly turning to non-traditional private and commercial entities in the hope of salvation. There is little sign of significant military capability being delivered by this ‘new’ approach. Few would doubt that technology will continue to play an important role in conflict, but various speakers at the Land Warfare and Sea Power conferences have opined that perhaps the role would be clearer if militaries accepted that a debate shaped by an examination of technology as used by adversaries might be more productive. In any case, there have been few signs that Western militaries will accept the suggestion that technological parity (at best) will be hallmarks of the future battlefield. Discussion may have moved on from the fad of innovation, but the MoD is not signposting areas of invention that it needs industry to progress, nor is it making funding available to pursue such avenues. The US has made such a leap, with several companies making the shift back to believing military requirements as core business that will drive research and development strategies (for example, General Electric).

The US has opened a discussion on military attrition, redundancy and scale from which Europeans remain largely absent. Revised American presumptions on survivability and combat losses are driven by an understanding of the reality of great power competition, and indeed the place that such discussion has as part of deterrence postures. While other Western military leaders might be having a conversation about near-peer conflict and contingency operations at scale, there is little evidence of such discussions having substance (see, for example, discussion by Lieutenant General Eric Wesley and Brigadier General Ori Gordin at the Land Warfare Conference, by Rear Admiral Archer Macy at the Missile Defence Conference, and by General Franc Gorenc at the Airpower Conference). There is certainly little useful discussion occurring with industrial suppliers about the art of the possible for contingency planning.

Indeed, it is clear across senior military leadership in the UK that defence primes are being ignored. The MoD business model has evolved by widening engagement and discussion with smaller suppliers, which in itself is slowing down acquisition pathways. Despite no evidence that the broadening of suppliers has delivered success or shortened procurement times, compared with traditional delivery through proven suppliers, it seems the MoD will accelerate this approach rather than reversing course. The reticence of senior military leaders to engage with these historical defence primes is likely to be highly counterproductive over time.

Alliances

Within such plans, and as outlined perhaps best by Professor Daniel Baltrusaitis at the RUSI Airpower Conference, mobility and connectivity are becoming watchwords for force
development. Neither is adequately resourced, having been sacrificed in previous defence reviews. Across Europe, no state appears to be investing resources to overcome this significant hurdle in delivering military capability.

The tension between US and European partnering was clear in discussions with each of the services. As noted in the Sea Power and Land Warfare conference reports, military leaders in prepared remarks walked the fine policy tightrope of ensuring each was adequately acknowledged. Unwritten and unspoken are the real challenges in meeting interoperability with US forces (a stretch), and – as described by Professor Julian Lindley-French at the Missile Defence Conference – ‘dumbing down’ military capability for interoperability with European allies. Leadership of the Combined Joint Expeditionary Force (CJEF) remains a focus for military leaders, with each of the three services making efforts to ensure this formation spearheads military capability. However, conference academic speakers at the Land Warfare Conference, such as Ronen Bergman and John Buckley, have been at pains to explain in discussions that only a full-spectrum (self-contained and supplied) force provides leverage in a coalition. Further, according to General Gorenc at the Airpower Conference and Professor Nina Kollars at the Land Warfare Conference, states that offer piecemeal contributions of military capability do not have the leverage to impact or shape Alliance policy.

The aspiration of UK military leaders remains full interoperability and integration with US formations on night one of any operation: this is perceived to be the most challenging and testing of conditions and places considerable cost on defence capability.

Conclusions

It is clear that each of the forces acknowledges that its part of the British military must adapt to an era of long-term strategic competition spanning the spectrum of conflict. Shortened warning time linked to unpredictable actors is likely to lead to a period of markedly increased instability. Adversaries are more numerous, less constrained by national caveats and rules, faster at making decisions, and have achieved technological parity on the battlefield – in some cases having the technological superiority over allies. Partners are less committed than previously, publics are less engaged, and certainty about political commitment is much reduced. Potential enemies have shifted to doctrines of offence rather than defence, leaving UK forces reactive rather than being able to take the initiative.

If the UK military commanders acknowledge the issues associated with a lack of scale to defeat a superior and more numerous foe, they also now need to acknowledge that commercial and technological parity is all but certain on the battlefield. Even large increases in the defence budget would not change these facts. The current British approach of purchasing boutique equipment in ever-decreasing numbers has elevated the risk of investing in the wrong platforms to one of potential strategic failure.

Military success is not a preordained right of the British forces, nor has it decisively won an intervention in action since 2001. Commanders and their political masters must start to
acknowledge that as currently resourced, their forces will be unlikely to prevail in a major or
great power conflict. The procurement decisions and reductions in size of the UK forces now
make it of dubious use to the US in military terms;9 indeed, much of NATO finds itself in a similar
or worse position. Military commanders might start having conversations with their ministers
on the basis of military advice, not politically (or even policy) aware military advice.

Senior figures in each of the services have been calling for an intellectual revolution, perhaps
most clearly articulated by General Mark Carleton-Smith in 2019.10 Likewise, Admiral Jones made
similar points in 2017,11 and Air Marshal Stuart Atha as far back as 2014.12 Progress is certainly
being made but deeper systemic challenges exist in reversing the culture of the post-Cold
War decades, when promotion and reward was earned through expertise in delivering change
programmes and financial acumen, rather than intellectual ingenuity or ability to command
forces in combat.

The lack of urgency in such debates, as presented in this review, is based on an inability to predict
or foresee a future in which major or great power war comes to pass. In such circumstances,
recapitalisation of the forces, as it is currently being explained, does not beat the resourcing
priorities for schools, hospitals and infrastructure. Missing from the UK defence and security
debate is the requirement to recapitalise the force to become a credible conventional deterrent
in an era of great power competition.

It might be argued that it is the role of military commanders to see threats, to perhaps focus
on them and derive conclusions that are overly significant. It is also the case that military
commanders spend lifetimes examining the security environment. They are the national experts
in defence and security, not simply those with a passing interest. Their opinions and views
matter: for the present, however, their explanations are simply not coherent nor persuasive
enough to galvanise more than a handful of politicians or the public.

In short, right now the narrative does not appear to be good enough.

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École de guerre in Paris.

9. Private roundtable with Henry Kissinger after he had been awarded the Chesney Gold Medal at
RUSI, 15 June 2015.
RUSI’s Land Warfare Conference, 2019, <https://rusi.org/annual-conference/rusi-land-warfare-
rusi.org/event/gallipoli-memorial-lecture>, accessed 1 August 2019.
Annex 1

MISSILE DEFENCE

Conference held on 13 and 14 February 2019

Sidharth Kaushal

On 13 and 14 February 2019, RUSI convened its 19th Missile Defence Conference to examine how policies regarding missile defence must adapt to an era of great power competition. The conference was designed to stimulate discussion on how missile defence as an enterprise will have to undergo an overhaul that is as much a matter of underlying concepts as it is of introducing and incorporating specific technical changes in an era in which the bête noire of international order is no longer rogue states but near-peer challengers.

The event continued some useful discussions from the 2018 Missile Defence Conference regarding the need to overcome stovepiped air and missile defence systems to create genuinely integrated air and missile defence (IAMD) capabilities and explored both the challenges and potential posed by disruptive technologies in the realms of space, cyberspace and AI.

Equally important, however, was an effort by participants to situate the role of missile defence in a wider competitive strategy. Two key themes were identified at the strategic level – the utility of limited theatre-level IAMD in the context of limited and grey-zone conflicts and the need to nest missile defence within the framework of strategic counterforce.

Strategy: Moving Beyond Stability to Competition

As several conference delegates noted, no military capability exists in a strategic vacuum. Missile defence needs to be pursued in a manner that makes it compatible with a wider competitive strategy with which to confront near-peer competitors. This, however, requires a more sophisticated understanding of how near-peer competitors intend to use missiles in the context of their own competitive strategies than has been forthcoming in Western debates thus far.

Critically, as was discussed during the panel on the future of NATO’s missile defence policies, much of Western thinking on ballistic missiles is still tied to the Cold War notion that they are instruments for the delivery of strategic non-conventional payloads. As RUSI Associate Fellow Jeremy Stocker noted, this opinion is not shared by competitors such as Russia and China, who see short-range ballistic missiles (SRBMs) and intermediate-range ballistic missiles (IRBMs) equipped with conventional payloads as a critical component of any effort to cripple a Western response to a regional crisis, by targeting the ports and airfields upon which such a response
would depend. China also envisions using ballistic missiles in an anti-ship role with its DF-21D and DF-26 IRBMs capable, in principle, of targeting carrier battle groups at distances of 2,000 and 4,000 kilometres respectively.\(^1\) Moreover, delegates were told by speakers such as US Rear Admiral Archer Macy that both China and Russia envision using ballistic missiles as part of multi-vector salvos – that is, salvos that combine both ballistic and air-breathing threats (such as cruise missiles) launched from a variety of ground-, sea- and air-based platforms. The primary value of missiles to near-peer competitors, then, is at the theatre level as part of their anti-access and area denial networks, as opposed to being strategic levers.

A second critical difference between Western and non-Western approaches to nesting missiles within competitive strategies is the tacit role that missiles might play in escalation control. As speakers such as Europa Analytica Director Julian Lindley-French and Director Brad Roberts of Lawrence Livermore National Laboratory’s Center for Global Security Research pointed out in the panel on the role of missile defence in cross-domain competitions, both Russia and China plan on short, sharp conflicts followed by attempts at de-escalation. This is something China dubs ‘local wars under informationized conditions’.\(^2\) Missiles have a strategic impact in these conflicts even if they are not fired. The threat they pose to bases and assets deters the adroit reinforcement of a given theatre and the risk of further escalation that exchanges of missile salvos pose gives Western leaders an incentive to accept a fait accompli after the regional status quo has been altered.

One major takeaway, then, was that limited missile defences are of value irrespective of whether they can counter the strategic arsenals of peer competitors. While it has often been correctly noted that the strategic arsenals of near-peer states cannot be credibly prevented from overwhelming missile defences, the sorts of limited salvos that might accompany an attempt at a quick local campaign can in fact be defeated by limited missile defences. Credible defences against SRBM, medium-range ballistic missile and IRBM threats integrated with air defences capable of intercepting air-breathing salvos will be critical to deterring and, if necessary, defeating a limited local aggression backed by theatre-level salvos.

The threat posed by theatre-level salvos will be particularly acute in the maritime domain. As RUSI Research Fellow Justin Bronk and Georgetown University Professor Keir Lieber stated in the final panel on missile defence in an age of precision, the proliferation of anti-ship missiles will necessitate new technologies such as high-power lasers, along with non-kinetic efforts in the cyber and electro-magnetic spectrum (EMS) space to disrupt the kill chain of sensors and command-and-control (C2) assets – on which these missiles depend – will likely have to be integrated into theatre missile defence. Should a defensive capacity against the use of limited defences not exist, then, the limited nature of most regional conflicts may give near-peer states the opportunity to exploit those strengths.


theatre-level salvos be achieved, it will greatly complicate competitors’ efforts to fight short, sharp wars given that the initial ‘shock and awe’ effect of a massed salvo is critical to achieving local revisionist aims quickly. If, as panellists concurred throughout the event, precluding such rapid limited revisions is the core strategic challenge facing the West, then credible theatre missile defences will be critical to deterrence by denial. Moreover, knowing that a missile salvo will not necessarily render any adroit response moot will likely buttress the political will in Western capitals to respond to regional contingencies.

That said, changes that will upend traditional operating concepts and strategic assumptions are not restricted to the theatre level. A second trend was noted at the level of strategic exchanges—the gradual evolution of a new era of counterforce. As Lieber and Dartmouth College Professor Daryl Press convincingly argued, developments in multi-source data fusion (combining data from multiple sensors), along with the penetrating ISR capability provided by low-frequency sonar and underwater unmanned vehicles, mean that previously survivable mobile launchers on the ground and at sea are now increasingly vulnerable to a crippling first strike. Together with increasing warhead accuracy, which would allow missiles to be destroyed in hardened silos by even low-yield weapons, this portends a strategic picture in which crippling a substantial proportion of an opponent’s strategic arsenal in a first strike is no longer beyond the realm of possibility. As such, while the immediate concern is theatre-level salvos in the context of limited wars in the medium to long term, incentives to pursue first-strike capabilities at the strategic level will emerge as a factor driving the transformation of missile defence.

In this context, missile defences targeting a peer competitor’s strategic arsenal are no longer a futile expenditure. While no missile defence system can overcome a robust missile arsenal in its entirety, overcoming what is left of an opponent’s arsenal after a first strike has disabled much of it is a different matter entirely. Nor, it should be said, can concerns regarding strategic stability cause leaders to ignore this option. As Lieutenant General Henry Obering III noted during the conference, near-peer competitors are already operating on the assumption that the West will achieve this capacity and are actively developing countermeasures and offensive postures to prepare for a potential counterforce exchange. If indeed the technological trends driving the new era of strategic competition are irreversible, it is worth considering whether policy should be restricted by Cold War prescriptions regarding stability which were, even in their own time, hotly contested.

3. A counterforce posture entails an effort to cripple or destroy much of an opponent’s nuclear and strategic arsenal with a first strike. It is juxtaposed with a countervalue posture where both parties deter one another by the risk of mutual catastrophic destruction. While the robustness and diversification of nuclear forces made successful counterforce unlikely in the past, this may well be changing. See Kier A Lieber and Daryl G Press, ‘The New Era of Counterforce: Technological Change and the Future of Nuclear Deterrence’, *International Security* (Vol. 41, No. 4, 2017), pp. 9–49.

Moreover, a conclusion that emerged from the panel on the relationship between missile
defence and strategic stability was that in the context of strategic competition, achieving
a degree of overmatch at the highest levels of competition (that is, full-scale warfare) may
reinforce deterrence at lower levels by leaving the other party with more to lose in the event of
escalation. This is particularly true in competitions with countries that cannot afford to match
the West’s financial investments. Consider, for example, how the Strategic Defence Initiative
(commonly referred to as the ‘Star Wars’ strategy) impacted Soviet perceptions of their ability
to compete with the West by posing the prospect (however technologically distant) of a West
capable of achieving overmatch rather than merely parity.

If this is indeed the case, missile defence needs to be explicitly nested within a wider policy
shift towards counterforce. The role of strategic (but not theatre) missile defences would be to
mop up a weakened nuclear arsenal after a crippling first strike as opposed to attempting to
intercept missiles on a reactive basis. Ideas such as left-of-launch interception (the interception
of a missile by kinetic or non-kinetic disruption before it is launched, which, as Lieber noted,
already implies counterforce thinking) need to be integrated more explicitly into a policy shift
towards counterforce than they currently are.

A final point on strategic competition noted during the conference, in particular when cross-
domain competition was being discussed, was that missile defence needs to move apace with
efforts to develop capacity and capability across competitive domains. Alliances such as NATO
need to be more explicitly committed to competition as opposed to deterrence – a goal in which
missile defence will play a part. By itself, however, missile defence is not a general panacea and
can only have a strategic effect if capabilities in other areas are generated in tandem.

Technology and Tactics: Integrating Systems and Disruptive
Technology

The conference heard from speakers such as Uzi Rubin of the Begin-Sadat Center for Strategic
Studies and Brigadier General Kenneth Todorov of Northrop Grumman about how the threat
environment is becoming more complex and cluttered, with ballistic missiles being joined by
other tools as part of a salvo threat which combines ballistic and cruise missiles along with
cheaper lower-flying projectiles such as UAVs and rocket fire. Technological advances deemed
worthy of note were:

- The emergence of projectiles capable of following non-parabolic trajectories at Mach 6+ speeds. Notable examples were hypersonic glide vehicles capable of atmospheric
  skipping – that is, altering a warhead’s path mid-trajectory while it is outside the earth’s
  lower atmosphere.
- The emergence of massed low-cost munitions such as rockets and cheap UAVs.
- The eroding distinction between theatre and strategic threats.
- The integration of kinetic salvos with non-kinetic enablers in the EMS and cyberwarfare.
Over the course of the first day, speakers such as Richard Rushton of Lockheed Martin, Todorov and Rubin concurred that the emergence of hypersonic glide vehicles, such as China’s DF-ZF and Russia’s Avangard, severely complicates the tasks of tracking and intercepting missiles by posing a threat that traditional missile defence systems were not built to intercept. The task of calculating the trajectory of a ballistic missile following a parabolic arc at speed is an already complex one, rendered nearly impossible by hypersonic glide vehicles that do not follow a standard arc of trajectory.

As was noted in the panel on disruptive technologies, high-end threats such as hypersonics are not the only complication facing stovepiped missile defence systems. Closer to earth, ballistic and cruise missiles will be joined by salvos of rocket fire and swarms of cheap UAVs. As Russian operations to dislodge Ukrainian forces from Debaltseve have proven, swarms of cheap UAVs can suppress the sensors on which effective missile defences rely and pin forces to their positions in advance of a salvo of ballistic missiles (although at Debaltseve rockets rather than missiles were used to capitalise on the paralysis created by UAVs). Ukrainian forces had their C2 facilities suppressed by UAV swarms and could not effectively manoeuvre from their positions – leaving them incapable of responding effectively to the rocket salvo that followed.5 Moreover, even relatively primitive actors are learning to coordinate these assets – witness the Yemeni Houthi rebels’ use of UAVs to suppress Saudi patriot batteries in advance of ballistic missile attacks.6 The conference also heard from UK Rear Admiral Chris Parry about how threats in the cyber domain and in the form of electromagnetic suppression can facilitate the effective use of missile salvos.

The aforementioned complexity of the emerging operating environment is exacerbated by a blurring of the lines dividing theatre and strategic weapons. As the conference heard in the first day’s panels regarding the US missile defence review and NATO’s missile defence, the capacity of long-range air-breathing threats, such as Russia’s Kalibr cruise missiles, to carry nuclear payloads raises the question of whether assets can be neatly classified as being either theatre or strategic in nature. Indeed, as Macy pointed out, even conventionally armed missiles can be used coercively against civilian targets to, for example, deter a Western intervention by demonstrating an adversary’s willingness to escalate. It is thus not clear whether threats to fielded forces and strategic threats can be neatly categorised in the way they previously could.

That being said, the panel on disruptive technologies also suggested that emerging technology provides pathways forwards which might mitigate these risks. As Rubin noted, hypersonics might be more easily tracked using optical tracking by long-range high-altitude long-endurance UAVs. Additionally, space-based tracking and interception represents another fruitful avenue to pursue. Of interest was US Air Command and Staff College Professor Everett

Dolman’s suggestion that distributed small space-based lasers, which could coordinate their beams onto a single position, might allow for the accurate and timely interception of hypersonic threats. Targeted energy, albeit from ground-based platforms such as Israel’s drone dome, a mobile system equipped with both a radio frequency jammer and a high-powered laser capable of exploding UAVs mid-air, was also suggested by Rubin as a means of mitigating the threat posed by UAV swarms. Additionally, it was suggested earlier in the day by Macy that cyber warfare represents a useful left-of-launch capability with which to thin missile salvos.

The pursuit of more cheap and short-range interceptors was put forward by a number of speakers over the course of the two days as a means to mitigate mass raids. As T X Hammes has noted, the fourth industrial revolution, with its breakthroughs in additive manufacturing, just-in-time delivery, and increases in the power of nano explosives, is likely to favour mass over precision. Efforts to augment the few and exquisite hit-to-kill interceptors that currently exist with tools that can either be deployed in mass or which, like targeted energy weapons, are restricted only by their power source, will be key to adaptation in this age.

Delegates heard from industry actors, such as Raytheon and Lockheed Martin, about how integration and interoperability within and across states can be achieved. In the near term, achieving interoperability between the sensors and shooters of partner states by ensuring that their fielded platforms can communicate will increase the robustness of sensor grids, improve warning times and increase the likelihood of successful intercepts. In the long term, interoperability will need to be superseded by true integration in the form of integrated fire control systems that are capable of fusing data from multiple sensors, prioritising targets and allotting tasks to disparate sensors and shooters across a system. A consensus emerged that this would require both a governmental effort in terms of coordinating procurement across partner states and an industry-led effort to improve interoperability across the platforms fielded by companies. Government–industry synergies were also identified as a key factor in rapidly adopting breakthrough technologies which, more often than not, emerge from the private and not the public sector.

Existing Policy: Change and Continuity

As might be expected, a substantial factor in the conference discussions was the 2019 US Missile Defense Review. Despite its broad embrace of left-of-launch interception and moving beyond kinetic interceptors, speakers such as CSIS Senior Fellow Tom Karako saw the review as a relatively tepid evolutionary step. The review restated commitments already made in documents such as the Joint Chiefs of Staff’s ‘Joint Integrated Air and Missile Defense: Vision 2020’ and, indeed, stopped short of the more explicitly transformational missile defeat (as opposed to

defence) framework outlined in the ‘National Defense Authorization Act for Fiscal Year 2018’. While promising commitments to intercepting both rogue-state missiles and the theatre-level assets of peer competitors left-of-launch, speakers such as Todorov noted that document was short on specifics.

At the level of NATO policy, a similar stasis is evident – a point that emerged from the event’s second panel on NATO’s missile defence. NATO still views ballistic missile defence (BMD) as a separate enterprise aimed at rogue states, while its IAMD capability at the theatre level relies on voluntary state contributions and consciously veers from ideas such as left-of-launch interception. Certainly, there are good reasons to be cautious about embracing an overly aggressive approach to theatre-level missile threats – as Frank Rose noted, theatre and strategic assets in states such as China, and to a lesser degree Russia, share C2 structures, raising the spectre of cascading instability. That said, a rigid stovepiped alliance posture with its limited theatre defence and stovepiped BMD looks to be woefully overmatched in a great power contest.

What seemed evident is that on both sides of the Atlantic great power competition has been embraced only tepidly as a paradigm – with important knock-on effects for missile defence. The goals of stability and completion are conceptually incompatible – competitions tend towards disequilibrium. This is not to say that certain forms of escalation should not be avoided, but in an era in which technology at the theatre and strategic level looks to be overwhelmingly offence dominated, a commitment to the comfortable remedies of the Cold War, with its neat delineations of theatre and strategic threats and the relative safety of both parties’ second-strike capabilities, looks to be inadequate.

Conclusions

The missile defence environment might be shifting towards a strategy dominated by offence rather than defence. At the theatre level, the ability of adversaries to launch powerful multi-vector salvos at short notice means that warning times to conflict are likely to shorten. This is matched at the strategic level by trends that incentivise counterforce postures. In this context, missile defence will need to be conceptualised, as Macy had it, as an enabler for other tools to do their task. Missile defence can buy time for forces to surge into an area and take the offensive at the theatre level, while at the strategic level a credible missile defence may play a mopping-up role after a strategic first strike. This offence-dominated environment will require old schemes about stability to be discarded.

Missile defence needs to be underpinned by a conceptual overhaul at the higher levels of policy and strategy. Western governments need to think in terms of long-term strategic competition spanning the full spectrum of conflict. Until this conceptual overhaul is achieved, generating

a full-spectrum response in which theatre and strategic missile defence can be nested will prove problematic.

Disruptive technology poses promise and pitfalls. On the one hand complex multi-vector salvos of cheap and exquisite weaponry will come to play an increasingly important role at the theatre level. That said, technological shifts in space, cyberspace and the realm of targeted energy have the potential to enable an evolution beyond a few, expensive hit-to-kill interceptors. Moreover, strides in data fusion make defence against strategic missile arsenals conceivable, subject to doctrinal evolution and the emergence of faster interceptors.

Cross-government and private sector synergies will be critical to leverage the opportunities afforded by the present environment and avoid its pitfalls.

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Annex 2

SPACE

Conference held on 16 January 2019
Is Space the New Cyber? UK Dependencies and Vulnerabilities

Alexandra Stickings

On 16 January 2019, the Royal United Services Institute (RUSI) convened a conference entitled ‘Is Space the New Cyber? UK Dependencies and Vulnerabilities’. The aim of the event was to discuss the ways in which the UK government is dependent upon space and the threats and hazards to space assets that create vulnerabilities in government activities.

The UK has an ambition to capture 10% of the global space market by 2030,¹ as well as develop its own launch capabilities. However, while the importance of space is recognised by the Ministry of Defence (MoD) and the UK Space Agency, understanding across other government departments is patchy at best. There was, therefore, a requirement for a concerted effort of outreach beyond those who were already ‘space aware’.

There are similarities between this situation and the one related to cyber security 10 years ago. Then, as now, an understanding developed which acknowledged the requirement for a whole-of-government approach to tackle the consequences of a large-scale cyber-attack. The conference organisers felt, however, that despite such an understanding, a coherent policy and strategy (for cyber) does not exist a decade on, and the cyber debate remains siloed within classified areas of government.

The conference was designed to stimulate discussion about the threats faced by satellites, the likelihood and potential consequences of each threat, and the UK’s current state of preparedness to respond to and mitigate the loss of space systems. Speakers represented government, academia and industry, but the conference was designed to not allow UK MoD or service personnel to lead or influence discussion. This approach accepted the premise that current MoD influence over government space policy was misaligning programming and strategy discussion towards expeditionary military operations at the expense of national resilience themes. The conference was attended by more than 70 international delegates representing the academic, government, military and industrial sectors of the space enterprise community.

The event sought to understand the role of various actors within the space sector, both in terms of their contribution to resilience and sustainability and their role in creating a narrative that is accessible and digestible to non-experts. The role that space plays across society – in everything from telephone communications, mobile-data exchange, navigation and weather forecasting to the financial sector, energy grids and water distribution, to name only a few – has long been

understood by militaries and industry, and by a relatively small number of government workers and academics. However, even everyday services such as satellite television and navigation seem not to have produced a wider recognition, either across government or among the wider public, of the role that space plays in the daily lives of all.

Similarly, the potential dangers to satellites are well understood by the space community, but the community tends to talk to itself rather than reach out to non-experts. However, there is disagreement about the relative dangers of threats and hazards. For example, a subset of the space community, represented at the conference particularly in the sessions ‘Space Armageddon’ and ‘Current UK Mitigation and Preparedness’, is intensely focused on the problem of space debris and the need for better international cooperation regarding Space Traffic Management and debris mitigation or removal, while others, particularly in the session on ‘Industry Viewpoint’, feel that this is an area in which satellite manufacturers and operators are well placed to protect assets, highlighting instead the actions of states such as Russia and China, who are developing anti-satellite capabilities. It is clear that the wide range of potential dangers to satellites creates a complex situation that needs to be fully understood to allow for effective risk assessments.

**Lessons and Deductions**

Several important themes on risks, dependencies and vulnerabilities emerged during the conference.

There is a consensus that reliance on space assets across the military, government services and civilian life is unprecedented. It has been said that Global Navigation Satellite Systems (GNSS),\(^2\) such as GPS and Europe’s Galileo are, as noted by Lord Harris of Haringey in the opening keynote, the ‘invisible utility’, with services from the financial sector to transportation to the emergency services all dependent in some way on the precise signals provided by these systems. Modern society is totally dependent upon energy networks, and a repeat of the Carrington Event – a solar storm in 1859 that severely impacted the worldwide telegraph infrastructure\(^3\) – would have even more extreme consequences today as a result of increased dependency on the systems that would be affected, with estimated losses of up to $2 trillion in the US alone.\(^4\) The conference heard how this is not a case of if, but when, with a similar level (or worse) event likely within the next 50 years. It is a contingency for which the UK government should be planning, but is not.

Addressing such issues cannot be simply a matter of reviewing vulnerabilities on a case-by-case or even sector-by-sector basis. Delegates agreed that a system-of-systems approach is required,

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where multiple, independent systems are seen as part of a larger, integrated system. The Government Office for Science’s review on satellite-derived time and position, the accurate signals received from GNSS systems that are used for, among others, navigation and the timing of financial transactions, highlighted the need for all Critical National Infrastructure (CNI) sectors to review not just their reliance on these signals but also the other reliant systems with which they interact. For example, many CNI sectors will rely on transportation networks for staff to be able to get to work. A three-stage response was put forward as necessary to respond to the vulnerabilities:

1. Understanding the vulnerabilities across and between systems that rely on space.
2. Assessing the risk of a major event that affects the satellites.

Investment in such resilience is critical, but there was general agreement among delegates that for this, decision-makers must understand that this is a real issue that needs to be taken seriously.

It was noted as ‘positive’ that the UK designated space as a CNI sector in 2015. As a result, not only is the importance of space recognised but there is also the opportunity for the CNI space sector to interact with other CNI sectors and educate them on their reliance and the vulnerabilities. This also allows for a discussion of what other areas of CNI affect the ability of space to operate, highlighting the interdependencies of all CNI sectors. Such engagement will go some way towards better preparing the UK government if one or more of the space systems on which it relies is disabled or disrupted.

Critically, delegates noted that this is not just a problem for one country. The US Air Force-operated GPS constellation and the EU’s Galileo network are used internationally by many countries. Some of the questions raised by delegates relate to how responding to a catastrophic solar event can be tackled at the international level. One answer suggested an increase in programmes that monitor the Sun and can provide some level of warning of potentially dangerous activity. Yet it was noted that perhaps more crucial is the need to appreciate cross-border systems that rely on signals from satellites, such as communication and energy networks.

International cooperation is also relevant to the issue of space debris. As with solar activity, there is a worst-case scenario that would have catastrophic consequences: the Kessler Syndrome, in which a collision between two objects in orbit produces debris that causes yet more collisions.

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resulting in complete orbital pollution and potentially the inability to use low earth orbit.\(^7\) This situation is similar to the rise in climate change or the proliferation of plastics in the ocean, a problem that affects all but cannot be solved by one state on its own. According to one delegate, the cleaning of orbits through debris removal is currently very expensive and still in the trial phase,\(^8\) and will require extensive international collaboration, as will promoting regulations on responsible de-orbiting of satellites that have reached the end of their lives or use. It was noted that the parallels with the issues of climate change and overuse of plastics perpetuate the question of why all countries should be concerned with cleaning up the mess made by a few, and who should be responsible financially. However, the conference heard that there is insufficient time to assign blame. Prevaricating may mean passing a point beyond which any intervention will have a negligible impact.

It was mentioned frequently throughout the conference that the space industry plays a central role in the operation and resilience of space systems through the protection of satellites and management of their orbits. Here again, though, there is some disagreement regarding the relative risks relating to various threats and hazards. Hardening of satellites to mitigate the effects of solar activity, such as radiation shielding, and the use of robust Space Traffic Management capabilities through tracking of objects in orbit means that some within the industry do not see space weather and orbital debris as unmanageable problems. Instead, it is suggested that the focus should be on the proliferation of counterspace and cyber threats and the use of force in space. To counter these threats and protect the UK’s assets, the space industry is central to developing capabilities that are more resistant to threats and designing resilience in at the beginning of a mission. It was agreed that the UK government must work closely with industry to identify the methods to create resilient systems.

Focusing on the situation in the UK, there is a suggestion that the country has placed itself in a binary position between the US system and the European system (both the EU and the European Space Agency), which is now jeopardised by the Brexit process. When Britain exits the EU, it will remain wholly dependent on the US for military grade position, navigation and timing, having lost access to the Public Regulated Service (PRS) encrypted signal from Galileo. The UK has been working alongside other EU countries to establish the Galileo GNSS system and has provided around 15% of the work,\(^9\) but Brexit will remove the right of UK companies to be involved further and will forbid UK military access to its PRS capability without a separate agreement. The UK’s reaction to this has been to scope for its own GNSS constellation, but this is a far bigger project than is understood by policymakers. While the debate surrounding Galileo has certainly gone some way towards highlighting the importance of space, there is a danger that the UK’s new focus on building its own GNSS constellation will move conversations away from both the steps required for resilience and the UK’s broader ambitions in space.


Conclusions

Reliance on space systems will continue to increase, whether this is for military or civilian operations. Governments need to lead work to map dependencies, identify vulnerabilities and put in place plans for mitigation and response. However, the space community needs to continually engage with government, as does industry, so that policymakers are aware of the full range of potential threats and the national security apparatus is able to carry out effective risk assessments. Such engagement is also necessary to ensure that the messages around the importance of space reach all areas of government and society, as any response will require the involvement and cooperation of all sectors.

As new technologies proliferate, new actors enter space, and when evolving space capabilities emerge, the space environment will become more complex. This may change the dynamics of the threats and hazards and the responses that will be required to protect space assets. Assessing what these changes might be and how they will impact on resilience, both in orbit and on the ground, needs to be a continuous activity of the space sector and counterparts in government to minimise the impact of events. This includes maintaining and increasing Space Situational Awareness activities encompassing satellite and debris tracking, solar-activity monitoring, and prediction and analysis of the capabilities and intentions of all actors, particularly potentially hostile states who may wish to do harm to space assets.

For the UK specifically, a more coherent space ambition is required. Plans for a sovereign launch facility and the goal of capturing 10% of the global market by 2030 are positive steps, but these need to be integrated with broader aims, such as how the UK views itself as a space power in the future and the nature of international alliances and partnerships. Achieving such an ambition will require input from the space community alongside government and may lead to a situation where the importance of space is fully recognised by UK government and policymakers. The UK will then be able to reap the benefits of space while being in a strong position to withstand worse-case scenarios.

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Annex 3

AIRPOWER

Conference held on 20 March 2019
Rethinking the Combat Air Survivability Mix Conference

Justin Bronk

Context and Intent

It is increasingly common in airpower circles to debate the latest trends in novel weapons systems; the possibilities offered by lethal, highly autonomous unmanned combat aerial vehicles; and the ways that future systems will increase lethality compared with the current generation. A less-featured part of this debate, which requires urgent attention, is the survivability aspect of combat air. Among Western air forces, attrition in combat is hardly planned for in force design, and there is a political unwillingness to contemplate risking any significant losses in scarce and extremely expensive aircraft and crew. However, when contemplating how to deter an aggressive Russia and a rising and increasingly assertive China, NATO’s airpower is the strongest source of military advantage. An approach which is unwilling to take risks or incur losses will not be viable, so airpower must be usable without prohibitive loss rates against forces fielded by these powers. Without the ability to purchase enough current-generation fighters to offset emerging survivability deficiencies through attrition tolerance, the next generation of developments must significantly improve survivability, not only for those next-generation platforms but also to allow legacy fleets to remain relevant.

The UK has announced its intention to develop a next-generation combat aircraft through the Team Tempest initiative,1 and multiple other states including France, Germany, Turkey, Japan and potentially the US are also looking at what will replace and/or supplant the current stable of advanced fourth- and fifth-generation manned fast jets. The threat picture has evolved significantly even since the design and introduction of fifth-generation fighters in the mid-2000s. As a result, the next generation of combat air systems might be optimally configured with a different combination of characteristics from those which are currently at the cutting edge.

When the US Air Force declared initial operational capability for the F-22 Raptor in 2005, it introduced a combat aircraft which combined revolutionary situational awareness, all-aspect stealth and extreme aerodynamic and kinetic performance, resulting in a survivability and lethality mix which remains unmatched more than a decade later. It also challenged the US’s potential great power rivals, Russia and China, to either develop comparable combat aircraft, or find ways to neutralise this formidable advantage. Both have been working hard on this problem from multiple approaches and with varying degrees of success. As the F-35 Lightning II enters service with multiple air arms in the US, Europe and beyond, it is important to examine both the advantages this fifth-generation platform offers, and the challenges posed by the fruits of nearly 20 years of research into unmasking and countering stealth fighters by Russia and China.

The survivability equation is not simply a question of picking stealth or advanced kinematics, jamming or standoff weapons, massed or exquisite platforms, but instead a mix of different elements to create a balanced solution suitable for the threat picture and missions required. To that end, the conference sought to re-examine what the optimal survivability mix might look like in the late 2020s, 2030s and potentially beyond in the light of current trends in both combat air systems design and emerging disruptive threat technologies.

Key Takeaways

One of the most important takeaways from the conference was that a critical part of the future combat air survivability equation is a means of keeping the legacy, fourth-generation platforms viable in the face of modern threats – a point stressed by multiple presenters. Even if the US Air Force were to purchase 72 new fighters per year – as outlined in US President Donald Trump’s recent budget request – that were solely fifth-generation F-35s, the US Air Force would still be composed of 50% fourth-generation and 50% fifth-generation fighters in 2030. For NATO air assets in the European theatre, the situation is even more stark – on current projections the ratio in 2030 will be 80% fourth-generation and 20% fifth-generation fighters. Therefore, these legacy platforms must be upgraded and networked to ensure that maximum situational awareness can be leveraged from fifth- (and possibly next-) generation assets to remain combat-relevant. Novel datalink, sensor fusion and machine-teaming technologies will have to form part of this mix, as will new standoff weapons to provide both kinetic and electronic warfare effects from outside the threat ranges of air defence systems. Hypersonic weapons for air carriage and launch are likely to be a critical part of this mix, as will the ability to update digital threat libraries for defensive-aids systems and electronic warfare in flight. These technologies will require new ways of compiling and producing threat system data by defence intelligence and other similar organisations – requiring the expertise of data scientists as much as that of conventional intelligence analysts.

As Air Vice-Marshal Simon Rochelle pointed out, the UK assumes that with two main platforms (the Typhoon and the F-35), it will be able to contribute to any mission in which the US might require allied assistance. However, the US is running at a faster developmental pace. Therefore, acquisition reform and novel technology investment strategies such as digital ‘twinning’ and digital prototype testing are essential if the UK is to stay relevant for high-threat mission scenarios during the 2020s.

Major General Frederic Parisot stressed that for the French Air Force, survivability as a concept is wholly centered on the requirement to carry the air-delivered component of France’s nuclear deterrent. The missile and launch aircraft must be credibly survivable against the most modern

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3. Digital twinning is where a virtual version of a given design or airframe is created alongside a physical one, and is kept updated with all changes made to its physical counterpart to enable faster and cheaper modelling and testing throughout the lifecycle.
defence systems protecting potential hostile powers, and be able to accomplish the strike mission if required. All considerations in the French combat air survivability domain ultimately stem from this. As a result, along with the Système de Combat Aérien Futur (Future Combat Air System, or SCAF) project with Germany, the French Air Force is committed to aggressively upgrading the Rafale – the ‘F5’ standard which is planned for service in 2032 will include an active-protection system to engage incoming missile threats, and an artificial intelligence (AI)-driven ‘virtual cognitive assistant’ to provide guidance and allow pilots to focus on other tasks. The SCAF project itself intends to counter the inevitability of attrition by avoiding dependence on the capabilities of a single platform type, instead aiming to create a family of systems and capabilities.

During panel discussions surrounding the future of sensors and electronic warfare, several key themes emerged. Advances in 3D radar, multi-static radar and virtual modelling of hostile platform radar cross-sections, as well as huge improvements in computing power available for post-processing and sensor-fusion-based analysis, are making it ever harder for even very low-observable aircraft to remain completely undetected in the modern battlespace. However, it is still important to remember that being hard to detect in the X and Ku bands of the electromagnetic spectrum – where the vast majority of fire-control and engagement radars operate – will continue to be extremely valuable as a component of survivability. Even if an enemy can tell roughly where a flight of stealthy combat aircraft is in an area of operations, that does not mean that it can complete the kill chain and cue weapons onto those aircraft. The increasing lethality of combat aircraft, both in terms of standoff ranges and probability of kill, is critical to ensure that stealth aircraft can remain ahead of adversary kill chains by destroying threats before they themselves can be targeted effectively. Electronic warfare is a key component for shaping the battlespace to allow both legacy and stealth aircraft to fulfill their missions in high-threat environments. However, this cannot be a silver bullet and has its own limitations in terms of electromagnetic fratricide and predictability of effects.

At multiple points throughout the conference, the audience was reminded that with the constantly increasing importance of data in combat aircraft, from electronic warfare to threat recognition to the automatic prioritisation and recommendation of courses of action against targets, data assurance will be a vital part of ensuring survivability and combat effectiveness in all future air warfare. If a pilot cannot trust the data that a platform such as the F-35 presents, how can the rules of engagement be applied legally? As systems provide ever-greater situational awareness through the processing of more data than the human operator can understand, let alone check or interrogate, trust in the data being fed into those systems needs to be assured.

As a key source of threat technologies looking forwards, specific attention was given to China in the final panel on disruptors. The Chinese People’s Liberation Army Air Force (PLAAF) remains focused on its relatively modest goal of being a modern regional military force by 2035, and it only aims to be capable of playing a dominant global military role by 2049. However, it is

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not simply aiming to create a carbon copy of the US Air Force, but rather is taking lessons from the latter and blending them with a technologically broad, AI-heavy investment strategy to keep technological options open for as long as possible, and a force structure tailored to China’s specific regional goals. Serious deficiencies in training and proficiency in complex realistic environments remain a limiting factor for the PLAAF but the Chinese have taken a surprisingly open attitude towards acknowledging failures and are improving the realism of both squadron-level training and major exercises at a rapid rate.

Finally, General Frank Gorenc (rtd) reminded the audience that one of the most vital missing components of modern military strategies in the West is a discussion of whether the threats being prepared for are ‘existential’. When a country decides that it cannot afford a capability for its air force (or indeed any other part of the military instrument), that generally tends to mean that the country does not want to pay for it. Without a discussion about what ‘existential’ might or could mean in the defence planning process, it is impossible to accurately make value judgements on what is and is not required, because the cost implications cannot be compared with an accurate risk assessment.

Without ambitious changes to address the survivability shortfalls evident in current air force inventories and even upcoming fifth-generation platforms in the face of a rapidly evolving threat landscape, NATO air forces risk being unable to prevail in the event of a war between major powers. Without credible conventional warfighting capabilities, strategic deterrence itself is undermined, so a serious discussion of the issues raised at this conference should not simply be a matter for airpower professionals, but policymakers more generally.

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Annex 4

SEA POWER

Conference held on 15 May 2019
RUSI First Sea Lord’s Sea Power Conference

Sidharth Kaushal

Introduction

The 2019 RUSI First Sea Lord’s Sea Power Conference held on 15 May 2019 challenged delegates from navies from around the world to reconcile the competing demands of meeting current requirements of naval operations and achieving a longer-term transformation of naval forces to meet future challenges. The conference addressed the broad geopolitical trends that will shape navies’ future operating environments and the prospects for a UK maritime strategy to emerge in this milieu before delving into the specific technological trends and personnel requirements that might inform naval planning in this context. The links between the navy’s planning and broader policy visions such as Maritime 2050 were also discussed.

Conference participants discussed four central challenges that face strategists and civilian defence planners:

- The first challenge is correctly ascertaining the nature of changes to the character of war. Williamson Murray and MacGregor Knox usefully distinguish between military–technical revolutions and revolutions in military affairs. The former are primarily technology driven and alter the character of war at the tactical and operational levels. By contrast, the latter typically involve the intersection of technological, organisational and social changes and transform war at every level, from the strategic to the tactical. For example, the US Army’s development of the AirLand Battle framework to leverage the opportunities provided by precision-guided munitions was a military–technical revolution. By contrast, the reorganisation of the French army in the aftermath of the French Revolution was a revolution in military affairs which radically changed the character of conflict. The French Revolution changed the nature of military organisations by including the general populace in warfare and, concomitantly, expanded the size of armies while ensuring that leaders had to seek expansive war aims to justify this level of mobilisation. The changes seen were not just technical or organisational but socially driven and altered the character of war at all levels. Delegates heard that today, as navies contemplate their futures, senior leaders would do well to divine the precise nature of the transformation being asked of their forces and reach deductions as to whether they face an evolutionary military–technical revolution or a disruptive revolution in military affairs. Historical

research on the drivers and impact of previous revolutions in military affairs, then, will be a critical factor in helping the navy ascertain the nature of its future strategic and operating environment.

- Second, having identified agility as an objective, the next step will be to specify the structural and procedural changes needed to cultivate an agile organisation. A central task will be analysis of Royal Navy capability areas to ensure that existing processes are fit for purpose and, where they are not, to alter the navy’s way of doing business. In effect, leaders have to take stock of, and attempt to cultivate, what Michael Horowitz called their organisational ‘adoption capacity’. The adoption capacity of an organisation is its ability to integrate changing technology, concepts of operations and personnel. Generally speaking, three variables predict organisational adoption capacity: the organisation’s ability to sustain the financial costs of adoption; the organisation’s age; and the congruence (or lack thereof) between the organisation’s critical task focus and emerging imperatives. Delegates were asked to contemplate whether navies had sufficient adoption capacity to deal with the challenges being faced.

- The third challenge is identifying and accounting for sources of uncertainty with regard to the first-order assumptions that drive planning. Military leaders (like all organisational leaders) are forced to plan under conditions of uncertainty regarding first-order beliefs: the assumptions that allow leaders to rank threats as being more or less urgent and identify pacing challenges. However, changing political circumstances can alter a state’s hierarchy of threats and, by extension, what it asks of its military. Consider, for example, the way in which the two-power standard that the Royal Navy outlined at the turn of the 20th century with France and Russia in mind became all but obsolete as both countries became de facto allies against a rising Germany. Or, to use a more contemporary example, one might consider the resurgence of traditional security threats which, it was assumed, would be superseded by constabulary duties in an age of ‘new wars’ conducted not against states but against non-state actors. Documents such as the sixth edition of ‘Global Strategic Trends’ (GST 6) incorporate an understanding of uncertainty by mapping the contours of several conceivable future geopolitical horizons as opposed to projecting the future per se. Naval planning would benefit from a military operational-level counterpart to the multiple futures framework outlined in GST 6 in order to stress-test the viability of future planning in the face of uncertainty regarding first-order assumptions.

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Finally, and perhaps most crucially, leaders need to distil a broad set of policy imperatives derived from multiple stakeholders into a coherent and parsimonious set of strategic principles. Policy documents like George Kennan’s ‘X Telegram’ and Bismarck’s ‘Bad Kissingen Memorandum’ stand out in the annals of history by virtue of their ability to distil key objectives and waypoints to achieving them from the cacophony of competing aims, debates about the nature of the future strategic operating environment and department-level objectives. The principles articulated in both documents were, moreover, flexible enough to account for unexpected change. The challenge facing both political and military national-level leadership is to articulate a maritime strategy that is more specific than general statements about maintaining world order and yet sufficiently general to amount to more than a description of the needs of the hour. A strategy that can serve as a bridge between policy aims and department-level activity is required.

The Changing Character of War and Military Adaptation

Leveraging the Positive Externalities of Technological Change

The burgeoning technological and social changes that figures such as Klaus Schwab characterise as the harbingers of a ‘fourth industrial revolution’ may well portend a revolution in military affairs as opposed to merely a military revolution. In conference sessions one and four, the audience heard from speakers such as James Sproule of LEK consulting and David D’Souza of CIPD engagement that a combination of population ageing and demographic decline across the developed world and technological disruption in the form of automation could fundamentally alter the nature of work. Automation, in particular, will likely raise the demand for the skills of individuals capable of complex non-routine tasks as opposed to both manual workers and individuals who can perform complex but routine jobs, such as technicians. In the medium to long term, artificial intelligence (AI) may well come to perform tasks typically reserved for human decision-makers – such as tactical planning – with greater efficiency. In session three, conference speakers such as acting Ministry of Defence (MoD) Chief Scientific Advisor Simon Cholerton considered, however, that this will not eliminate humans from the decision-making loop. They proposed that a more likely outcome involves human–AI teams, with AI providing tactical solutions and human decision-makers making broader strategic choices. The future force, then, may well be a smaller force of highly educated ‘strategic corporals’ selected on the basis of their capacity for higher-order decision-making and their ability to thrive in a technology-rich environment.


A cautionary note was sounded by Nick Wright of University College London in the third panel on technology, however. Wright noted that AI systems still struggle to fully understand context and require substantial amounts of data in order to ‘learn’. In the short to medium term, then, automation is more likely to replace individuals involved in routine cognitive and non-cognitive tasks, such as the maintenance of vessels or assessing ISR, as opposed to higher-order tasks. Nonetheless, as the audience heard from speakers such as Cholerton and former US Presidential Adviser and founder of H-Robotics Philippa Malmgren, developments in the realms of data-processing, networking and the Internet of Things are already reaching a level of maturity that is likely to produce an impact on the character of warfare, if not a military revolution.

In the short to medium term, then, navies will confront something closer to a military technical revolution than a revolution in military affairs. A combination of early developments in artificial intelligence, additive manufacturing and the increasing lethality of small unmanned platforms looks to exacerbate the problems faced by forces reliant on few and exquisite platforms by tipping the military balance at sea in favour of mass. For example, scholars such as T X Hammes note that a combination of relatively primitive AI, additive manufacturing and nano-explosives are collectively likely to increase the number and lethality of UAVs operating as loitering munitions in the congested urban littorals where, as First Sea Lord Admiral Philip Jones noted in his speech, naval and amphibious forces will be needed most.10

Similarly, in line with speakers such as Wright’s observation that ISR roles will be the primary impact area for automation and AI in the short term, unmanned gliders currently used for civilian research could well serve as cheap redundant sources of surveillance data or as loitering smart mines – a development that some argue will complicate the deployment of previously stealthy platforms such as attack submarines.11 The application of emergent technology in the area of neural networks can allow AI that has been sufficiently well ‘trained’ to assess imperfect ISR for targeting purposes more effectively than human analysts – potentially allowing the adroit deployment of precision strike tools against both fixed and mobile assets and exacerbating the challenge posed by ground-based anti-access/area denial (A2AD) systems. Critically, however, all of these changes largely involve the intensification of existing tactical and operational trends, such as the need to grapple with the congested and complex nature of the littoral or the risk posed by networked reconnaissance strike complexes. Moreover, the technology that enables these shifts is characterised by rapid technological diffusion, returns to scale and diminishing requirements for financial investment. These trends have allowed relative ease of adoption even for unsophisticated actors, suggesting that barriers for entry and adaptation will be even lower for powerful states.12 That said, the question of how a navy built around a few expensive

platforms should adapt to an age of mass is worth exploring. For example, using expensive platforms such as SSNs as ‘motherships’ for cheaper underwater unmanned vehicles (UUVs) and extending the range at which carriers can operate by leveraging cheaper and longer-range unmanned combat air vehicles (UCAVs) in the place of more expensive shorter-range manned aircraft have been suggested as tactical expedients to meet this challenge. Nonetheless, it would appear that the immediate impact of technological change is likely to ease certain pressures on the navy – such as the need for manpower – while stimulating changes within the force that are more evolutionary and technical than revolutionary.

In the medium to long term, however, this evolutionary change will likely lead to something more disruptive as the pace of technological change quickens and, more importantly, interacts with social trends such as changes in the expectations of human workers and economic trends favouring small enterprises. As AI matures and begins to perform tasks that might be classified as cognitive non-routine, a broader shift in all aspects of military conduct, from the generation of forces to their strategic employment, is likely to occur.

Substantial changes to military practice will be necessary both to leverage the more complex technological innovations that will emerge in the medium to long term and to secure the personnel capable of exploiting them. With regard to staying abreast of technological change, the critical issue will be building cross-cutting links between the navy and industrial partners. This civil–military integration will need to extend beyond the few companies with which the navy has traditionally worked if it is to give the forces access to the cutting-edge innovation that often occurs in smaller firms. The audience heard from speakers such as Malmgren that keeping abreast of disruptive innovation will likely require a broad shift in the way in which the MoD approaches procurement and research and design – with a greater emphasis on cultivating ties with smaller firms and on eschewing a risk-averse investment culture in favour of a ‘fail fast’ approach. This raises questions regarding how the navy approaches its ends–means chain with regard to procurement. On the one hand, excessive neophilia may result in the procurement of technology that is either immature or surplus to operational requirements largely because other nations have adopted it. On the other hand, a fail fast approach requires the navy to spread its bets on a substantial number of potentially disruptive technologies – a process that is wasteful because most bets fail, but also increases an organisation’s chances of being the first to uncover the military potential of a given technological innovation.

Existing research suggests that there are advantages and drawbacks to both the approach that allows operational concepts and requirements to drive procurement and the approach that focuses on procuring and experimenting with the broadest possible array of new technology and building tactical and operational plans around experimentally derived results. On the one hand, militaries that have a top-down approach in which concepts of operations drive procurement are often able to signal their requirements to industrial partners effectively

and thus avoid the budgetary waste of failed experiments because the gap between military and industrial assumptions is reduced. On the other hand, militaries that take a bottom-up approach often adapt more quickly to technological change.\textsuperscript{14} A critical question for the navy, as it contemplates a fail fast approach, is how much wasted investment it is willing to tolerate to secure a breakthrough that pays for the model.

A second point raised by speakers such as Wright and Malmgren was that the critical resources that navies have to cultivate to be effective will change. For example, a major advantage of authoritarian states in the global AI race is their ability to train AI using large volumes of data forcibly extracted from their citizens. Given that the efficacy of any system depends on the amount of data it is provided with, cultivating stocks of data may be as important as cultivating strategic reserves of tangible assets – a point highlighted by Wright.

**Matching the Right Personnel to the Right Jobs**

Building stocks of human capital will also require the modernisation of the navy’s manpower model. As speakers such as British Maritime Transport’s Sarah Kenny highlighted, the navy will have to confront a changing work culture which emphasises flexibility if it hopes to attract individuals who are comfortable with the technology-rich environment in which future recruits will have to operate. In particular, the growing importance of areas such as cyber security will likely require efforts to reach out to a recruiting pool that is young, highly educated and desires greater flexibility in the work it does. Moreover, as the difficulties surrounding the Pentagon’s collaboration with Google illustrate, segments of this workforce may also be averse to working with the military.\textsuperscript{15} As such, the navy will need to reconsider both its outreach and its internal processes for managing personnel to reach out to a demographic with a variegated skill set that is quite different from traditional recruits.

Two models for mitigating the challenges posed by a changing workforce were proposed. One model, outlined by Marianne Greene of Deloitte, is a ‘patchwork’ system which combines part-time workers, crowdsourcing, contractors and full-time workers – thereby leveraging the niche talents of individuals who may not be inclined to work for an organisation on a full-time basis. The alternative pathway, highlighted by speakers such as CDP People Transformation Lead Adrian Dottridge, was to focus on developing a strong internal pipeline to ensure the cultivation and education of promising individuals. Greater flexibility in terms of allowing individuals to choose their career paths and allowing lateral entry will go some way to this end. This latter course of action is particularly appealing given that the navy has historically acted as a vehicle for social mobility – offering skills and training to potentially talented but under-skilled recruits. Given that maintaining public support for naval expenditure requires embedding the navy in the UK’s social consciousness, maintaining this role as an engine of mobility may be particularly

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important. This does come with challenges, however. As D’Souza noted, organisations often commit the error of training individuals for the skills that would have been valuable to the organisations’ leadership in its formative years, as opposed to skills which have contemporary and future relevance.

Managing Uncertainty and Geopolitical Flux

The second major challenge facing leaders is a perennial one – managing uncertainties regarding their own first-order assumptions. The assumptions that undergird long term planning in any organisation are based on models of the world that may prove inapposite. For example, while questioning the utility of analysing the world through the lens of a democratic/authoritarian divide, former Defence Secretary Malcolm Rifkind noted that existing challengers like Russia, which serves as a pacing threat, may have reduced salience if today’s Sino–Russian entente endures the same fate as its Sino–Soviet predecessor. Similarly, the question of whether China will rise to the status of a superpower and what the ramifications of this will be are open to question. While speakers such as economist Gerard Lyons highlighted the importance of the seismic shift in economic power from west to east, James Sproule of LEK Consulting signposted the challenges that emerging powers such as China may face in becoming innovation-driven economies and escaping the middle-income trap with systems that depend on rule by law – in which the government sets rules but is not bound by them – as opposed to rule of law whereby the state is bound by the rules it sets. Perhaps as worryingly, the second-order effects of potential future scenarios are not altogether clear. For example, would a stagnant China be less geopolitically ambitious or, as some have argued, would a Chinese regime no longer able to seek legitimacy on the basis of economic progress seek military aggrandisement as a means of generating support? In other words, are autocratic regimes at their most dangerous when they are strong or weak? Moreover, will the response of the world’s sole superpower to these challenges be predictable or, as some have argued, has the critical political middle ground that sustained a foreign policy consensus in the US collapsed?

From a naval perspective, this raises critical questions but also presents opportunities. As Vice Admiral Jerry Kyd noted in his speech, middle powers can often collectively work to manage uncertainty in eras where the intentions and trajectories of superpowers are not easy to discern. A globally postured Royal Navy could, then, act in conjunction with other regional partners to provide crucial public goods and abet the endurance of the rules-based international order. Kyd’s speech illustrated that as the Royal Navy ponders which resources to generate and where to dedicate them, it will need to build flexibility into the development of its concepts of operations, procurement and the deployment of forces. The resources needed to cope with threats on NATO’s northern flank are drastically different from those needed to play a role in maritime East Asia if China becomes a pacing threat. The nature of the challenge posed by rivals is also to some degree uncertain. A country such as Iran or Russia which restricts its challenges

to the grey zone may, for example, become more risk acceptant if it perceives an opportunity for success by more overt methods or, alternatively, if it is suffering a crisis of internal legitimacy. Moreover, given that different contingencies may necessitate working with different partners, consideration ought to be paid to how the integration of forces beyond those of traditional allies with UK naval forces can be achieved.

One way the navy can mitigate uncertainty is by adopting a strategy of hedging – building the flexibility to meet or contribute to meeting multiple challenges as part of a coalition. Alternatively, the Royal Navy can opt for a policy of concentrating its resources for maximal impact. This would require the Royal Navy to identify and prioritise a particular challenge or geographical theatre which is deemed to supersede alternative potential missions in terms of its long-term relevance to national security. An analogy could be drawn with Admiral John Fisher’s Royal Navy before the First World War, which withdrew from a number of peripheral missions to concentrate resources on Germany’s High Seas Fleet.

From Policy Objectives to Strategy – Towards a Strategy for Generating Seapower

The audience heard from the First Sea Lord in his keynote address that seapower is likely to be central to realising the vision of a global interconnected UK. The mobility of seapower and its centrality to maintaining the economic sinews of a globalising world make it a critical asset to a nation that expects to be forward postured globally. It is important to note, however, that seapower and naval power are not the same thing. Many continental nations have maintained large navies but only a few nations have had seapower – an interconnected web of institutional, economic and military assets centred on the sea. A maritime strategy needs to nest naval strategy within this broader context. The audience heard from speakers such as Kenny and Kyd about the overarching priorities of the civilian and military sectors respectively – namely improving the competitiveness of the UK’s maritime sector and maintaining the stable security architecture at sea on which this sector depends. However, a strategy must do more than aggregate the specific objectives of different parts of the maritime enterprise – it is a set of overarching principles which determines the roles of individual departments and sectors, identifies complementarities and contradictions between them and attempts to leverage the former while mitigating the latter. In effect, then, a strategy is more general than a statement of policy but less context-specific than a particular organisational plan. The conflation of strategy with statements of policy means that there is a niche to be filled in this area. There is, then, room to develop precisely this conceptual bridge between national policy and the actions of individual components of the maritime enterprise.

An example of such an overarching ends–means–ways chain was provided in a recent report by Kun-Chin Lin of Cambridge University, who convincingly made the case that the recent expansion of the Panama Canal represented an opportunity for the West to reorient the locus of maritime

trade from the Indo-Pacific to an East–West route running from the Atlantic to the Pacific through the Panama Canal.\footnote{Kun-Chin Lin, ‘Ports, Shipping and Grand Strategy in the Indo-Pacific’, in John Hemmings (ed.), ‘Infrastructure, Ideas and Strategy in the Indo-Pacific’, Henry Jackson Society and Asia Studies Centre, 2019.} An archetypal maritime strategy might involve working to position the UK at the centre of the Atlantic component of this new maritime highway and prioritising the security of the key routes that straddle it. This would in turn delineate responsibilities for the department of transport and the navy. The former would need to prioritise the competitiveness of those ports and facilities within the UK that are most relevant to the transatlantic part of this route. The navy would reinforce this vision by focusing assets primarily on the Atlantic and the chokepoints that secure access to it, such as the GIUK (Greenland, Iceland and UK) gap. The purpose of this example is not policy suggestion – this need not be the UK’s maritime strategy. However, this vignette serves as an illustration of how a coherent geopolitical vision with a clear ranking of priorities and responsibilities can distil broad policy aims into concrete practice and delineate the priorities of individual departments/sectors within government.

Conclusions

A number of conclusions and avenues for further work emerged from the day’s proceedings. Central among them are:

- There is a gap in the existing intellectual architecture with regard to an intermediate-level set of priorities between higher-level policy aims (maintaining a globally interconnected UK or the defence of a rules-based order, for example) and sector-specific aims. Effectively, articulating a strategy would serve as a bridge between higher-level policy aims articulated in documents like Maritime 2050 and the department/sector-specific aims of particular sectors of the maritime enterprise.\footnote{Department for Transport, ‘Maritime 2050’.} What is often described as strategy presently might more aptly be described as an articulation of policy aims.

- A corollary to this is the need for an emphasis on identifying sources of uncertainty regarding first-order assumptions and building mitigation strategies into naval planning. An operational-level counterpart to GST 6 that served to frame naval strategy within the context of multiple possible future horizons would usefully frame the uncertainties that planners need to take into account and serve as a starting point for discussions regarding mitigation.

- Given that the near- and long-term impact of technology may differ, the navy will need a twin-track approach to modernisation. In the near term, adaptations to breakthroughs in areas such as automation may be more tactical and operational in their nature while in the long term a broader transformation of the force may be necessary to remain competitive.

- The navy needs to consider the means by which it intends to approach civil–military integration. Specifically, to what degree can the navy adopt the fail fast model needed to work with an ecosystem of smaller firms and is this the optimal approach to leveraging...
innovation? More broadly, the navy needs to weigh the adaptive advantages of fostering an innovation-driven ecosystem vis the clarity of purpose achieved when operational concepts and requirements drive procurement. Both models have something to commend them and will need to be rigorously compared.

- Reconsidering the navy’s manpower model will likely become a necessity. As the navy attempts to build a workforce with a 21st-century skillset, it will need to weigh the advantages of a patchwork model, including full-time workers, part-time workers and contractors, against a sustained effort to cultivate an internal pipeline. The flexibility and agility of the former model needs to be weighed against the sustained access to personnel and societal embeddedness that an internal pipeline-centric model provides.

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Annex 5

LAND WARFARE

Conference held on 4 and 5 June 2019
USI CONVENED ITS 19th annual Land Warfare Conference from 4–5 June, organised in partnership with the Chief of the General Staff, to explore how land forces can secure advantage in an era of constant competition. Held during the 75th anniversary of D-Day, the conference not only sought to look ahead at emerging concepts and capabilities, but to reflect on historical experience. As adversaries develop increasingly effective strategies to circumvent the strengths of the ‘Western way of war’, the conference attempted to explore how land forces can maximise their advantages and mitigate their vulnerabilities while contesting all domains.

Competition and Deterrence

The challenge posed by adversaries exploiting the thresholds for escalation imposed by the conventional distinction between peace and war has been widely discussed over the past decade. Another framing of the issue emphasises the capacity for these operations to extend the decision-making cycle supporting a response by presenting policymakers with persistent ambiguities. In his opening remarks General Mark Carleton-Smith emphasised what while the problem was clear, solving it demands innovative thinking as to how armies operate.

The first session saw divergent approaches to confronting this challenge. To explicitly compete in the space between peace and war – embracing ambiguous operations – is to legitimate such activity as the new normal. Conversely, the assertive adaptation of stated thresholds to reduce the space for ambiguity, and thereby enable quicker and more direct responses to hostile activity, risks escalation. Furthermore, deterrence requires some ambiguity as to a state’s red lines, and yet if Western governments wish to uphold an international rules-based system, they must clearly articulate what constitutes an attack, thereby communicating their red lines, and signalling the thresholds that adversaries can then exploit.

It was noted that different states have adopted distinct approaches to this dilemma. Lieutenant General Terry Wolff made the case for calling the bluff of those seeking to conduct undeclared operations, as in the Euphrates Valley, where US forces decisively engaged Russian mercenaries in February 2018. This was consistent with the argument made by Lieutenant General Eric Wesley that adversaries operated covertly because they had concluded that they could not compete in direct force-on-force conflict. David Kilcullen similarly noted that since adversaries operated ambiguously because of their unwillingness to fight conventionally, kinetic retaliation would increase the risk of testing thresholds and thereby deter such operations.
On the other hand, since the UK and other NATO members lack the conventional dominance of the US, competing beneath the threshold of armed conflict may be necessary. In this, Israel likely represents the most effective actor. Ronen Bergman, author of *Rise and Kill First*, outlined how Israel, using targeted killings, and more than 500 air strikes in Syria, has sought to undermine its adversaries’ capabilities to avoid escalating to large-scale conflict. Israel’s population, however, sees itself as facing an existential threat. The public acceptance of undeclared operations is therefore significantly higher. Ed Williams, CEO of Edelman UK, drew on extensive polling data gathered by his company to show that in the UK, by contrast, the public – while accepting official deception when practised for military necessity – would overwhelmingly prefer that the military maintain sufficient conventional capabilities, rather than rely on deception and covert action.

The means by which effective deterrence can be achieved are not limited to offensive capabilities but include a resilient state and society that does not readily present vulnerabilities that an adversary can target. The Chief of the General Staff highlighted in his opening address how adversaries are becoming adept at turning the tools of globalisation into Western vulnerabilities, threatening supply chains and exploiting information flows to raise the economic and political costs of conventional operations. These vulnerabilities are difficult to eliminate, because they arise from the economic framework that has been the basis for Western prosperity, and therefore conventional military strength. It was in this context that the military’s role in national resilience was raised. Unconventional threats to critical national infrastructure could deter military retaliation for operations below the threshold of armed conflict.

**The Utility of Agile Capabilities**

The need to contest multiple domains, and the dominance to be gained by superior communications and situational awareness, has consistently increased the price of platforms. Furthermore, the expanding reach and lethality of weapons systems is threatening theatre entry and logistics capabilities. This is shifting prioritisation in force design. The conference heard from the Vice Minister of Defence for Lithuania, and senior military officers from Australia and France, whose armies are all modernising in response to significantly different contexts. However, all three have prioritised mobility first, and lethality over protection, favouring wheeled and modular platforms.

A second trend consistently observed by numerous forces, including the UK and the US, is that protection can be achieved through dispersion, since the range and accuracy of systems is allowing small force packets to attrit more concentrated adversaries. Dispersion, however, leads to a more chaotic, porous battlespace, with force penetration and exposed flanks. Furthermore, with the integration of long-range fires and cyber capabilities, and the wide range of theatres of competition, the distinctions between near, deep and rear battle areas are collapsing. While the force structure has not been entirely flattened, the result is that all echelons are likely to be simultaneously engaged in action; higher echelons will have to defend themselves and use their cyber capabilities for effect against adversaries in conjunction with the kinetic effects of lower echelons, rather than higher echelons.
The implications of fighting dispersed, and the need to converge effects across domains, is not simply – or even primarily – a question of platforms. Officers must be able to understand the battlespace, and soldiers must be prepared to operate with their flanks exposed. This requires a shift in mindset, from sequential and planned periods of contact, to a continuous manoeuvre for advantage. Indeed, a junior NCO, speaking about military culture, highlighted that the issues of mindset and culture can influence or even dictate battlefield performance. Not all domains are equal, however. There are significant limits to what information warfare, for example, can achieve, and initiative will still rest with the army most able to generate violence quickly against relevant targets. This was consistent with the conclusions of the historians’ panel on Operation Overlord, where deception helped to shape the operation, but the survivability of forces depended upon their available firepower, especially from indirect fires. Information operations were critical, but they were not decisive.

The Necessity of Multiple Axes

Common to almost all expected future force structures is an integrated, networked army. This vision, however, is unlikely to be reached by laying down a blueprint for a future force and then rigorously implementing it. Several speakers addressed the need for spiral development, testing prototypes in real-world conditions, and A/B testing capabilities. The technological implications of many capabilities are not yet fully understood. Furthermore, as the cost of new systems increases, the strategic cost of investing in the wrong technologies is high. Procurement premised on the complete replacement of platform for platform across a force is not realistic. Indeed, since advantage is unlikely to lie with early adopters, but rather with those best able to integrate, and make use of, new capabilities, bending the force around platforms is likely the wrong approach to modernisation.

Instead it will be necessary to advance along multiple paths. To facilitate this, as Lieutenant General Alain Bouquin argued, new platforms will need to be modular, and software will need to be based on open architectures, allowing new software packages to supersede old, without requiring the replacement of the whole systems. With an open architecture it becomes possible to test different modules and capabilities, or to equip a part of the force, and then adopt technologies once they are sufficiently mature.

There is a persistent belief within armies that counterinsurgency in Iraq and Afghanistan has bent the force out of shape. While this may be true in terms of training and readiness, Sharon Weinberger, author of The Imagineers of War, reminded the conference that many of the transformative technologies and techniques at the core of AirLand Battle emerged from Vietnam, and that in moving away from counterinsurgency, armies must be careful not to forget hard-won lessons. Samuel Bendett, a Research Analyst at CNA, described in detail Russia’s approach to using operations in Syria as a laboratory to develop capabilities for warfighting at scale.

The need for multiple axes of advance was not only true in capability development, but also in theatre entry. It was noted that with the US shifting its attention to China, the endurance of NATO depends on its delivering clear utility to the publics who must fund the forces that
underpin it. NATO must therefore be able to support missions that are politically important – such as operations to Europe’s south – as well as its core strategically vital mission of deterring Russia. Of course, the concerns of a small number of Alliance members may not be concerns of the Alliance. There is therefore a need for a wider base of logistical capabilities, so that Alliance members can conduct politically relevant operations without need for approval from and support by the US. These capabilities do not need to be prohibitively expensive. David Roberts of King’s College London explained how the UAE has shown that with a modest logistical capability, it is possible for small and medium states to project their interests. It was noted that although the UAE is a close counterterrorism partner of the US, converting engagement into leverage is a serious challenge. The lesson appears clear; those who can contribute sovereign force packages to an alliance retain independence, and therefore influence. Those that make their own capabilities dependent upon others lack leverage.

The Devil is in the Detail

The conference considered a wide range of emerging technologies, from artificial intelligence and autonomous systems to long-range precision fires and battlespace management architectures. Professor Nina Kollars of the Naval War College emphasised that the utility of these systems would be determined by the detail of their integration into and use by the force. Moreover, it is unlikely that a new piece of technology will reshape the individuals that must use it. Instead, technology that makes sense to users and has clear utility will be adopted and experimented with, and new ways of using the technology will emerge. The viability of autonomous systems will likely be determined by their combat service support requirements, and other points of detail all too often overlooked in conceptual discussion. In this sense, the pace of technological development is likely to be faster than envisaged, and its impact on the military more uneven, chaotic and disruptive than accounted for by future fighting concepts.

A non-technological example of the importance of detail raised during the conference is lateral entry, a controversial topic which has raised concerns about outsiders entering the military without understanding its culture or having the basic grounding in military skills that service personnel spend the formative parts of their military careers building. Yet lateral entry is arguably essential, as Western militaries have struggled to internally generate skill sets that are available in the civilian workforce, particularly with regard to cyber capabilities. In practice, the success or failure of the concept will be dictated by the granular detail of implementation.

Conclusion

Despite technological disruption and emerging capabilities dominating the discussion, it remains the case that technological superiority does not win wars. While technological innovation is critical, it must be matched by the innovative employment of the tools of war, and policymakers must be prepared to make strategic decisions about which innovations are transformative, rather than simply novel. As General Mark Carleton-Smith observed, ‘we probably need to focus more on how to fight rather than what to fight with’.
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