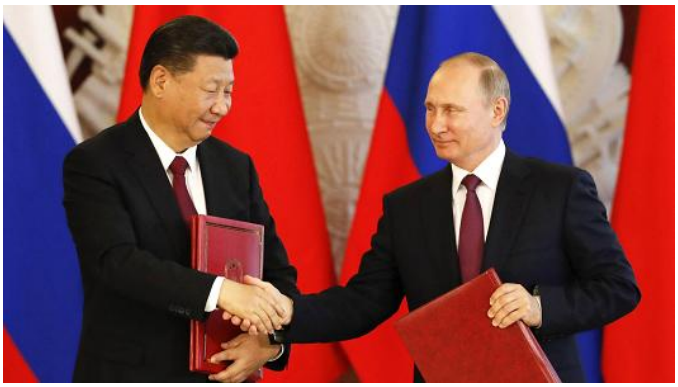
The Strategic Shift from Counter-Insurgency and Stability Operations:



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High Tempo Ops, High Intensity Operations and Deterrence

Since 2014, the Williams Foundation has held a series of seminars, which have looked at the nature of military transformation enabled by new platforms, new technologies and new approaches. Now, the Foundation is focusing on the new strategic context within which this force will operate and the kinds of further changes necessary for Australia and allied forces in facing the challenges posed by peer competitors. On March 22, 2018, the Williams Foundation hosted a seminar which began the process of examining these key questions. This report is based on that seminar. This enhanced version of the report includes the interviews conducted prior to, during and after the seminar. We have published on defense.info, a version with just the seminar report itself.

The Strategic Shift from Counter-Insurgency and Stability Operations:

HIGH TEMPO OPS, HIGH INTENSITY OPERATIONS AND DETERRENCE

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The US military has been focused along with core allies in dealing with counter-insurgencies for more than a decade, which represents a defining generation of combat experience for the joint, and coalition force. We have an entire generation of military officers with little or no experience in dealing with the direct threat from peer competitors.

With the return of great power conflict and the return of core nuclear questions with the coming of a second nuclear age, force structures are changing along with concepts of operations as well as the need for relevant and effective crisis management strategies.

A strategic shift is underway for the military.

The past decade the military has primarily focused its training and operations dealing with counter-insurgency and stability operations. Now the need to deal with operations in contested air and sea space from adversaries who can bringing significant capability to bear against US and allied forces requires a significant reset of efforts.

It is a strategic space in which operations in contested settings is where the military will operate. It is about learning how to deal with the policies and capabilities of peer competitors who are seeking strategic and military advantage against the liberal democracies.

And this challenge is one which will require the civil leadership to come to terms with the challenge of crisis management in which escalation and de-escalation will have to be mastered as a strategic art form.

It is not just about sending off the military to fights thousands of miles away and welcoming them back from time to time. It will be about facing the adversary squarely and forcing his hand and shaping outcomes to the benefit of the liberal democracies against those of the illiberal powers, and by doing so with using military means as one of the key tool sets

The nature of the threat facing the liberal democracies was well put by a senior Finnish official in a recent briefing: The timeline for early warning is shorter; the threshold for the use of force is lower.

What is unfolding is that capabilities traditionally associated with high end warfare are being drawn upon for lower threshold conflicts, designed to achieve political effect without firing a shot.

Higher end capabilities being developed by China are Russia are becoming tools to achieve political-military objectives throughout the diplomatic engagement spectrum.

The non-liberal powers are clearly leveraging new military capabilities to support their global diplomacy to try to get outcomes and advantages that enhance their position and interests.

The systems they are building and deploying are clearly recognized by the Western militaries as requiring a response; less recognized is how the spectrum of conflict is shifting in terms of using higher end capabilities for normal diplomatic gains.

Recently, Paul Bracken put the challenge quite clearly as the reshaping of escalation or perhaps it could be put as the challenge of understanding and working crisis management in the new strategic period of peer-to-peer conflict.

The United States has recognized a return to major power rivalry in recent official documents such as the National Security Strategyand the Nuclear Posture Review.

This is a useful step that catches up to a reality that analysts and many others have argued has been underway for some time.

It is especially important because it opens up new pastures for exploring strategy that have been overlooked because of the nature of American involvement in low intensity wars of counterinsurgency and anti-terrorism for nearly two decades.

In low intensity environments certain things are taken for granted, like air superiority, cyber dominance, and freedom of strategic access.

Obviously, these conditions cannot be assumed to hold in an environment of major power conflict.

Recognizing the change from a low to a more intense conflict environment in official documents is one thing.

But reshaping operations and strategy for this environment is something else altogether.

One of the main reasons the outbreak of World War I was such a surprise to everyone was that the preceding two decades had seen repeated political crises where there was a show of force – but no actual combat between the major powers.

They had grown accustomed to this and believed that every crisis would play out this way, with strong messages and force maneuvering, but without combat.

There was no crisis management that existed for actual combat, especially the early clashes of the campaign.

No one, for example, had conceived of limited strikes or retaliation, force disengagement, or messaging once the shooting started.

The result was that the generals and mobilization plans took over.

The key point for today is that there are many levels of intensity above counterinsurgency and counter terrorism, yet well short of total war. In terms of escalation intensity, this is about one-third up the escalation ladder.

Here, there are issues of war termination, disengagement, maneuvering for advantage, signaling, — and yes, further escalation — in a war that is quite limited compared to World War II, but far above the intensity of combat in Iraq and Afghanistan.

While a full-scale replay of a "1914 scenario" is always possible, there are several reasons to think that a limited war is more likely than an all-out one.

Two factors stand out.

First, the fact that an actual shooting war had started between the United States and Russia or China might produce a mutual shock reaction that swamps politics.

Whatever the differences were – protection of Taiwan or the Baltics – would pale in comparison to the fact that the United States and Russia were fighting.

Second, while we are talking about limited war, it is a war between thermonuclear powers.

The political focus in an early clash is going to be on "where things might go" if it goes on.

There are many implications of focusing on "one third up the escalation ladder" wars. Attacks are designed more to end the conflict than to destroy enemy forces outright.

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A particular area of focus should be exemplary attacks.

Examples include select attack of U.S. ships, Chinese or Russian bases, and command and control.

These are above crisis management as it is usually conceived in the West.

But they are well below total war.

Each side had better think through the dynamics of scenarios in this space.

Deep strike for exemplary attacks, precise targeting, option packages for limited war, and command and control in a degraded environment need to be thought through beforehand.

The Russians have done this, with their escalate to deescalate strategy.

I recently played a war game where Russian exemplary attacks were a turning point, and they were used quite effectively to terminate a conflict on favorable terms.

In East Asia, exemplary attacks are also important as the ability to track US ships increases.

Great power rivalry has returned.

A wider range of possibilities has opened up.

But binary thinking — that strategy is either low intensity or all-out war – has not.

This lesson is too important to learn in the real time pressures of war.

We have seen several manifestations of a new strategic era in which contested operations require a different approach, a different force structure response, and, above all, shaping a relevant crisis management capability.

It started with the Russian seizure of Crimea, continued with the Russian projection of power into Syria, a rapid expansion of the number of intercepts by Western quick reaction forces in Northern Europe of Russian aircraft, with events such as a simulated Russian strike against Norway's northern C2 facilities, the Chinese build out into the South China Sea, a very aggressive North Korean nuclear test and missile modernization approach, and significant modernization of the forces of the Chinese, Russians and North Koreans, and Iranians, with real uncertainty about how the edges of warfare begin and end with regard to the use of the increasingly diverse arsenal which the illiberal powers have at their disposal.

And this new period comes as the Western liberal powers are modernizing their own forces, which raises the question of how their modernization processes will be shaped to deal with the new threat dynamics, threat envelopes and evolving strategic behavior and decision-making capabilities of the authoritarian powers.

How will Western liberal democratic military modernization reshape capabilities which Western leaders have to deal with the challenge of the authoritarian powers?

How will conflict with various authoritarian powers be managed to avoid all-out war?

How will escalation management be shaped to ensure that Western democratic interests are met and not put under the pressure of constant compromises which simply allow for the expanded power and influence globally of the authorization states and powers?

Such questions are emerging as key ones for what is shaping up to be a new strategic period ahead for the Western liberal democratic powers.

THE WILLIAMS SEMINAR ON THE STRATEGIC SHIFT

Since 2014, the Williams Foundation has held a series of seminars, which have looked at the nature of military transformation enabled by new platforms, new technologies and new approaches. Shaping of a fifth generation warfare force has been at the heart of the conversation, and the challenge of crafting, shaping and building a more integrated force has been a core focus.

Building a more integrated force is required to operate with more flexibility, more scalability, and with more effectiveness, using either kinetic or non-kinetic means. This force needs to be more integrated because it needs to operate in a multi-domain space to achieve combat effectiveness, and to achieve strategic objectives set by the political leadership.

This year the Williams Foundation has shifted focus to look at the demand side of the equation. The Foundation is focusing on the new strategic context within which this force will operate and the kinds of further changes necessary for Australia and allied forces in facing the challenges posed by peer competitors.

On March 22, 2018, the Williams Foundation began the process of examining these key questions. The Williams Foundation laid out the following narrative in preparing the seminar along with the following questions:

Most Air Force and senior military leaders in the western world begin their military careers either around or shortly after the Falkland Wars which were watched globally as an epic air, sea, and amphibious campaign; conventionally fought at the ends of the earth and at the end of an immense supply chain for the British Forces.

The decades that followed saw warfare in the Balkans and Middle East, and counter insurgency operations in Afghanistan; warfare very different from that postured for during the cold war and exercised in high end air combat exercises.

The Australian Defence White Paper 2016 and the associated Force Structure Review was written to an Office of National Assessment Strategic Environment to 2035 against this paradigm, whilst recognizing impending change. The subsequent rate of change in global security has shocked even pessimistic observers and we face the heightened risk of high intensity, non-permissive air environments non-discretionary wars.".

Questions to be addressed at the Seminar

What will be the impact on the delivery and expectation of 5th Generation systems as the world has changed so dangerously and so rapidly?

Have hostile forces been watching the development of our 5th generation systems and developed active asymmetry to defeat us?

Has the combination of our cold-war legacy and participation in irregular wars led us to make decisions that will limit our freedom of movement?

As we rediscover the concept of denied area (A2AD / beyond FEBA) and need to re-invest in strike capabilities, are there areas of concern? [Range / Payload / Escort requirements / requirement to step non fast-air platforms / risk of hypersonic AD systems] [Basing options / Life Support / Force Protection / Multi-domain threats]

Do we need to reconsider air campaigns in the light of Joint Force / Joint Strike options?
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Do our national systems support the requisite battlespace awareness in denied areas to conduct effective targeting and effect generation?

Presentations by senior Australian and allied military leaders along with those by civilian analysts provided a solid foundation for understanding the challenges and how profound the shift will be for the liberal democracies in the period ahead.

Future seminars will address the question of what capabilities need to be added to the Australian and allied forces to deal with the strategic shift as well as how those forces can train more effectively to deal with the new challenges.

It is clear that the kinds of peer competitors the liberal democracies are dealing with are engaged in broad political conflict with the liberal democracies. They are crafting a range of tools to disrupt and to influence domestic policies in the liberal democracies.

It is also clear that the presence of Chinese and Russian economic interests in the liberal democracies provide a much broader opportunity than in the days of the Cold War to both establish and expand influence within our societies.

And the evolving tool sets associated with a core activity like information war or cyber conflict is designed not only to help competitors now but will be used in enhanced ways in the shape of any future high intensity conflict. They are already attacking our civil societies.

We are not facing an abstract future warfare scenario; we are already engaged in information war and cyber operations are being directed against the liberal democracies. These operations are certainly designed as well to undercut the cohesion of the liberal democracies to work against the interests of the illiberal powers.

A core point made at the seminar was that dealing with peer competitors was not just about preparing for an abstract future high intensity conflict but about dealing with various elements of a force already engaged against us.

The bulk of the seminar focused directly on the challenges of remaking the force to deal with higher tempo operations and possible direct high intensity conflict.

Certainly, a key argument made throughout was that many habits learned in the the counterinsurgencies and stability operations of the past two decades would need to be unlearned; notably, notably that we can operate with air superiority and have information security as a given.

THE NATURE OF THE CHALLENGE

The challenge posed by competitors such as modern China and Russia is both significant and different from what the Western democracies have seen both in the recent past and during the Cold War.

The Western democracies are in a fundamentally different historical era. Russia is not the Soviet Union. And the Chinese military is not Mao's People's Liberation Army (PLA). There are lessons learned from the past and domain knowledge, which can be leveraged but we need to shape new ways to use military force and to exercise crisis management in the new strategic period as well.

The Western democracies must also try and learn what they don't know.

Effective military organizations around the globe respect what Secretary Rumsfeld once sagely called "the unknown unknowns"

This problem was put very clearly in a recent interview with the commander of the Royal Australian Air Force's Air Warfare Centre (CDRAWC), which is totally focused on joint warfare as the driver for change.

Throughout the interview, CDRAWC was very clear on the importance of breaking out of legacy patterns and thinking, and finding ways to train for the future fight with the force the RAAF is crafting, and to respect what one doesn't know.

"Our senior leadership, including myself, has never grown up in the combat environment which is now evolving rapidly. We need to unlearn as well as learn to shape an effective way ahead."

"The change is to effectively shape a future force structure based on where you need to go, rather than what you have inherited?

I would add that this is not just true for the military but for civilian strategists, policymakers and politicians.

What is the nature of conflict the Western democracies are facing posed by peer competitors?

How do the Western democracies compete more effectively?

How do the Western democracies protect their way of life?

How do the Western democracies prevail in the conflict with the illiberal societies?

As the Chief of the Australian Navy put it bluntly: "We are not looking at conflict between platforms, or segments of the military against adversaries. It is a fundamental test of conflicting approaches to conflict and to warfare."

This comment put the challenge where it needs to be, namely, the demand set is broadening as the range of tools for conflict also increase; and the potential impact from miscalculations are ramping up with the consequences for prolonged armed conflict among peer competitors.

What is clear now is that a new phase is beginning which requires clear-headed analysis and preparation of tool sets, which can effectively protect the ways of life and strategic interests of the liberal democracies.

The tectonic plates are shifting and the liberal democracies need to think carefully about the prospects and consequences of these profound changes between (and within) nations, and how best to respond to this new world order (or disorder).

Security threats have unleashed national reactions with various nations seeking to rebalance their position in the global order, and seeking to work with clusters of either like-minded states, or with states capable of providing key needs.

It is not exactly the return of nationalism, for that has not been absent in any case, but is clearly the return of security and defense concerns as a priority, and these concerns are always led by states seeking allies, partners or friends, or "the enemy of my enemy is my friend" types of partners.

Put in other words, the return of hard power combined with various other tool sets is being exercised to try to reshape the global situation to the advantage of the illiberal powers.

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A CLEAR-HEADED LOOK AT THE ILLIBERAL POWERS

A point made throughout the seminar was the shifting nature of the global competition and the need to deal with the world as it is or is becoming rather than the world which the Western liberal democracies might wish to see. This means dealing with the return of great power competition and politics, but without missing the new strategic contexts within which this completion is unfolding as well.

Even if globalization is not leading to global peace and brotherhood, it has created new conditions within which competition is unfolding. Key elements of global reach will remain relevant in the new situation, such as the reach of global information, cyber threats, and information war, as key interactive tools, which will be as disruptive as they are binding.

And the reach of global information into sub-regional groups can well lead to new types of disintegration and integration as well.

At the Seminar, Dr. Ross Babbage focused specifically on the threats posed by the illiberal powers. A key focus of his presentation was to highlight the crucial importance of understanding the nature of the strategic competitors to the liberal democracies, notably China and Russia, and how they are reshaping their forces and engaging in a wide range of cyber and other intrusions within liberal democratic societies.

During his presentation he highlighted how he saw the changing threat environment in the following manner:

I had a chance to sit down with Dr. Babbage during my time in Canberra to discuss more fully the character of the adversaries we are dealing with and how best to understand the nature of the challenges being posed by Russia and China, as peer competitors.

"The starting point for any discussion of threat facing Australia and its allies clearly is the nature of the regimes we are dealing with. This is something even many people in government don't fully understand. These are Leninist regimes of a fairly sophisticated type. They're different in some respects, but their overall goals are very similar."

For the West, the tendency is to think that there is peace and there is war with nothing much in between.

For a Leninist regime, there is a broad area in between peace and war in which they believe one can aggressively contest the adversaries of these regimes and engage in political warfare and use their militaries to enhance their influence.

Put in other terms, a much broader gray zone has been created within which the authoritarian regimes are contesting the liberal democracies with little fear of direct retaliation.

"And both regimes, have got great political stories to tell domestically to support their foreign policy actions. For Russia it is about restoring Russian influence and power status and rebuilding a buffer zone.

"And doing so enhances the Russia's abilities to act elsewhere. For Beijing, it is about restoring the Chinese civilization's globally dominant position to it's their rightful place. Recently Xi Jinping has emphasized that they will spill blood if required to achieve their rightful place in the world."

And when one looks at the nature of their domestic systems, the ever-present role of repression and tight regime control is obvious.

"For the Russians, the national leadership comes largely from intelligence and security force backgrounds. With the Chinese, the government has developed and is developing high-technology control mechanisms, which include powerful sets of incentives to comply with the regime's policies.

"They have a vast national database on their citizens, something which would be completely illegal in the liberal democracies. They have developed a Social Credit System whereby they monitor citizens and evaluate their behavior and can build detailed report cards on their citizens. And dependent upon your grade, so to speak, you can receive or be denied credit for things like work promotions and foreign travel."

In effect, the Russian and Chinese regimes are consolidating internal controls and are expanding their capability to operate in the gray zone internationally to reinforce their domestic and international authority.

"They're waging political warfare using a very wide spectrum of instruments right now; whereas the liberal democracies continue to think of warfare as a radical shift from the normal condition, which is peace. Since the Cold War the West has paid little serious attention to operations in the gray zone."

Dr. Babbage sees growing recognition in both the United States and Australia about the nature of the challenges facing both countries. "To respond is not simply about military capabilities; it is about whole of government capabilities and indeed whole of nation and whole of alliance capabilities."

"And we need to have a much more open and frank discussion with our publics about the nature of the challenges we are facing. I think the starting point is to share factual stories about what the Chinese and the Russians are actually doing both within their own societies and also within ours. "

The challenge we are facing is fundamental and requires us to take a hard look at how the Chinese and Russians are already operating against our interests internationally and simultaneously seeking to undermine the liberal democracies from within.

CRAFTING AN EFFECTIVE DETERRENCE EQUATION

One of the key elements of the discussion during the seminar was how best to characterize the problem to be solved and how best to shape deterrent solutions to that problem or set of problems?

High intensity warfare at the highest end is total war. It is about a test of wills and capabilities at the society level. The engagements in the past two decades of counter-insurgency and stability operations have not been that. As one Marine put it a few years ago: "The Marines are at war; Americans are the shopping mall."

Obviously, high intensity operations which break out from constrained engagements, such as was just seen in the Syrian strikes in April 2018 and escalate to tests of warfighting systems at a macro level is one meaning of the shift from the counter insurgency operations to high intensity conflict.

If there is a significant spin out into more extensive military operations where tests of entire warfighting systems can be envisaged, it is crucial for the Western democracies to have effective alliance support structures not only in place but effectively so.

And the two can be significantly linked as the presentation by Alan Stephens which started the conference highlighted.

As Stephens put it:

It was the 19th century British prime minister Lord Palmerston who famously remarked that in international relations there are "no eternal allies … only interests".

Palmerston's hard-headed world view has particular relevance for small- and medium-nations that find themselves drawn into high-intensity warfare. The October 1973 war in the Middle East and the 1982 war in the Falklands illustrate the point.

The 1973 war began on 6 October when Egypt and Syria launched a sudden attack against Israel. Over-confident Israeli commanders were shocked when their previously dominant air force found itself unprepared for the quality and tactical disposition of the Arabs' ground-based air defence system.

The IAF started the war with about 290 frontline F-4 and A-4 strike/fighters and within days some fifty had been shot-down. It was an unsustainable loss rate.

A week later, as the war in the air began to turn and the Israelis started to assert their expected dominance, it was the Arabs' turn to experience unsustainable losses.

Now, both protagonists faced the same urgent problem: neither had the reserves nor the local capacity to rapidly reinforce their fighting units.

There is a limit to how much a nation can spend on otherwise non-productive war industries and stockpiles. Governments have to make fine judgments regarding how many weapons – which represent stranded assets until they are used – they can afford to have parked on ramps or stored in warehouses against the possibility of a contingency that might never arise.

That economic imperative is especially pronounced in the war in the air, in which platforms and weapons are exceedingly expensive. And in high-intensity fighting, extreme unit costs are accompanied by extreme loss and usage rates.

Thus, during the nineteen days of the October War, the Israelis lost 102 strike/fighters and the Arabs 433, and the Arabs fired 9000 surface-to-air missiles.

Those numbers alone amounted to thirty aircraft and $560 million per day.

What that meant was that neither the Israelis nor the Arabs was capable of fighting a high-intensity air war for more than about a week without direct assistance from their American and Soviet sponsors.

And that's precisely what happened.

On 9 October, the Soviets started a massive airlift to resupply the Egyptians and Syrians with missiles, ammunition, SAM components, radars, and much more; shortly afterwards, the US did the same for Israel. The US also made good the IAF's aircraft losses by flying-in about 100 F-4s, A-4s and C-130s, some of which arrived still carrying USAF markings.

Without that resupply, Israel and the Arab states could not have sustained such a high-intensity conflict.

This point bears emphasis. Israel was far superior militarily to the Arab states, and its excellent indigenous industry enabled it to develop important capabilities (such as electronic warfare counter-measures) during the conflict.

Nevertheless, it is not unreasonable to suggest that, had Egypt and Syria been resupplied and Israel had not, the war would have ended differently.

Sustainment in the form of aid from an external source was again crucial during the 1982 Falklands War between the United Kingdom and Argentina.

The UK's armed forces are among the world's very best, and the nation is one of the world's wealthiest and most powerful. Argentina in 1982 was a dysfunctional, second-world nation led by an incompetent cabal of military dictators.

Yet according to both the key foreign affairs advisor to prime minister Margaret Thatcher, Lord Charles Powell, and the assistant US defense secretary,

Richard Perle, "Britain probably would have lost the war without American assistance". That assistance extended to providing vital intelligence, and to "stripping part of the frontline US air forces" of the latest version of the Sidewinder air-to-air missile.

Argentina, by contrast, and to its dismay, found itself the subject of Lord Palmerston's unsentimental characterisation of alliances, when it was abandoned by two nations which, until the day the shooting started, it had believed were its friends.

The first, the US, cut-off intelligence and diplomatic assistance; and the second, France, which had sold the Argentine Navy Super-Etendard strike fighters and Exocet missiles, withdrew the technical support needed to make that capability fully effective.

In the event, the Argentines managed to fire five Exocets, sinking two ships from the British war convoy and severely damaging a third. It is feasible that, with better targeting information and only a half-dozen more operational missiles, the Argentines might have inflicted sufficient damage on the convoy to have compelled it to turn back before it got within 100 kilometres of the Falklands.

Should Australia become involved in a high-intensity conflict in the next ten years, we can confidently expect that our air power would be well-trained and well-equipped.

Those attributes would be insufficient in themselves, however, if they were not under-written by a strong and reliable alliance.

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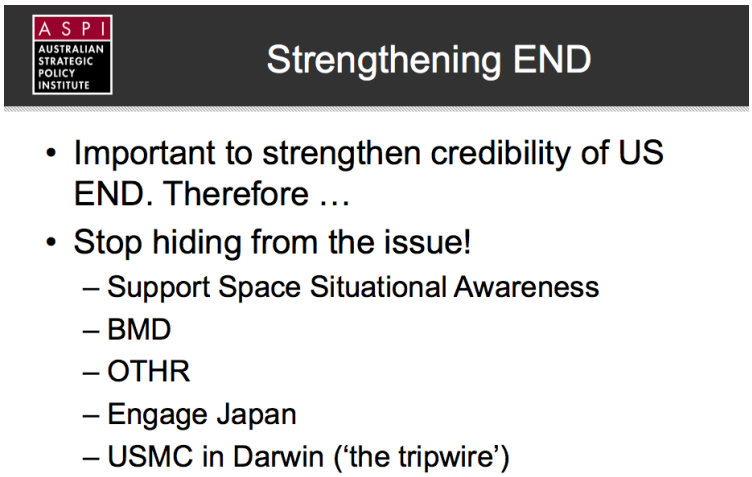
The alliance factor is crucial to how liberal democracies can prepare for high-intensity war. It is also a problem or challenge which needs to be managed, for allies are different nations, different cultures, different leadership structures, this creates seams which can be exploited, and adversaries are focused on how to divide and conquer.

Managing effective alliance working relationships in the presence of significant domestic changes within liberal democracies and while adversaries are operating WITHIN those societies is no simple matter.

It is not at all clear that the inherited alliance practices developed over the past twenty years will be able sustain the effective alliance political and military relationships necessary to deter adversaries from driving wedges between allies to enhance their own power positions.

The need to readdress alliances and deterrence approaches was the core focus of the presentation by Peter Jennings at the Seminar. Given the return of the nuclear issue in the region with the emergence of North Korea as a nuclear power, part of the alliance rethink must embrace extended nuclear deterrence.

While stopping short of advocating nuclear weapons for the ADF, Jennings focused specifically on the challenges which nuclear weapons development by adversaries has on extended nuclear deterrence (END) provided by the United States to the regional partners. Jennings argued that Japan and Australia should begin discussing the END issue and that Australian conventional force restructuring ought to be designed in part to reinforce END within the Australian-US conventional force working relationship.



Jennings citied the Defense White Paper of 2017 which noted that the END issue was really a central one going forward:

"... only the nuclear and conventional military capabilities of the United States offer effective deterrence against the possibility of nuclear threats against Australia and other allies of the United States such as the Republic of Korea and Japan. Without extended deterrence, more countries in the Indo–Pacific would need to re-assess their security and defence capabilities."

Much of the seminar discussed the changing nature of the operational area between full scale war and peace within which high intensity warfare tools are already being used.

As the Chief of Staff of the RAF put it:

Hybrid warfare as we know will continue to be a significant feature of strategically contested environments, in which actors will see to blur the boundaries between peace and war and engagement of attributable and non-attributable activities below the threshold on force conflict. The theme today is clearly high-intensity warfare.

My question might be, how and when do we know we're in one?

Air Marshal Hillier focused on hybrid war as already part of the new strategic conflict situation in which the liberal democracies find themselves. And the hybrid concept really gets at what some called operating in the gray zone, but there is nothing gray about using high intensity warfare tools in operations short of open direct conflict. The entire maneuvering among the allies and with the Russians prior to executing a very high intensity warfare strike on Syrian chemical facilities illustrates the challenge and the reality.

The Finnish Chief of Staff of the Finnish Air Force spoke at the seminar and a key reason for that was also to highlight another point made by Hillier.

"You asked me to speak about high-intensity warfare in Europe.

"Perhaps I've not really provided that much of that specific geographical context.

"But then as I said right at the start, I don't believe that what I've described can be bracketed within a particular geography.

"The challenges I've described are truly global and truly common to us all. I believe that airpower's inherent characteristics and capabilities make it especially able to respond effectively to those challenges."

The challenges facing the UK and Finland are very similar in many ways to that of Australia. Notably, the Finns have established a hybrid influence center to look at the core challenge of this area between war and peace which is being characterized by an expanded zone within which hyper influence tools are being used as means for direct strategic conflict between the Western democracies and the illiberal powers.

My visit to Helsinki to the Centre of Excellence for Countering Hybrid Threats provided a European view of ways to get governments focused on the nature of the challenges and the nature of the responses, which we need to shape to modern political warfare, and information operations generated by the illiberal powers.

According to Juha Mustonen, Director of International Relations, at the Centre:

Adversaries are using many instruments of power. One may identify a demonstration effect from the limited use of military power and then by demonstrating our vulnerabilities a trial of a psychological affect within Western societies to shape policies more favorable to their interests.

"If you are using many instruments of power, below the threshold of warfare, their synergetic effect can cause your bigger gain in your target societies, and this is the dark side of comprehensive approach."

"The challenge is to understand the thresholds of influence and the approaches.

"What is legitimate and what is not?

"And how do we counter punch against the use of hybrid influencing by non-Western adversaries?

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"How can we prevent our adversaries from exploiting democratic fractures and vulnerabilities, to enhance their own power positions?

"How do we do so without losing our credibility as governments in front of our own people?"

Put in other terms, Helsinki and Canberra are literally on the other sides of the globe, the threats they face are not.

How do we work deterrence in this realm?

How do we fight in the hybrid warfare and hybrid influence space?

And how do those adaptations relate to the evolution of our general force structures, and approach to warfare?

The excellent presentation at the seminar by Major General Marcus Thompson, Deputy Chief Information Officer for the Australian Defence Force, overviewed the dynamic area of information warfare, a key element of the shift to a new strategic period of conflict with the authoritarian powers.

Major General Thompson reminded us that the reset the Western liberal democracies need to be innovative but to recognize that we need to be realistic about how to do so.

"There is nothing new in cyber warfare; what it requires is the application of old or established military methods in a new warfighting environment."

The new warfighting domain of cyber needs to be understood in his view within a broader concept of information war, one in which we have engaged before but with different tools and evolving approaches needed to prevail.

Major General Thompson argued that partnerships were crucial for the ADF in operating effectively in the information warfare environment.

As Wing Commander Travis Hallen, Deputy Director – Air Power Development at the Royal Australian Air Force's Air Power Development Centre and a Sir Richard Williams Foundation Scholar, put it with regard to the challenge raised by MG Thompson:

"Information war morphs seamlessly into and out of hybrid/grey zone conflicts.

"We in the West seem to struggle with this continuum.

"Although we are starting to get our heads around information warfare, our forces are optimized to fight an integrated conventional conflict, not in the grey zone.

"This hybrid step is something we are struggling with and this in turn creates a further risk.

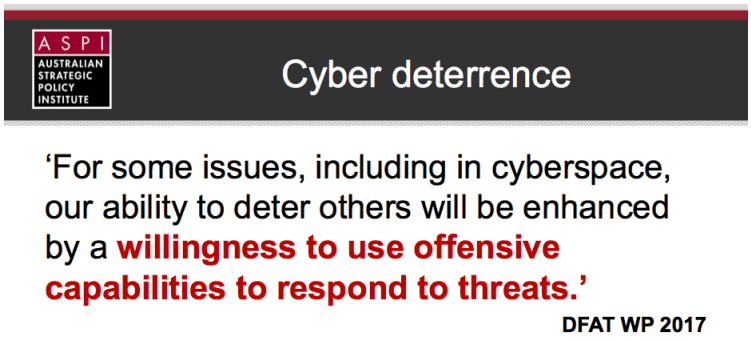
"That risk is that we become involved in an unintended escalation to high intensity war as a result of poor handling of a hybrid threat.

"This means that preparation for high intensity war requires that Australia and its allies become adept at operating along the continuum from information war through hybrid operations and into the high intensity space.

"And effective responses are not just a joint military activity, but a whole of government issue."

Peter Jennings in his presentation as well highlighted the importance for Australia to deal with the new warfighting domain effectively and he noted progress in taking the challenge more seriously and modifying government's focus of attention and role in dealing with the challenge.

Notably, he underscored that there was a recognition that Australia not need simply be taking incoming but can take offensive actions as well.



The kind of challenge which involves both high intensity conflict and deterrence but falls into the zone between mobilized engagements which can lead to total war and lower end engagements is illustrated by the build out by the Chinese into the South China Sea. In many ways, the Chinese build out into the South China resembles the Russian seizure of Crimea, and neither power has been deterred.

Second Line of Defense

This then raises a question a senior RAAF officer raised in a discussion after the seminar: "How do we deter the Chinese for expansion in the South China sea?"

This is precisely the kind of question being raised by the transition away from the land wars.

LEARNING NEW SKILLS AND ADAPTING OLDER ONES

A key challenge is to not take the skill sets learned in the past two decades and straight line into the new strategic context. One can adapt those skills which are relevant or harvest the best of what we learned but get rid of the rest. And as one is doing that obviously new skill sets need to be shaped leveraging the new technologies and new concepts of operations to be able to prevail in conflict with peer competitors and to shape effective crisis management approaches to the new historical epoch.

The presentation by Air Vice Marshal McDonald at the RAAF Airpower Conference 2018 put the challenge of avoiding rote learning from the past going forward particularly well with regard to security of information.

The largely unopposed use of airpower in the Middle East saw the fielding of unmanned systems without encrypted links. While the Taliban had little capability to intercept these links - we forgot that others on the periphery did – and that they gained a bird's eye view of tactics and procedures - and in some cases full platform ownership….

Stripped of all technical jargon we should remember that most cyber operations involve age old elements of war, such as subversion, sabotage and espionage.

Humans need context to shape their actions and responses --- but when the context is difficult to grasp –-- difficult to see – or when it is so pervasive that it becomes normalized – then we can lose focus.

This is equally true in other areas – as I am sure many of you in this room - whilst in the Middle East - have witnessed the widespread use of mobile phones and open lines to discuss the movements of aircraft and other important events.

How will we all fare when the stakes are higher? Are we capable of changing destructive habits – habits that have been learnt over the past 15 years?

There are many examples of the challenge of learning and unlearning, but I will address two in this section, one raised in interviews done in Australia and the second, discussed at the seminar but reinforced in interviews conducted in Australia as well.

The first is the question of air tanking and its role in contested operations.

In an interview conducted with the 86th Wing Commander at Amberley Airbase prior to the seminar, Group Captain Steve Pesce, Officer Commanding 86 Wing, put the challenge clearly:

From his perspective, in a conflict against a "near-peer" adversary the RAAF and allied forces may not have the luxury of secure tanking in uncontested airspace.

Air forces will gain transient advantage rather than total control of the air and will support surface assets that will be more dispersed across a larger Area of Operation (AO).

Demand for AAR (and air mobility in general) will increase as the survivability of a large tanker is reduced.

Distributed operations in contested airspace will become a norm, and that means in his view the end of the classic larger tanker operations.

The manned tanker will operate further away in the battlespace and become the mother ship for tanking remotes operating as refueling nodes to expendable assets deployed forward,

"My view of the future battlespace is that sensors and shooters will be more proliferated, integrated and reach further and with greater precision.

"There will be a natural move towards dispersion to improve survivability and delivery of fuel will be critical.

"The future of a large tanker will be to support more distributed and dispersed operations and we will be looking at small tactical refuelers providing fuel to tactical air combat assets – these tactical assets will likely be cheaper, unmanned and more expendable.

This quote highlights the learning side of the equation; but prior to learning and development you need to unlearn and shift your skill sets, which is also a task being worked by the Aussies and allied air forces.

In an interview last year with the then Air Mobility Commander, Air Commodore Lennon, he highlighted a recent exercise that was beginning the process of learning and unlearning.

Mobility Guardian 2017 is part of this strategic shift in learning the skills necessary to operate in a contested battlespace and to prepare for high tempo and higher intensity operations.

Air Commodore Lennon described the focus of Mobility Guardian 2017 as follows:

"The exercise was the first of its type held in a very long time."The exercise focused on integrating the efforts of several partner air forces using their air mobility fleets in contested airspace to support force insertion.

"We were required to seize an airfield, establish a point of disembarkation, and through that process we were required to conduct aeromedical evacuations and airdrop missions to support ground forces."

A key part of the exercise was working tactics and procedures with fighters to provide force protection for the air mobility fleet as it operated to support the force insertion effort.

US F-15s and A-10s accompanied the air mobility fleet in shaping the tactics and procedures for operating the fleet in a contested air environment.

The exercise has been two years in the making. Approximately 50 aircraft were involved with several thousand airmen participating in the exercise.

The Aussies brought their C-17 and KC-30A crews to the exercise as well as air dispatch, aeromedical evacuation, force protection and contingency response personnel.

A key challenge within the exercise was shaping interoperable procedures for operating in a contested air environment as each air force had evolved its own procedures over time.

Clearly with a higher tempo operation getting significant sortie generation rates and air dropped delivery is crucial to combat success.

"Our operations for over a decade in the Middle East have been largely in uncontested airspace where we've had control.

"In this exercise, we were really testing the readiness of our forces to rise to the next level and work in a challenging environment, and challenging environment it was.

Second Line of Defense

"The exercise program was ambitious.

"It ran twenty-four hours a day for ten days.

"There was no let up, and everyone in the exercise was working hard."

"There were a number of key tactical lessons learned.

"Notably, we need to alter procedures across the various Air Forces to ensure more rapid responses and smoother interoperability.

"The exercise highlighted the central importance of the kind of modernization we are doing with the C-17 and the KC-30A to provide for enhanced situational awareness and communications capabilities.

"We learned that we did not have all the information available which we needed and we were not able to process it rapidly enough; we are working with technologies and procedures to change that."

"A key part of the exercise was working our con-ops with fighters to provide effective counter air.

"We matured our understanding of the procedures required to work effectively with counter air operations in support of the air mobility forces.

"A significant number of command and control and communications networks come into play during the activity once you bring in that counter air support, or escorts for the formation.

"Communications gets very complicated, very quickly and tests capacity.

"This is a major area of work for continued development."

The second is the question of question of basing and how to defend fixed bases and to enhance mobile basing and defense in a contested combat environment.

The Commander of the 11th USAF, Lt. General Wilsbach, who highlighted the basing challenge in response to a question during a panel discussion at the seminar.

From the US Air Force standpoint, we are organized for efficiency, and in the high intensity conflict that we might find ourselves in the Pacific, that efficiency might be actually our Achilles heel, because it requires us to put massive amounts of equipment on a few bases.

Those bases are within the weapons engagement zone of potential adversaries.

So, the United States Air Force, along with the Australian Air Force, has been working on a concept called, Agile Combat Employment, which seeks to disperse the force, and make it difficult for the enemy to know where are you operating from when are you going to be there, and how long are you are going to be there.

We're at the very preliminary stages of being able to do this but the organization is part of the problem for us, because we are very used to, over the last several decades, of being in very large bases operating with very large support organizations.

Prior to the seminar, the basing challenge was discussed with Air Commodore Robinson at his office in Amberley Airbase. Air Commodore Robinson is the Commander of the Combat Support Group.

"We are having to reacquaint ourselves with some tasks and challenges which we parked to the side a bit while we were in the Middle East for so long.

"We did not have to worry so much about mobile basing to counter the principal threats in that theatre.

"The mindset is in transition now."

This clearly is an Army and Air Force challenge.

"We are good at supporting maneuver with our tactical transport aircraft and Australia's Army aviation capability, including the Tiger Reconnaissance Helicopter, but what we need to do is move to the next level of support to maneuver the most lethal part of our air power capability across a range of airfield options."

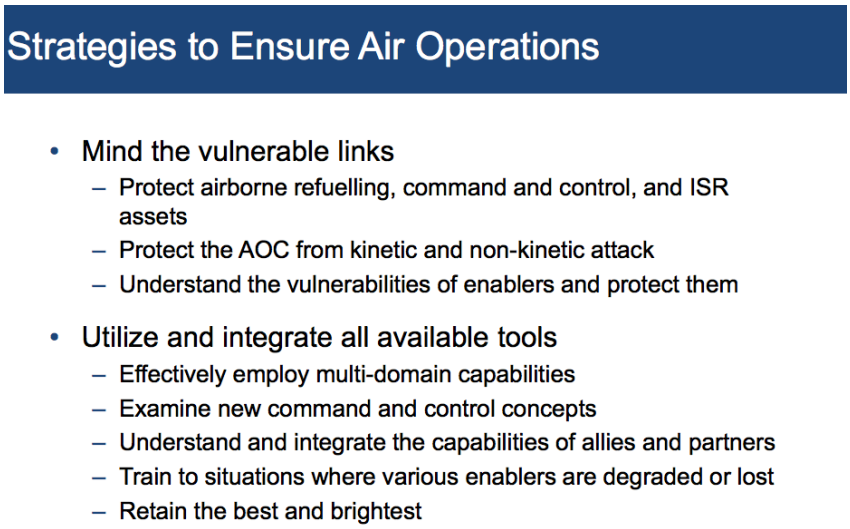
Core capabilities such as providing fuel for air systems when operationalized for a mobile airbasing force on Australian territory are clearly different from supporting a fixed airbase.

For example, "expeditionary fuel capabilities is something that's very much on the forefront of my mind. Lean and agile support packages to operate expeditionary airfields are also key, so that we can offer the best possible maneuver options to the aviators without tying down strategic airlift."

The logistics side of enhanced support for Australian forces in Australia to deal with crisis contingencies is also a work in progress.

Taking up the last point, sustainment, warehousing and support to a deployed and expeditionary process is critical. This will also require a significant enhancement to mobilization capabilities by providing active defenses of key warehouses, factories and facilities which can be mobilized to support a high intensity warfare force. It is not just about calling Fed Ex and getting delivery to a Middle East depot in a few days,

At the seminar, Carl Rhodes, RAND Australia, discussed the challenge of defending fixed airbase as well as developing an overall air basing strategy as we deal with peer competitors and the threat of precision and barrage strikes from greater distances.



And learning from neighbors and allies can help in this effort.

The Singapore and Finnish Air Forces live with deployment flexibility as a fact of life. It is in their DNA. The Chief of the Finnish Air Force, Major General Eskelinen, highlighted both the challenge and the approach of

the Finns which underscores dispersion and flexible logistical support as key elements to a survive and fight strategy. Given their experience in the Winter War it is very safe to say that this kind of capability is deep in the Finnish historical memory.

During my visit to Finland earlier this year, I discussed the Finnish approach with he former head of the Finnish Air Force and now Deputy Chief of Staff, Strategy for the Finnish Defence Forces, Lt. General Kim Jäämeri.

"It is becoming clear to our partners that you cannot run air operations in a legacy manner under the threat of missile barrages of long range weapons.

"The legacy approach to operating from air bases just won't work in these conditions.

"For many of our partners, this is a revelation; for us it has been a fact of life for a long time, and we have operated with this threat in the forefront of operations for a long time."

The adaption of skills and learning new ones challenge will be central to shaping an effective military transformation approach to both fight and deter peer competitors in contested operations.

In many ways, this is about building the toolsets and crafting the concepts of operations which maximize our effectiveness and that is the subject in the next section.

But throughout the challenge is an unlearning as well as a learning one in shaping more effective concepts of operations.

WORKING THE TOOLSETS AND SHAPING THE CONCEPTS OF OPERATIONS

There was much discussion with regard to how the force being built needed to be able to operate in order to be effective against a peer adversary operating throughout the spectrum of warfare which can be anticipated.

What was not the focus of attention were silver bullets which needed to be acquired; rather, how the capabilities being added to the force could be integrated more effectively to enhance the agility, flexibility, lethality and effectiveness of the force.

There was a discussion about new capabilities which might be added to the force at it evolves, and certainly the importance of ensuring security of supply and an ability to mobilize more effectively than we have been required to do in the period of primary focus on the land wars.

At the heart of any fundamental change is evolving and crafting more effective C2, a C2 which can operate a distributed force able to be configured flexibly. In part this is because the concepts of operations needed up to the level of a major war are scalable tailored force packages which can be inserted into a crisis and provide effective tools for managing a crisis.

Rear Admiral (Retired) Manazir highlighted the kill web approach as a way to described the distributed force capability as a goal towards which one might direct force generation and concepts of operations. During his presentation in August 2016, he introduced the kill web concept…..

The kill chain is a linear concept which is about connecting assets to deliver fire power; the kill web is about distributed operations and the ability of force packages or task forces to deliver force dominance in an area of interest.

It is about building in integration from the ground up so that forces can work seamlessly together through multiple networks, rather than relying on a single point of failure large network.

And during that seminar two senior Australian naval leaders provided significant insight into the importance of and moving forward with a kill web approach.

In his presentation at the conference, Vice Admiral Barrett underscored that "we are not building an interoperable navy; we are building an integrated force for the Australian Defence Force."

He drove home the point that ADF integration was crucial in order for the ADF to support government objectives in the region and beyond and to provide for a force capable of decisive lethality.

By so doing, Australia would have a force equally useful in coalition operations in which distributed lethality was the operational objective.

Vice Admiral Barrett noted that it is not about massing force in a classic sense; it is about shaping a force, which can maximize the adversary's vulnerabilities while reducing our own.

Rear Admiral Mayer focused specifically on the networking aspect of the kill web and how to make it work.

He highlighted that the Navy was returning to a task force concept but one which was 21st century in character, whereby Navy was tapping into ground and air assets as "part" of the task force, rather than simply focusing on Navy operated assets.

This evolution of the task force, clearly in the mode of what the US Navy is referring to as the "kill web," will require the evolution of capabilities, both in terms of connectivity, and training. During the seminar he characterized as the network as a weapon system with "no single master."

It was important to shape a way ahead for the joint force to work within the evolving networks in order to effectively operate in a distributed task force sense.

"Each service is underpinning its platforms with elements of a common network.

"There is increased overlap thereby for the air and sea forces. How should we best develop our joint concepts of operations and joint capability?"

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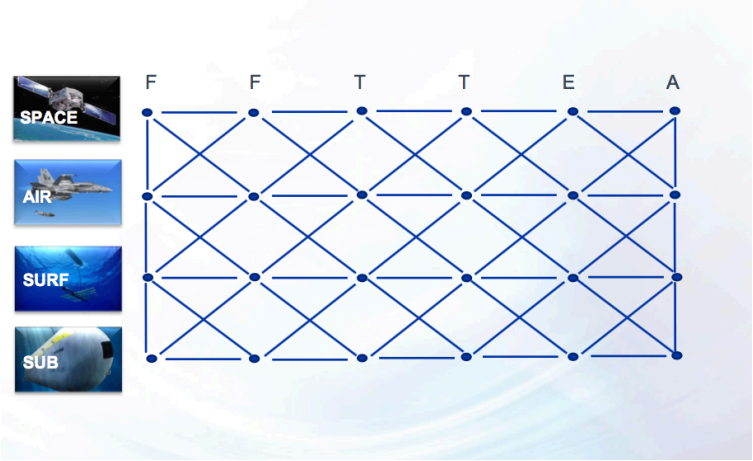
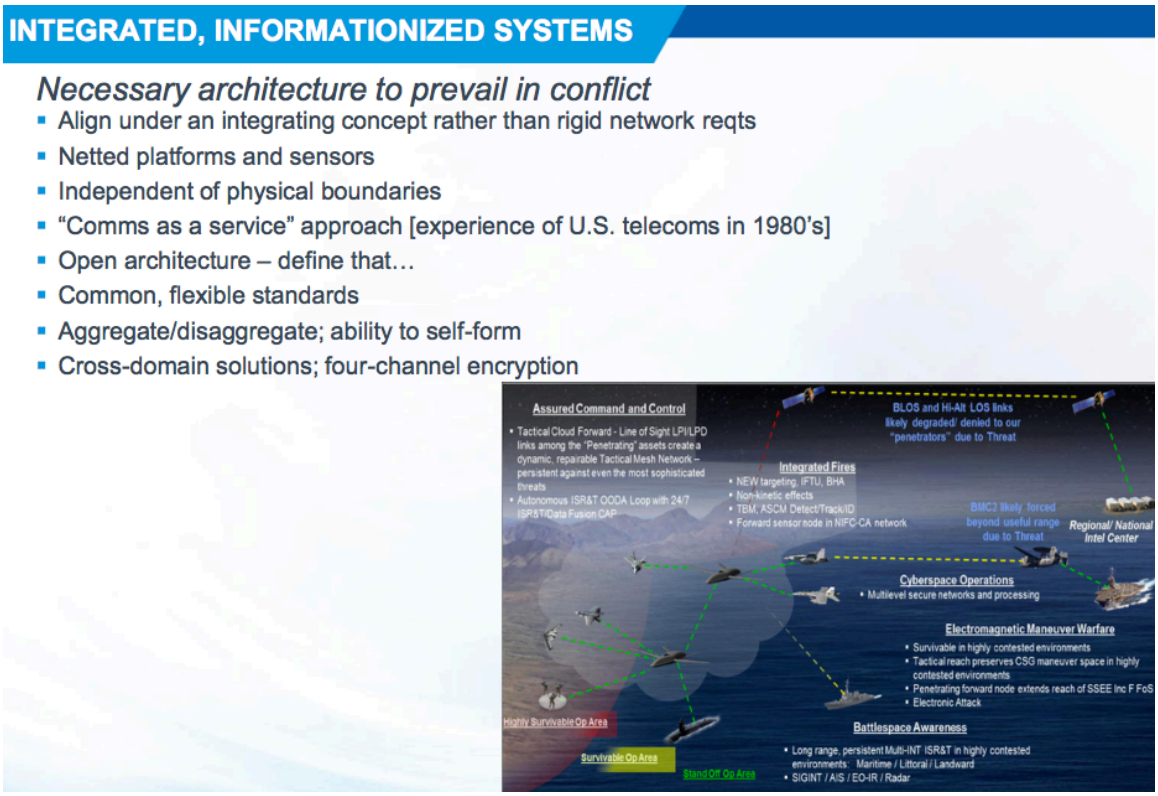
At the seminar, Manazir focused on the focus of a kill web being to be able to work with various platforms in various domains to engage and destroy targets. He highlighted the sequence of find, fix, track, target, engage and assess for the force package given certain objectives for the overall combat authority for the desired actions in an area of engagement.



His focus was upon the information domination of warfare and the importance of building out an architecture to fight and to deter.

This architecture in his view would combine several aspects which were identified in the following slide:



The C2 part is the lynchpin of all of this, but C2 able to operate at the point of attack where the central command authority is directing the battle but not controlling in detail the operations. It is a mission command

approach and would represent a significant shift from how airpower has been used in counter-insurgency operations

In fact, new technology like the F-35 is optimized to execute decisions in an area of operations and its capabilities would simply be undercut by the legacy C2 system.

C2 innovation will be driven in significant part by the man-machine revolution in which artificial intelligence will be play a greater role. Air Marshal Hillier highlighted this in his presentation to the seminar as follows:

But this tsunami of information that ever more sophisticated systems generates presents a challenge that can only be addressed through vastly more agile and adaptable C2 architectures. Against that backdrop of increasing data volumes, the OODA Loop as we've discussed essentially is indeed spinning faster, and we've got to maintain that tighter, faster loop than our adversaries. We need C2 networks that are adaptable, distributed, secure, and assured.

The successful flow of information across joint and multinational boundaries demands that greater collaboration, automation, and integration must be achieved.

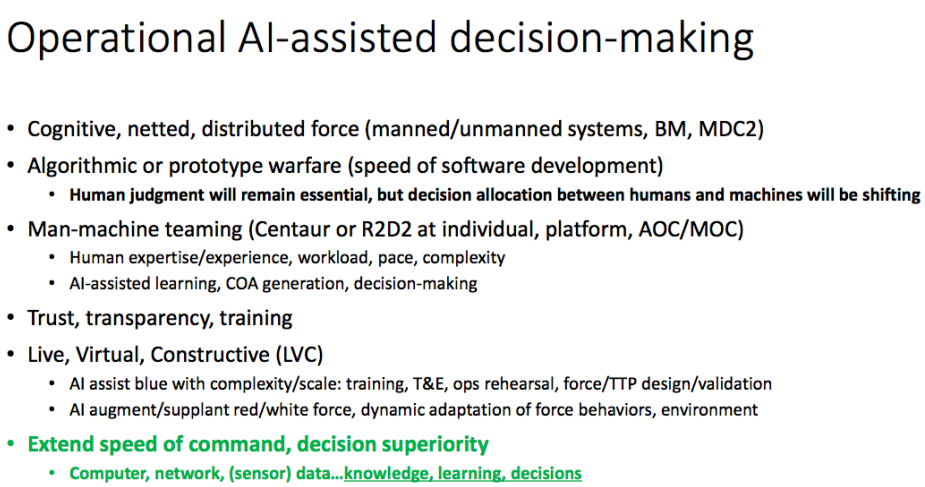
We know we need to adopt an information-centric rather than a platform-centric approach to our future capabilities.

This swift and accurate decision-making cannot be the sole preserve of C2 architectures and technological advances. Warfare will be, as it has always been, primarily a human activity, and the making of decisions primarily a human activity, particularly those that involve the use of lethal force.

The important aspects here are to ensure that humans are unburdened by the trivial and presented only with the decisions to which legally, morally, and intellectually they remain uniquely best suited to make.

JD McCreary, Chief Disruptive Technology Programs, Georgia Tech Research Institute, provided a presentation on ways Artificial Intelligence can aid or rather transform decision-making in high-intensity conflict.

The goal is to extend the speed of command and decision superiority.



Second Line of Defense

AI is clearly used in a number of new combat platforms, and the US Army has extensive experience in the missile defense system with using AI to detect, launch and kill ballistic missiles. The problem has been when engaging cruise missiles and aircraft, using AI is limited by the concern for killing blue assets. Progress in this area needs to be made for sure as in a intense fire fight there will be more concern with staying alive on the ground for the missile defense force, than making some mistakes. The goal of course is to perfect AI where Red is the only target.

A key dynamic will be the training area and its significant change as kill webs are crafted, C-2 evolves and the multi-domain battle is prepared for and fought.

How do Western forces fight multi-domain operations with new approaches to C2?

How might those forces use new training technologies to learn how to fight the battle differently and effectively?

After the seminar I had a chance to talk with the head of the Air Warfare Centre who is centrally focused on the question of where to take training to shape a fifth-generation warfare force.

The Air Warfare Centre was launched as part of the Plan Jericho initiative at the time when Air Marshal Geoff Brown was the air chief, and was forged, designed and shape to work 21st century force integration, not simply to train air warriors to fight in a legacy manner.

In part this was done in recognition that the F-35 is not a legacy fighter, but a "flying combat system" which can form the foundation for a kill web approach to warfare, in which the relationship among sensors and shooters changes and with that the need for a new C2 approach As Air Commodore Iervasi puts the challenge: "How do we learn what we have not done before?

"We can train and get better at legacy approaches, but how do we learn what we have not experienced before and how do we leverage our new platforms to transform and create an integrated force?"

There is another key dynamic generation by the new approaches to training, namely reshaping how equipment gets modernized, and developed. In a world of software upgradeable systems, it makes little sense to separate code rewriting from LVC training.

This key point was made last year in an interview with Air Vice-Marshal (Retired) John Blackburn, a Research Fellow, with the Williams Foundation.

"*We know that we need to have an integrated force, because of the complexity of the threat environment will will face in the future. The legacy approach is to buy bespoke pieces of equipment, and then use defined data links to connect them and to get as much integration as we can AFTER we have bought the separate pieces of equipment. This is after-market integration, and can take us only so far.*"

"*This will not give us the level of capability that we need against the complex threat environment we will face. How do we design and build in integration? This is a real challenge, for no one has done so to date?*"

Laird: And the integration you are talking about is not just within the ADF but also with core allies, notably the United States forces. And we could emphasize that integration is necessary given the need to design a force that can go up an adversary's military choke points, disrupt them, have the ability to understand the impact and continue on the attack.

This requires an ability to put force packages up against a threat, prosecute, learn and continue to put the pressure on.

Put bluntly, this is pushing SA to the point of attack, combat learning within the operation at the critical nodes of attack and defense and rapidly reorganizing to keep up the speed and lethality of attack.

To achieve such goals, clearly requires force package integration and strategic direction across the combat force.

How best to move down this path?

Blackburn: We have to think more imaginatively when we design our force.

A key way to do this is to move from a headquarters set requirements process by platform, to driving development by demonstration.

How do you get the operators to drive the integration developmental piece?

The operational experience of the Wedgetail crews with F-22 pilots has highlighted ways the two platforms might evolve to deliver significantly greater joint effect. But we need to build from their reworking of TTPs to shape development requirements so to speak. We need to develop to an operational outcome; not stay in the world of slow motion requirements development platform by platform.

Laird: Our visit to Fallon highlighted the crucial need to link joint TTP development with training and hopefully beyond that to inform the joint integration piece.

How best to do that from your point of view?

Blackburn: Defence is procuring a Live/Virtual/Constructive (LVC) training capability.

But the approach is reported to be narrowly focused on training. We need to expand the aperture and include development and demonstration within the LVC world.

We could use LVC to have the engineers and operators who are building the next generation of systems in a series of laboratories, participate in real-world exercises.

Let's bring the developmental systems along, and plug it into the real-world exercise, but without interfering with it.

With engagement by developers in a distributed laboratory model through LVC, we could be exploring and testing ideas for a project, during development. We would not have to wait until a capability has reached an 'initial' or 'full operating' capability level; we could learn a lot along the development by such an approach that involves the operators in the field.

The target event would be a major classified exercise. We could be testing integration in the real-world exercise and concurrently in the labs that are developing the next generation of "integrated" systems.

That, to my mind, is an integrated way of using LVC to help demonstrate, and develop the integrated force. We could accelerate development coming into the operational force and eliminating the classic requirements setting approach.

We need to set aside some aspects of the traditional acquisition approach in favor of an integrated development approach which would accelerate the realisation of integrated capabilities in the operational force.

Second Line of Defense

The training piece is especially important for Australia, given its space and training opportunities. Key allies need to train to the kind of warfare a fifth-generation asset brings and one does not want to do this to close the presence of a key competitor. And training for non-kinetic warfare is not going to be done very well in congested population areas.

And it is clear that a major area where innovation needs to unfold and accelerate is in the weapons area. There is no reason that Australia could not combine its test areas, with its skill sets and with government investing to become a center of excellence for non-Australian partners to work with Australian companies to generate new capabilities. Australia could amortize the cost of any missile innovations the ADF might need by becoming a key player in the missile development and manufacturing areas

SHAPING A WAY AHEAD: THE PERSPECTIVE OF VICE ADMIRAL TIM BARRETT, CHIEF OF THE ROYAL AUSTRALIAN NAVY

The Vice Admiral was very visible during both the RAAF Airpower 2018 Conference as well as at the Williams Foundation Conference. The perspective underlying those presentations was the focus of a discussion, which I had with him prior to his making those presentations.

The challenge for the Australian Navy is that it is starting a significant recapitalization effort in the wake of the modernization of the RAAF, but Vice Admiral Barrett and his team have clearly focused on Naval recapitalization which leverages and aligns itself with the fifth generation warfighting transition being spearheaded by RAAF modernization.

It was clear from his presentation at the Williams Foundation that the threat of high tempo ops and high intensity conflict could emerge from either deliberate or inadvertent actions in the region.

As he put with regard to the future: 50% of all submarines and advanced aircraft will operate in the region, and the challenge from the illiberal states building up capability or deliberately subverting the global peace is a clear one.

And one for which Australia must be prepared.

In the discussion we had in his office, he highlighted the challenge of being prepared and reshaping the Navy in the context of a modernized Australian Defense Force (ADF).

The broad point is simply gaining public understanding and appreciation for how important the maritime domain is for Australian national interests, indeed for the Australian way of life.

“We sing about Australia being a sea nation. It’s in the fourth line of our national anthem. But most people don’t look beyond the breakers.

“They don’t realize the significance of maritime trade.

“But more importantly they don’t understand the significance of what, not just Navy, but Air Force is doing at the moment in terms of representing the national in keeping the sea lanes open in our region.”

He emphasized in his presentation at the RAAF Airpower Conference and in our discussion the importance of standing up a significant industrial capability in Australia to generate the modernization necessary for the navy.

This was true on several levels for the Vice Admiral.

The first is the need to shape an industrial base that is not building a current ship, but evolving the skill sets to design, support and build the next ship.

It is about continuous shipbuilding; not simply building a ship.

"I like to think that our regeneration is not just around platforms for today, but it is around recognition of where we will need to adapt and evolve over the next 30 to 50 years.

"The ship building model that we're bringing into place now needs to be a catalyst for our future figures and future submarines.

The second is clearly related to the changes in the strategic environment whereby Australia clearly will need to sustain its force in a time of crisis.

It is about mobilization and support or what one might call sustainment in the context of a contested environment.

The Vice Admiral noted in his comments at the Williams Foundation that high intensity conflict is not about separate services showing up and doing their best; it is a test of the capabilities of conflicting military systems.

The third point flows from that realization, namely that building out of navy clearly needs to be done in broader multi-domain systems approach.

He argued that the decisions being made with regard to the battle management systems onboard the fleet were being taken from the standpoint of enhancing collaboration across the fleet and across the ADF, more generally.

"We made a significant decision last year concerning our future combat management system and we did not take this with just regard to the new Frigate, but with regard to the current Air Warfare Destroyer and we are focused on our ability to combine the efforts in a distributed sense.

"This will need to encompass our offshore patrol vessels, our supply vessels, but also out LHDs, in terms of how we will provide a domain awareness across the battle space.

"We centered on Aegis with the view that that will be part of an engaged battle space awareness with Air Force. You spoke earlier about the U.S. Navy and the approach of JSF and where they will go with Aegis. We have that same view.

"This not just this piece of equipment, it's a lineage."

In earlier discussions with Vice Admiral Barrett, he underscored the importance of shaping maritime capabilities, which can operate at the national task force level, rather than simply providing a ship to a larger ally's task force.

He argued in our discussion this time that Australia is focused on shaping a "meaningful contribution" of its allies in the region.

He used the example of the way ahead with theater ASW.

"Our 12 new submarines will provide better deterrent capabilities for us but it should be seen as building a meaningful contribution for the US and our allies in the region.

Second Line of Defense

"And by participating in a broader information-sharing framework, we can deploy our submarines to have an appropriate effect.

"In other words, we are focused on making meaningful, not a trophy, contribution to an alliance effort.

SHAPING A WAY AHEAD: THE PERSPECTIVE OF AIR CHIEF MARSHAL STEPHEN JOHN HILLIER, THE ROYAL AIR FORCE

On the occasion of the coming 100th Anniversaries of both the RAF and the RAAF, the Chief of Staff of the RAF addressed the Williams Foundation Seminar and highlighted he saw the challenges and how best to deal with the challenge.

His presentation underscored that even though he was asked to speak about the challenge within the European theater, that in his view the challenges faced by both Australia and Europe are quite similar.

"You asked me to speak about high-intensity warfare in Europe. Perhaps I've not really provided that much of that specific geographical context. But then as I said right at the start, I don't believe that what I've described can be bracketed within a particular geography. The challenges I've described are truly global and truly common to us all. I believe that airpower's inherent characteristics and capabilities make it especially able to respond effectively to those challenges."

A clear driver of the shift is that airpower advantage will have to be fought for and not assumed. And his way ahead focused very much on leveraging what new platforms we are acquiring but to build out from them to shape new ways ahead to regain strategic advantage.

"But the asymmetric advantage airpower has given us for the last three decades at least, is narrowing. The integration into our air forces of fifth generation capabilities such as the F-35 Lighting will only redress the delta to a degree. Of equal importance in maintaining our combat edge is this ability to manage vast amounts of information, and make decisions more quickly and more accurately. Technological developments will be a key element in ensuring that the lever of the best possible output from our air and space platforms, but our C2 structures, processes, and approach to information sharing will be a decisive factor."

"The human factor will remain incredibly important, but we should strive to maximize our people's decision-making space by relieving them of the trivia. And perhaps most important of all, will be our allies and our cooperative efforts to establish the C2 and information-sharing architectures necessary to deliver decisive combat airpower to the right place at the right time. This has been our hallmark as air forces and should remain so well into the future if, together, we successfully address the challenges and seize the opportunities."

The Air Marshal provided both an overview of the challenges as seen from his perspective as well as key elements for shaping a way ahead to deal with those challenges.

What follows is an unofficial transcript of his remarks.

I'm delighted also to be here at a time when the Royal Australian Air Force and the Royal Air Force are celebrating their anniversaries, and reflecting on our shared histories. In just 10 days' time the Royal Air Force will be 100 years old. And it offers a moment to reflect on all that we have learned over the past 100 years and the need to look ahead at where we are likely to be in the future.

The focus of this seminar is on future high-intensity warfare, but I think it's perhaps worth pausing for a moment to reflect on the extreme intensity of the warfare in which Britain and Australia and our airmen were engaged exactly a century ago; for they were fighting desperately to halt the German Spring Offensive of 1918.

And the scale of that battle has largely been overshadowed by the even greater scale of earlier First World War losses….

That was then, and I'm not about to suggest to you today that we're likely to see a return to high-intensity warfare of that scale and that sacrifice. But we must accept the fact that the threats to our security and the costs of defending ourselves are rising faster now than at any time since the Cold War. And the Cold War was a period in which we understood the strategic context and our potential adversary pretty well. Things were constantly rather more predictable then than they are now.

It's also rather more complex now, as has been well covered by the earlier presentations. And it's this rapidly shifting strategic developments that make my task today of providing a vision of the future an especially challenging one. As is often said, prediction is hard, particularly about the future.

Now this audience is very well informed about what this new strategic environment looks like, not least from the conversations over the last few days. But let me offer some examples of how this feels at the moment from a British perspective. Just over two weeks ago, a foreign country, Russia, used military-grade nerve agent in an attempt to murder people on the streets of the United Kingdom. Not only an extraordinarily aggressive and reckless act, but the first offensive use of a nerve agent in Europe since 1945.

Russia's also illegally annexed Crimea, the first time since the Second World War that one sovereign nation has forcibly annexed territory from another in Europe. This is in addition to the appalling destruction, which has been visited on the Syrian civilian population by the Russian military itself, and the criminal activities of the Russian state under Putin in cyberspace and elsewhere; they're well known.

So the post-Second World War consensus that has provided the basis of the rules-based international order and, I might say, peace in Europe, is being challenged and undermined. We must respond, collectively, to reassure our citizens that hostile acts by Russia against our countries, our interests, and our values, will not be tolerated. And closer to home here, we can see many of these same issues and concerns being played out in relation to, for example, North Korea.

So the world is becoming more complex, and threats emanating from state and non-state actors alike are becoming more insidious and unpredictable. And whilst I don't claim for some supernatural foresight, these and other trends offer some useful insight into the operating challenges, which will confront in the near future. They will influence the character of combat and how we perceive and employ air capabilities into the future.

Now although I've been asked to speak about the future of high-intensity warfare in Europe, I'm very conscious, and I'm sure you are, that applying geographical boundaries tempts us to view things in terms that have limited utility in today's geopolitical environment. Airpower doesn't recognize such boundaries, nor do cyber or states. Our adversaries, certainly, do not. So we need to look at the world as it is, rather than how we might wish neatly to divide it.

If for example we were to look at Russia through a European lens alone, we would fail to see the links between what it does in Ukraine, the High North, the Eastern Atlantic, Syria, and East Asia; and in cyberspace. They've given us plenty of clues that their activities are connected. One example, a long-range bomber fight mounted, not only to irritate NATO, but to exercise military effects in Syria and promote Russian influence throughout the region. A flight in November of 2015, for example, Blackjack bombers making an 8,000-mile round trip around Western Europe, through the Straits of Gibraltar, fire cruise missiles at targets in Syria, and then route back via Iran to base in Russia.

And Iran's activities across a wide arc through the Middle East, to the shores of the Mediterranean, are not designed to enhance Western influence and security. For the UK, this adverse influence presents a substantial challenge. Up to 92% of our natural gas imports originate from Qatar, and around a quarter of our crude oil comes from countries with coastlines along the Persian Gulf, commodities which are at constant risk of interdiction by Iran.

These myriad threats, which extend beyond traditional geographical boundaries, place an imperative on air forces to become ever more adaptable, resilient, and nimble, if we are to preempt threats and react decisively, perhaps over lengthy periods of time, in an increasingly time-constrained decision-making space.

And we need to get rid of the notion that we can control conflict timelines in the way we've done over the last 30 years. As military planners, we need to treat every moment of peace as a period of grace to use to prepare as well as we can to meet the demands of the next major conflict.

That conflict may not arrive, I hope it doesn't, but it will almost certainly arrive if we do not invest conceptually, physically, and morally in the capabilities that will deliver the required power to deter our adversaries. And to deter, you need to have, and be known to have, the capability and the will to fight. Indeed perhaps that will is the first and most fundamental requirement of high-intensity warfare.

So what does all this mean from a UK and an RAF perspective?

Well perhaps I could offer firstly another fundamental requirement of high-intensity warfare from our perspective, and that's alliances. It's already been touched on earlier today, but for the UK, NATO is fundamental. It gives us our decisive advantage. It's not always easy to work with 27 other nations, but it's something that we have that our adversaries don't. Our adversaries are trying to undermine those coalitions and alliances. We collectively need to work hard to maintain them; they are our strength.

Turning to airpower, we've become rather used, I think, in the post-Cold War era, to the preeminent role of airpower, and combat airpower in particular, has constantly played in advance and protecting our national and multinational vital interests. Its key attributes of speed and reach, and I think it can be argued, the political advantage of impermanence, mean that the deployment of airpower has tended to be the first military response to international crises.

But our successes have imbued too much of our military thinking with the belief that control of the air, and of space, can be an assumed condition for interventions. British forces have not known what it's like to operate without the freedom of maneuver conferred by persistence control of the air since the Falklands Conflict 36 years ago.

The world is changing.

Our strengths have been well and truly spotted by our potential adversaries. Everyone is waking up to the fact that control of the air and space is now contested to a degree that we have not witnessed since the late 1980s. Highly lethal long-range double-digit SAMs are proliferating, and operational fifth generation fighters are no longer the sole preserve of our allies. Indeed Russia have recently deployed an Su-57, its latest generation, to Syria.

And if evidence was needed of our potential adversaries' increasing will to contest the air environment, it was provided in June last year, when Russia declared that coalition aircraft operating west of the Euphrates would be targeted, following the shooting down by a US Navy F/A-18 of a Syrian regime Su-22 that was itself targeting coalition forces.

So we need to get used to the idea that in any future environment, high-intensity warfare or not, control of the air is going to have to be fought for, and fought hard for, if we are to establish that vital freedom of maneuver.

The consequences of failing to achieve this foremost duty of air forces are severe. As Field Marshall Montgomery observed in the Second World War, "If we lose the war in the air, we lose the war, and we lose it quickly." Nothing has changed since, except that today, we could freely substitute "air" with either "space" or "cyberspace," or all three; the sense of the statement remains the same.

Now as airmen, we need to ensure that our joint force colleagues appreciate the importance of control of the air, and the implications for airpower mass and the apportionment of airpower effort….Our political leaders and our joint colleagues have the right to expect their air forces to dominate the high ground as integral parts of the multi-domain capability range of air forces.

If airpower's relevance and usefulness have never been greater, for this to remain the case into the future demands that we confront some of the emerging threats to its ascendancy. To maintain the combat edge in the Royal Air Force, we are implementing a strategy that will deliver the right technology, the right people, the right processes, to allow us to respond rapidly and decisively to changing threats at all levels of warfare.

We cannot rely on the freedoms that have made our air forces so successful in the recent past. Our potential enemies are becoming too adaptive to give us that luxury. And we need therefore not only to innovate new technologies, but processes too.

But before I move on to how we might achieve this, it's perhaps worth looking at the emerging challenges to combat airpower's effectiveness further, in high-intensity warfare and more generally. I've already mentioned the proliferation of advanced fighters, SAMs, counter-space, cyber, and electromagnetic threats.

Our adversaries seek to offset our strengths by raising the potential cost of action, and restricting our freedom of maneuver, through the adoption of anti-access and area-denial capabilities.

Our adversaries also seek to degrade our air capabilities by taking advantage of the legal and ethical constraints placed on us by our values, which are pleasingly higher, but are still more restrictive, than those accepted by our opponents.

There are implications from all of this. Hybrid warfare as we know will continue to be a significant feature of strategically contested environments, in which actors will see to blur the boundaries between peace and war and engagement of attributable and non-attributable activities below the threshold on force conflict. The theme today is clearly high-intensity warfare.

My question might be, how and when do we know we're in one?

So against this strategic backdrop, we have to fight hard to maintain the asymmetric advantage that airpower has conferred on us for so long. But as we've discussed in great detail and quite rightly, important as pure combat capabilities will be, of equal and arguably now of greater significance, is the information platforms that collect, disseminate, and integrate as part of this greater information management whole.

One of the key ingredients of success in combat will be, as indeed it's always been, to ensure that the right capabilities are in the right place at the right time. It will just be more so, much more so, in the future. Our successes will hinge on that decision superiority and being able to exploit technological opportunities.

The pace of that technological change is self evidently accelerating, and the most significant changes are likely to come from the rapid development of these new sensors; novel weapons, including directed energy; artificial intelligence; and automated and remotely operated systems.

I suspect that these developments are indeed likely to be most profound in the air domain, which has always been at the vanguard of technology. As airmen we shouldn't be afraid of this challenge.

The Royal Air Force tackled similar problems in the 1930s, which paved the way for the successful defense of our country during the Battle of Britain in 1940. Then as now, information superiority underpinned air superiority and by extension every military endeavor.

But this tsunami of information that ever more sophisticated systems generates presents a challenge that can only be addressed through vastly more agile and adaptable C2 architectures. Against that backdrop of increasing data volumes, the OODA Loop as we've discussed essentially is indeed spinning faster, and we've got to maintain that tighter, faster loop than our adversaries. We need C2 networks that are adaptable, distributed, secure, and assured.

The successful flow of information across joint and multinational boundaries demands that greater collaboration, automation, and integration must be achieved. We know we need to adopt an information-centric rather than a platform-centric approach to our future capabilities.

This swift and accurate decision-making cannot be the sole preserve of C2 architectures and technological advances. Warfare will be, as it has always been, primarily a human activity, and the making of decisions primarily a human activity, particularly those that involve the use of lethal force. The important aspects here are to ensure that humans are unburdened by the trivial and presented only with the decisions to which legally, morally, and intellectually they remain uniquely best suited to make.

Which brings me of course to our people, who are already outstanding, and who will continue to give us our decisive edge into the future. The challenge of senior leadership, of a certain generation like mine, is to give our people the opportunity, the freedom, and the incentives to think their way around the problems we face, and allow us to capitalize fully on their enormous powers of innovation.

And finally I would say again, that our successes will depend on like-minded allies sharing values and will as well as capabilities. Our potential adversaries struggle in this respect; I'm delighted that we do not.

So in drawing to a conclusion, we face a world, which is more challenging, and threatening than it has been for a generation. Air, space, and cyber power will remain at the forefront of political choice when our national, or collective interests are at stake.

But the asymmetric advantage airpower has given us for the last three decades at least, is narrowing. The integration into our air forces of fifth generation capabilities such as the F-35 Lighting will only redress the delta to a degree.

Of equal importance in maintaining our combat edge is this ability to manage vast amounts of information, and make decisions more quickly and more accurately. Technological developments will be a key element in ensuring that the lever of the best possible output from our air and space platforms, but our C2 structures, processes, and approach to information sharing will be a decisive factor.

The human factor will remain incredibly important, but we should strive to maximize our people's decision-making space by relieving them of the trivia. And perhaps most important of all, will be our allies and our cooperative

efforts to establish the C2 and information-sharing architectures necessary to deliver decisive combat airpower to the right place at the right time.

This has been our hallmark as air forces and should remain so well into the future if, together, we successfully address the challenges and seize the opportunities.

You asked me to speak about high-intensity warfare in Europe. Perhaps I've not really provided that much of that specific geographical context. But then as I said right at the start, I don't believe that what I've described can be bracketed within a particular geography. The challenges I've described are truly global and truly common to us all. I believe that airpower's inherent characteristics and capabilities make it especially able to respond effectively to those challenges.

Finally, again, you asked me to speak about these requirements of high-intensity warfare. The sense I think is that this refers to a potential future state. But perhaps I can offer the recent thoughts of Professor Malcolm Chalmers of the Royal United Services Institute in London. He said recently that the RAF is currently experiencing its longest period of high-intensity operations since the Second World War, especially in the fight against Daesh.

Well he's right. We are busier than we've been for generations.

But that has to be a cause for concern. Because if my current force is being pushed by a sustained fight against a terrorist organization, we have much work to do if we are to be technologically and in process and people, and resilience and sustainability, with much to do if we are to be ready to deal with the scale and the breadth of threats which we really mean when we speak about high-intensity warfare.

As was so rightly said in one of the earlier presentations, this is a national effort.

SHAPING A WAY AHEAD: THE PERSPECTIVE OF AIR MARSHAL LEO DAVIES, CHIEF OF THE ROYAL AUSTRALIAN AIR FORCE

Air Marshal Davies was very busy man during the week of the Williams Foundation Seminar, as he was hosting a number of fellow air chiefs, hosting the RAAF Airpower Conference, and attending the Williams Foundation Seminar. Then there was his day job!

He did address many of the key questions raised at the Williams Foundation Seminar in his keynote address to the RAAF airpower conference, two days prior, and those comments, clearly constitute his perspective on the way ahead, which combined with those of the Chief of Navy and of the head of the RAF provides a very good sense of how three key players in the allied arena are looking at the challenges.

He highlighted the growth in the breadth and depth of the challenges facing airpower as well as the growth in demands to operate in the zone between peace and war.

Among the key dynamics he highlighted in his speech were the following:

- The dispersal of global influence and the diversity of power centers;
- The shift in the center of global power from the North Atlantic to the Indo-Pacific region, the elevated strategic impact of China and North Korea;
- The shifts in US national strategy from focusing primarily on counter-terrorism to great power challenges.

These dynamics were leading to the need to invest in higher end military capabilities and to seek innovative solutions to ensure that the liberal democracies had credible deterrent capabilities.

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He underscored the core significance for the RAAF of evolving the skill sets to deal with these challenges which he characterized as shaping skill sets which could move beyond a narrow definition of mission performance to deal with the distributed battlespace and its more strategic demand set.

What follows here is an edited text of his remarks made at the RAAF Airpower Conference.

The information and communications revolution, the global increase in economic development, economic linkages and interdependencies, and competing forms of political and ideological movements have, together, made the early 21st century a more dynamic strategic environment and nowhere is this more evident than right here in our region of the Indo-Pacific.

With this unprecedented sharing of economic wealth and technical development it gives the wherewithal for more players—states, actors, businesses, communities—to exert influence.

This means that sometimes these disruptors cause friction. And this friction requires management: shaping where necessary, but certainly influencing, and—at times—direct action.

The airpower characteristics of reach, speed and precision effects remain important elements of a nation's defence strategy.

The question for us to ponder at this 2018 Air Power Conference is whether we are postured to apply this significant capability in a way that counters these disruptors.

So as we open up the Pandora's box, we will also be taking the opportunity to explore possible solutions.

Let us begin with the strategic environment.

In one of the most significant developments in the modern era, we are experiencing a shift of the geostrategic centre from the North Atlantic and Europe to the Indo-Pacific.

This is the most significant shift in the global balance of power since the end of World War Two.

There are a myriad of factors driving this change. I'd like to focus on two. These key trends are altering the security landscape and are creating a 'disruptive world'.

The first of these trends is the relative rise of the economic, military and political power of the Indo-Pacific.

The growth of the Asian economy, led initially by Japan and more recently by China and Korea, has significantly elevated the strategic influence of nations in our region

In the past 20 years, Asia's share of global manufacturing has increased from around 30% to over 50.

And rising economic powers will continue this transformation.

We must be mindful however that economic prosperity has typically been associated with increased military capability and, at times, international competition.

This is occurring at the same time as the United States of America—a prevailing 'underwriter' of global security—is facing challenges that are driving a refocus of its foreign policy:

The new US National Defense Strategy identifies the 'reemergence of long-term, strategic competition' with 'revisionist powers' as its principle priority. This is a shift away from its more recent focus on asymmetric

warfare— including counter-terrorism operations—and the maintenance of peace and order in an otherwise relatively stable global environment.

Dealing with the very real threat of major powers as well as many ongoing security issues requires a rebalance of investments across nuclear deterrence and support to its global network of alliances and partnerships – the backbone of global security.

Alliances and partnerships are of particular importance in the Indo-Pacific region, which is home to five of the US's seven bilateral defence arrangements. Excluding the particular arrangements of NATO, our region is home to more—and more-varied—formal defence relationships with the US than any other region in the world.

The impact of economic power will become even more pronounced as military power grows to match.

Prosperity has enabled nations throughout the region to invest significantly in militaries; a legitimate response aimed at protecting their national interests

They also have easy and affordable access to sophisticated technologies, enabling pre-industrial societies to leap straight to the digital age, bypassing industrial development.

More nations are investing in high-end warfighting capabilities, challenging what historically had been a western advantage.

Investments in stealth, networks, ISR and precision weapons are no longer a guarantee of capability overmatch.

We now need to seek alternate solutions to reinstate a military superiority.

Indo-Pacific nations now have greater means by which to pursue national agendas.

This new power balance is emboldening some states to challenge the post- World War Two international rules-based order.

The legitimacy of multinational security organisations and global arbitration systems is being questioned, challenging the future of the international liberal and rules-based order that has been the basis of stability for the best part of the last century.

The second trend is the growth in depth and breadth of security issues.

Today, would-be aggressors are seeking means to threaten all aspects of national power.

Terrorists and organised crime have always looked for ways to get around the system; we are used to them not playing by the rules.

But now some states are also looking to operate in the grey zone, exploiting the vulnerabilities of free societies, markets and global communications.

Historical Indo-Pacific security frameworks are coming under increasing pressure, in many instances from frontiers beyond the comprehension of those who designed them.

The ubiquitous nature of contemporary communications is seeing propaganda as an effective element of Information Warfare, giving rise to the exploitation of 'fake news' as a means to incite a response; everything from the use of chemical weapons to civilian workers striking, and even the presence of mass conventional troops in other countries.

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Technology is providing the means to contest every domain via integrated kinetic and non-kinetic effects, often originating from an asymmetric platform.

Social networks now provide the means for ideologies to unite globally, challenging state boundaries and the basis of the Westphalian System

The Indo-Pacific region has never been more complex or challenging.

And the rate of change is faster than at any other time in history.

The convergence of these trends is creating a new set of national security challenges

We have new and historical strategic actors that continue to abide by the international rule of law;

It is however the emergence of new strategic actors that don't abide by the international rule of law that are the catalysts to the disruptive world confronting us.

It is the latter category that we need to focus on.

Our challenge is to adapt and respond to this new order.

Implications for the application of airpower

The role of the Australian Defence Force, to protect Australia and its national interests, remains as relevant as ever in this dynamic and disruptive world.

For Air Force this equates to the delivery of the seven airpower roles (control of the air, strike, air mobility, ISR, C2, force protection, force generation & sustainment).

We have seen that air power can strike deep;

Integrated with the joint force, it can generate decisive effect.

Today, air power provides support to troops on the ground, and critical visibility for commanders. It is the analytic, situational awareness and communications capabilities that increasingly provide the full range of air power support to our joint and coalition engagement.

However, we need it to do more.

Our Air Force is already capable. But it is now facing the greatest evolution of airpower in its history

The 2016 Defence White Paper has committed around $195B to new Defence investments, or which almost $100B will directly impact airpower systems employed by the ADF

This will not just bring into service new platforms, but also a transition to 'information warfare' with unprecedented demands on data collection, processing and exploitation

We now must be able to integrate and C2 a networked force, not just a physical one.

Effective employment of an integrated and networked force, to gain decision superiority and enable manoeuvre despite any intent to deny the same, is the hallmark of a 5th generation force.

Such a change demands ingenuity, requiring a workforce that is empowered to think and act outside of the traditional norm. Innovation is essential to the realisation of the full potential of this investment.

Our next generation of airmen must develop professional mastery that extends beyond mission specialisations. It must promote critical thinking, strategic understanding, innovative problem solving, collaboration and leadership – this is not business as usual.

Airpower begins and ends with people and teams. A technical network alone is nothing.

Challenges we need to address

This 2018 Conference is both a 'strategy' and an 'airpower' conference.

It is structured to aid our collective understanding of emerging challenges – many of which I have already discussed – and our possible responses.

This conference is deliberately designed to take a measured approach to the problems we are presented with;

But this is no closed loop; despite the challenges, we are not 'destined' for war. But the complexity of the environment and severity of the possible consequences means we cannot be complacent.

In the Royal Australian Air Force we are tackling this through our own dynamic strategy. But we need a broad community to help us shape this strategy. We need your help.

This is my call to like-minded Air Chief's. Those of us who share these challenges and common values, to engage collaboratively in order to better understand and shape the role of airpower as an instrument of national security.

Conclusion

The disruptive world is presenting new challenges to the role of airpower in supporting national security objectives.

I don't know what the next conflict will be, but I do know:

Many of the tools of trade are now more freely available to potential adversaries than ever before;

In future conflicts we can expect bases and support infrastructures, including civilian infrastructure, to be targeted through the use of physical and non-physical effects;

These are no longer sanctuaries immune from attack;

Emerging technologies will revolutionise the application of air power but also give rise to new challenges.

Success in the future battlespace requires the coordination of joint effects across all domains – a system of systems.

Airpower must be comprehensively integrated across the joint force to contribute meaningfully to the future fight.

These obstacles and challenges are real, but so are the visions and the ideas we will bring to meet them.

I have confidence in our Airmen to deliver on our vision.

I am reminded of the words of Henry Parkes, our father of federation, as he looked to the challenges at the creation of our nation, 'In one hand I have a dream, in the other I have an obstacle. Tell me, which one grabs your attention?'

My proposition is that we 'grab' both, and collectively chart a new path for airpower in this disruptive world.

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THE DOWDING OPPORTUNITY: LEVERAGE AND ANTICIPATE

In the presentation by Dr. Alan Stephens at the opening of the Williams Foundation Seminar, the speaker went back to the history of World War II to identify lessons learned that might well be relevant to our thinking about preparing for higher intensity warfare. His emphasis on the importance of alliances in a mobilization effort has already been highlighted.

But another factor, which he underscored, was that of leadership, of the importance of preparing for events before they occurred. In a piece which I wrote with Ed Timperlake and published October 5, 2015, we focused on what we referred as the Dowding effect, or what can be done when you anticipate, leverage what your or can build in terms of military equipment and anticipate the coming battle and build an organization for combat success,

Dr. Stephens spoke in his opening comments to the Williams Foundation Seminar about leadership and what he emphasized was the ability to prepare for the future coming into the present, rather just perfecting legacy systems and approaches.

An example of con-ops driven innovation was seen in the RAF leadership preparing for the Battle of Britain.

Air Marshal Dowding's vision saved Britain but generated many enemies, including Prime Minister Churchill.

Just like all military technology is relative against a reactive enemy the flexibility of leaders and adaptability of Aircrews is a critical component of success in combat.

Flexibility refers to the capacity and willingness of leaders to adjust tactics in the face of a dynamic war and adaptive skills of aircrews in understanding the combat practical use of ever evolving technology to readily adapt to the required changes.

Air Marshall Dowding was such a leader and the RAF fighter pilots were such aviators.

As Churchill saw a gathering storm before WW II broke out Dowding developed what he believed what be a concept of operations for the defense of Britain and then looked at the bits of technology which could be forged into that con-ops.

The fighters by themselves would not succeed; as the British fighters chewed up on the continent in the defense of France demonstrated when facing the Luftwaffe. While the courage, skill and heroism of the RAF fighters in the Battle of Britain is not to be doubted, it was the context within which they operated which generated the conditions for their success.

Michael Korda in his book **With Wings Like Eagles: A History of the Battle of Britain** (Harper Collins, 2009) provided a very clear picture of how Air Marshal Dowding addressed shaping a con-ops driven design within which he sought out the pieces of kit and capabilities which were needed to fill out the air defense capability he believed was necessary for mission success.

And all of this was a few years BEFORE the Nazis had seized continental Europe and then were able to use air bases much closer to Britain to generate Luftwaffe strikes on Britain.

What Korda makes clear is that the Germans were pursuing a modified version of World War I concepts of operations for their Air Force.

Fighters continued to think in dog fight terms, and the role of the Luftwaffe was largely defined as flying artillery in support of the German ground forces.

Even when bombers were pushed to the front of the strike force to attack Britain, the fighters role was to accompany the bombers and to attack other fighters, not to engage in destruction of the three dimensional system which Dowding led Britain to build to enable a British victory in the Battle of Britain.

As Korda put it with regard to the Luftwaffe:

"Though nobody was about to bring it to Goring's attention, the Luftwaffe, in fact, had not been built with this kind of task in mind.

"Its successes in Spain, Poland, Norway and the attack in France had been won against weaker air forces or none, and with the Luftwaffe acting in support of the German army.

In the role of flying artillery, rather than as a long-range strategic weapon in its own right (page 13)."

The three dimensional system of fighters, radar, ground enabled C2 for the fighters came together just in time to defeat the Luftwaffe.

But it was a close run thing, and the conception of the three-dimensional space necessary to execute air defense was a clear vision but with concrete elements put together in the mid-to-late 1930s.

Air Chief Marshal Sir Hugh Dowding was the architect of the approach which would defeat the Luftwaffe in the Battle of Britain. He is most remembered for his unwelcome task of telling Prime Minister Churchill that no more fighters go to France to get destroyed in a losing cause; rather, they needed to be husbanded for the coming conflict, which would later be known as the Battle of Britain.

What Dowding understood, and the politicians did not, was that the con-ops shaped by design was crucial to mission success; and the fighters were the tip of the sword, not just silver bullets to be chewed up in fighter versus fighter battles.

Those fighters would be needed to kill bombers, primarily, and fighters, and they would operate from British soil and operate within a very clear strategic context, one which brought together elements of new technologies, and new was of operating which had not yet been tested in battle.

According to Korda, the three dimensional approach of Dowding was the key to understanding the concept of operations.

"He had in his head (as of the mid-1930s) an airman's three dimensional sense of how to fight a battle in the sky over southern England, and he understood that it would involve combining the newest and most radical scientific

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ideas about radio direction finding on a grand scale with the latest kinds of radio communications equipment and a totally new breed of fighter airplane into an efficient, tightly controlled, well-led organization linking fighters, antiaircraft guns, and ground observers into a single unite involving thousands of people and technology which did not has yet exist, pp. 16-17."

There were several key building blocks, which had to be brought together to shape an effective con-ops:

(1) The eight-gun Hawker Hurricane and the Supermarine Spitfire;

(2) The controlling "brain" of Fighter Command;

(3) Centralized Fighter Control;

(4) The Operations Room at Fighter Command Headquarters which was in constant communication with the radar plotters and fighter squadrons via which the battle could be systematically observed, controlled and led.

And to succeed, the con-ops would require training players in the system to work differently.

Pilots would have to shift from the tradition of aerial lone wolfsmanship and learn to be told where to fly and what to do over the radio by the ground controllers.

And this task would require a key cultural change, foreseen by the con-ops, and thereby prioritized as a key task.

"*Dowding had already guessed that the only way to provide the number of people who would be needed to transmit the endless flow of information from the radar stations to Fighter Command's Operations Room and from there 'filtered' to the operations room of each group, and on from there to the squadrons and the pilots in the air, would be to employ large numbers of young women.*

"*Maintenance units were aghast at the new tasks the ground crews would have to learn and the sheeer quantity of unfamiliar new tools and spare parts they would have to deal with, (p. 35).*"

Not only would an operations room be built at the HQ of Fighter Command, but an underground operations room would be built in advance of the Battle of Britain, for Dowding was concerned that the RAF would need to have continuity of C2 to succeed.

"*Dowding had a good picture in his mind of the battle to come, and what it would take to win. Fighter Command Headquarters, he had already determined, would not just control the fighter squadrons; it would have to control the entire battle," (page 37.)*

As the C2 system was built out, Dowding was concerned to have the training in place whereby the various players had confidence in the system.

And this was built into the system by the engagement of fighter pilots with the ground controllers and the C2 system over all.

"*An innovation that Dowding quickly introduced was to place experienced fighter pilots in the filter Room for a tour of duty alongside the filterers, so the pilots would gain confidence in the system (which they could then spread when they returned to their squadrons) and also so they could explain to the filterers what the pilots could and could not do, and what they needed to know, the objective being that the fighter pilots must have absolute*

trust in the instructions they received from the ground, even if the voice was that of a young woman who had never been up in an airplane in her life, (page. 46)."

And Dowding understood the importance of the joint element to mission success as well and built that into the C2 process.

"*Above the filterers was built a 'gallery' where the whole table could be observed from above by the officers charged with warning each Fighter Group of the situation as it developed on the board below, as well as by the naval liaison officer, a senior Royal Artillery officer with a direct line to the headquarters of the antiaircraft gunners and searchlight operators and officers linked by direct lines to the Observor Corps, the police, the fire services, and those in charge of sounding the air-raid alarms, (p.45).*"

Shaping a 21st century concepts of operations requires a shift as profound as envisaged by Dowding for his day.

As the Aussies correctly assume, simply introducing F-35s into business as usual without reshaping their overall approach will not make a great deal of sense.

It is about training and shaping the way ahead for the 21st century world, and not simply doing platform replacement for an approach, which no longer makes sense in the future, or now for that matter.

CONCLUSION

Preparing for and engaging in contested operations means that the Western democracies need to significantly rework how information is used and how command and control is executed.

This transition will be a major challenge and one, which forms a bedrock of further transformation.

How should the Western democracies organize their forces in the face of enemies, which will use a wide range of tools to disrupt Western democratic societies?

How will the Western democracies deal with adversaries relying on significant strike assets to make fixed installations inoperable?

In other words, force structure construction is both about having a more effective and dominant force and persuading Western democratic publics and leaders in fact that they are capable of victory in a direct conflict, whether it is an intense conflict limited in time or as a prelude to something of greater duration and impact.

One key challenge is to take mobilization of supplies and support more seriously. And if one looks at the actions being taken by today's Nordic democracies, clearly this is one part of the world which is indeed taking mobilization quite seriously.

If there is higher intensity conflict, clearly security of supply is both crucial and based on current policies questionable at best.

Mobilization options and approaches need to be assessed, evalutated and implemented where possible.

The liberal democracies need to do the counter part as well, namely, how to undercut the cohesion of the illiberal powers

How would the liberal democrcies undercut the dictators running these societies?

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How would the liberal democracies disaggregate these societies and undercut their abilities to fight?

And while the military leaders are trying to think through a transition, where are the civilian leaders and strategists working new crisis management approaches to work in the new strategic environment and the escalation zone which Paul Bracken highlighted at the beginning of this report?

To operate in the expanding conflict zone where advanced capabilities are being deployed and used clearly requires flexible military forces and capabilities.

It also requires and ability for civilian leaders to use these tools and to be able to shape adversarial behavior in ways that protect and expand our interest.

Currently, work on this side of the ledger is in shorter supply than we will clearly be needed.

Going forward, there are a number of core questions facing Australia and its approach force modernization and alliance evolution The Aussies have the most modern Air Force among the liberal democracies, are completely recapitalizing their Navy and building a modern ship-building industry and are upgrading the Army as it is redefined as part of an integrated combat force.

At the same time, strategic developments in the region and beyond are happening as the Aussies modernize their force.

This means that as the Aussies consider options beyond what they are already doing, and what the current force modernization packages, what is next?

What do the Aussies need to do next to enhance their capabilities to defend Australia and its interests?

And what impacts might Aussie choices have on the neighborhood and beyond?

APPENDIX

In the appendix to the report, we are including the presentation by the Australian Minister of Defence to the RAAF 2018 Airpower Conference as well as interviews which we conducted prior to, during and after the Williams Foundation March 23, 2018 seminar. In all of these interviews and in the presentation to shift from the land wars to the next strategic phase was discussed in various ways.

And it is the variety of ways in which it was discussed which is especially important in thinking through a way ahead to deal with the new strategic situation

Senator the Hon Marise Payne, Minister for Defence, March 21, 2018

Excerpts Follow

The Royal Australian Air Force has developed a valuable network of relationships throughout the region, reflected by your presence here today, and the Government of Australia is absolutely committed to strengthening these links. So, it is excellent to see so many international delegates. Your presence here over the next two days is an important opportunity and also a reflection of the need to work together to address the challenges that we are facing in a disruptive world. This year's conference will, as the Chief of Air Force has said, address some of the most significant challenges that we face today, some of which have the possibility to change, quite fundamentally, our approaches to, and understanding of, security on a national and global scale.

That you have been able to assemble a program of speakers with such diversity and depth of expertise, speaks volumes about the degree of integration we can achieve to make best use of a fifth generation force. I spoke at the 2016 Air Power Conference - just a few days after the Prime Minister and I launched the 2016 Defence White Paper, which set out our plans to modernise the Australian Defence Force, including the RAAF, so that we are best able to respond to the increasingly complex strategic environment. It's fair to say that only two years ago since that speech, feels like an eon in strategic terms.

The Defence White Paper at the time identified six key drivers shaping the future security environment for Australia, and having the greatest impact on Australia's strategic interests. First of all, the roles of the United States and to China, and the relationship between them. Secondly, challenges to the stability of the rules-based global order. Thirdly, the enduring threat of terrorism. Next, state fragility, including within our immediate neighbourhood. Then, the case of military modernisation and the development of more capable regional military forces. And finally, the emergence of new conflicts, non-geographic threats, such as in the cyber and space domains.

So, since I last addressed the Air Power Conference, all of these drivers have continued to affect the security of the region, if not the world. For instance, we know that North Korea has made significant progress towards an intercontinental ballistic missile. We have seen Daesh itself try to get a foothold in our region, as demonstrated by the siege of Marawi in the Southern Philippines. We also continue to see unprecedented technological disruption, which is affecting all parts of society, including the military and the Air Force. But whether you're in any service industry, the accommodation sector, in transport, in communications, or the military, technological disruption is having a profound effect on the way that business is done.

For Defence, unmanned systems, hypersonics, laser technology, are some of the areas presenting new challenges and opportunities. While some of the technologies to be discussed over the next two days remain

somewhat futuristic - requiring significant development before they would be considered viable, let alone mature - history shows science fiction can become science fact very quickly. We are, without doubt, living in a period in which the rapid advancement of technology is fundamentally re-shaping the way air forces receive and process information, the way we communicate with each other, and the way we protect and promote our national and regional interests.

Technology has always played a major role in Australia's approach to national security. We're a large country with a small population that takes an active role in our region and globally. This presents us with unique demographic and geographic challenges, and we rely on technology to enable us to defend Australia and contribute to regional security. In what is a period of rapid challenge, we must continue to embrace the benefits of innovation, and this has a number of implications for Air Force.

First, air power can no longer be viewed in isolation. It must be integrated. We are in the process of completely modernising almost all of the Air Force's fleet. We have the new Spartan Battlefield Airlifter aircraft in service, and the EA-18G Growler electronic attack platform. I'm pleased to announce that our P-8A Poseidon maritime surveillance aircraft has reached Initial Operating Capability five months ahead of schedule. It is already on operations. And of course, from December this year, the first two Australian F-35A Lightning Joint Strike Fighters will be permanently based in Australia. These platforms will underpin the creation of a fifth generation Air Force that will enable these platforms - the Wedgetail, Poseidon, and the JSF and the Growler - to integrate their picture of the battlespace.

But it isn't just, as you well know, about Air Force. These new platforms are giving us the ability to work with commanders on the ground and at sea to deliver combined strikes and disrupt the enemy in ways that have not been possible before. Here, we will soon have a glimpse of the power of this, with the delivery of the second Air Warfare Destroyer, HMAS Brisbane, and the introduction of the Cooperative Engagement Capability, or CEC. In very simple terms, this brings together, as new capability, radar data from ships, from aircraft, and ground-based units, and combines this information into one integrated picture. This single picture then provides all units with CEC, in the taskforce, with complete visibility in to the battle space. This significantly improves their defence capabilities, not by adding new radars or weapon systems, but by distributing existing sensors in a significantly more effective manner.

Currently, our new P-8A Poseidon and Growler aircraft are equipped to integrate into this system. As part of our White Paper plans, we'll look to upgrade other Air Force platforms such as Wedgetail. We're also investing in a number of complementary technologies for Air Force, including the recently announced investment in the world-leading Jindalee Operational Radar Network. This investment will extend its life and provide better situational awareness. While the JORN is run by Air Force, its surveillance of Australia's northern approach benefits all three services, and contributes to our ability to work as an integrated and a joint force. JORN is also benefitting from our recent government investment in the development of Australia's space capability. In September last year, defence invested over $10 million for Air Force in the University of New South Wales to develop new ways to enhance Australia's future defence space capability.

In November last year, I announced the successful launch of the Buccaneer cube sat by a US Delta-II rocket, in a collaborative effort between Defence and UNSW. This low cost, miniature satellite will perform calibration activities for JORN. The investment in JORN and space-based technologies will benefit all three services with improved situational awareness.

Longer term, our additional investment is planned in space-related capability, including new radars and sensors to enhance our space situational awareness. This will give us a better ability to protect our space-based assets, which underpin the vital communication links for our military in the field. But there are of course

risks to our comprehensive embrace of technology. Twenty years ago, our thoughts would not necessarily have gone to the need to protect our aircraft from cyber security threats. But that is exactly what we are now doing for our F35s and other aircraft. And 35 years ago, when the secret US military space-based navigation system called GPS was first opened up to civilian use, we didn't really contemplate that one day all emergency services vehicles and virtually every new car, every new smartphone, even smartwatches would have satellite navigation built into them. So much so, that our economy now depends on GPS satellite navigation for safety and productivity growth. And in saying that, it's worth noting that smartphones, as we know them today, only arrived on the market in 2007. This exemplifies the challenge of technology. As we increase our reliability on it we also become vulnerable to attacks on it, and then we have to defend it.

The second challenge I think is information overload. How do we process, prioritise and share the information we collect? How do we ensure the relevant and critical information is not buried in a sea of noise? So, solving these complex problems is going to require us to re-purpose, to grow, to train cohorts of the defence workforce.

As we also announced in the 2016 Defence White Paper, enhancement in intelligence in cyber and in space, will require around 900 ADF positions, including in intelligence collection and analysis, in communications, in supporting the information requirements of new platforms like the JSF in surveillance aircraft and navy ships, and defence support to special forces and cyber security. All of these areas will require a workforce with skills in STEM: Science and Technology, Engineering and Mathematics. Developing the talent and skills of Australians in STEM areas is one of the key pillars supporting our national approach to innovation; to maximise the benefit of emerging technologies or minimising the threat they pose to national security. It is also a personal passion of mine.

So, Defence, in the development of the White Paper and since, is placing the priority on STEM engagement and equipment. We have one of the largest STEM programs in Australia and promote STEM-related roles to school children, provide work experience opportunities and scholarships, as well as maximising career learning and development for STEM occupations.

We have made progress, but there is absolutely more to do. This is the challenge not just for the ADF, not just for Air Force, but for all of you, too. Our specific defence initiatives include partnering with the Australian Mathematical Sciences Institute to provide internships for up to 100 post-graduates over the next four years; to hold Defence Technical Scholarship camps with year 11 and 12 students, their teaching staff and their parents to showcase Navy, army and Air Force Engineers and technicians at work.

We'll offer employment for early career post-graduate researchers in priority science and technology areas such as computer sciences, autonomous systems, electronic warfare and information systems. At ADFA, the Australian Defence Force Academy, students in non-STEM related degrees are required to undertake STEM subject irrespective of their primary degree stream.

This provides our future leaders with a foundation in scientific and technical knowledge upon which they're able to build throughout their career. Our educational institutions provide the building blocks - the intellectual building blocks - but it's up to the individuals and the organisations within which they work to build on these foundations and to support the drive for innovative thinking and creative problem solving that will be the key to success into the future. They need to be given the opportunity to be innovative.

On this, I note, and I commend the Air Force on Plan Jericho, which has succeeded in a few short years in energising organisational spirit within the Air Force, as well as across the joint force and defence industry. By encouraging bottom-up innovation, Air Force has created an organisational culture that supports divergent and disruptive thinking. Aligned with technological and engineering solutions with an understanding of the Second Line of Defense

operational and organisation challenges that Australian air power is facing. What this highlights is that if we provide the opportunity for Australian creativity and innovative spirit, the sky is no longer the limit.

Our relationships and our ability to integrate and work with our international friends and allies is critical to addressing the challenges that will emerge of the years and decades to come, some of which we will be able to anticipate, others that we will not. Our international defence relationships and arrangements are vital to reducing the military conflict and in developing new culpability we get our partner forces to respond, to share the challenges of maintaining the international rules-based order, combating terrorism, and providing humanitarian assistance in the region.

Indeed, in our own region, in recent weeks - in fact in the last fortnight, in this example, our Royal Australian Air Force C-17 delivered aid to Papua New Guinea in the wake of their tragic earthquake. Army CH-47 Chinooks, C-130J, and B3100 King Airs continue to transport supplies and personnel between Port Moresby and the Southern Highlands of Papua New Guinea. In February, RAAF C-17s delivered approximately 140,000 kilograms of aid to Tonga in the wake of Cyclone Gita, while an AP-3C Orion conducted damage assessment flights for the same cyclone over the outlying Fijian islands at the request of the Fiji government.

Australia was also able to provide P-3 Orion support to the Philippines during the crisis and siege in Marawi last year. The commanding general of the Philippines Army, General Bautista, made clear to me just a week or so ago when I met him in Brisbane, that when his ground troops were fighting in Iraq, knew the AP-3C was overhead, their morale, their confidence in combat actions improved because they instinctively knew timely intelligence, surveillance, and reconnaissance information would soon be available to their ground battle planners.

There is though, room for improvement. We want to move from “soon to be available” to sharing data in real time. With new platforms and integrated capabilities, this sort of data will be part of in-flight air service downlinks and near real time uplinks of updated surface sensor data feeds. This new technology is a genuine combat force multiplier on land and at sea.

Beyond technology, our rapid assistance to friends and Pacific neighbours was made possible due to the mutual trust between our nations, through our continued bilateral engagements and participation in institutions that were part of the regional architecture, such as the Pacific Islands forum and ASEAN. It is a reminder that against modern national security threats, no single nation can stand alone and hope to defend itself completely.

We are deepening our already strong relationships with our partners to develop our war-fighting capabilities to meet the demands of modern conventional combat. Later this year more than 2500 personnel from more than 13 of Australia's partners and allies will take part in Exercise Pitch Black 2018 in the Northern Territory, to build our understanding and our interoperability in high end war-fighting. The month-long exercise enables us to test and improve our ability to integrate with partner nations in a range of offensive and defensive scenarios. These exercises reflect a strong relationship that Australia has with partner air forces. In fact the Royal Australian Air Force, the ADF, and the government have built as well as the high value we place on regional security and fostering closer ties throughout the region.

I want to end briefly with one final thought. Some of the concepts to be discussed at this conference and this weighty program, algorithmic warfare, digital natives and security, would have seemed based in theory two decades ago. Twenty years ago, the idea of artificial intelligence, of AI as a serious consideration to national security, might have been regarded by some as something out of a Hollywood movie. But, today in 2018, we find ourselves discussing these matters with the consideration and attention that they rightfully deserve.

This year's Air Power program is a graphic picture of the breadth of the challenges that face all of us in the decades ahead, from space to cyber, from energy security to digital advancement. Through this period of intense disruption, the Australian Government is investing heavily in our Defence Force to ensure that it stays on the cutting edge and we are building a workforce that is able to exploit the full potential of this new technology. We can't master all the challenges alone and we will need to leverage our international partnerships. We want to have the most effective Air Force possible….

The Perspective of Air Commodore Bill Kourelakos, Commander Air Mobility Group

During my visit with Murielle Delaporte to RAAF Base Richmond we had a chance to discuss with the new Air Mobility Group (AMG) Commander his perspectives on the way ahead. We focused primarily upon the KC-30A as well as the introduction of the new C-27J into the RAAF.

A key point to underscore is that the RAAF, like the USMC, is focused on ramping up combat capability for the operational force, rather than being focused primarily on a process based approach which requires a long list of process-driven requirements.

It is an attitude of get the new equipment into the hands of the warfighter and let them work the operational innovation.

Air Commodore "K-9" Kourelakos underscored that the RAAF relies on a risk-management approach as the warfighters work through the use and evolution of new equipment, in order to get it into the force as rapidly as feasible.

"We do a good job of teaching our airmen and airwomen to think about risk management. As they're going through hiccups and dealing with problems, they are asking a key question: "Can we actually do this? And to do so, what kind of risk are we taking?"

"If they think it is something really serious, they'll put the flag up and highlight their judgment that we should not go ahead with a specific action.

"Put in clear terms, there's a process view of life, and there's an impact or effects view of life, and we are focused on giving the war-fighter an effects view of life."

We discussed with the Air Commodore his sense of how the Group has evolved over the years and what the next steps will be moving forward.

He has been involved with RAAF C-130 operations from the start in the Middle East, and emphasized that the RAAF brought C-130s to the Middle East and operated them locally and have done so for more than 15 years.

They worked with allies and jointly work to sustain the force.

With the coming of the C-17 and then the KC-30A things changed fundamentally as the capability flew into theater and out again as the operational schedule and rhythm dictated.

He noted that with the KC-30A they brought a multi-function aircraft into the mix, not a narrowly specialized tanker.

This has meant that they have worked through ways to work the C-17 and KC-30A in support packages for the Australian Defence Force (ADF) in the Middle East and elsewhere.
Second Line of Defense

"We put the KC-30A into theater in what some would say was an early timeline, but given our effects-based approach, we deployed the aircraft and sorted through the challenges and got significant combat effect from deploying the aircraft prior to achievement of its Final Operating Capability."

He underscored that the operational experience in the Middle East for the tanker crews has been very significant in shaping the next chapters for the tanker within the ADF.

"They learned how to function effectively in a dynamic area of operations."

So what are the next chapters in the tanker story, from the perspective of the Commander AMG?

First, what is next in the Middle East?

"We have deployed a single tanker full-time for the past three years in the Middle East and we are shifting to a more periodic engagement and we shall work that operational challenge.

"The impact of continuing this engagement for a long time has yet to be seen or learned."

This means that they are ramping up their certifications and training with small receivers like the F-16 in order to prepare for extensive support to the Aussie F-35s.

This tanking will be done largely over Australian territory and working through support of the F-35 will be a major effort over the next three years as the fighter comes on line in Australia.

Third, the RAAF is rapidly expanding the number of types of aircraft for which the KC-30A has clearances.

And this is seen by the RAAF as a key part of supporting allies in the region, notably PACAF.

"A key strategic objective of our alliance with the United States is our ability to be interoperable and with regard to tanking this means working the clearance process for tanking fighters and other aircraft.

"If you get into a high-end fight you need to leverage every advantage that you can in order to prevail."

Fourth, a part of building out that combat advantage is the coming of the robotic boom to the KC-30A. In part it is a safety enhancement, functioning much like an auto-pilot, but it is a work in progress to sort out how the robotic boom will actually operate and be used by the RAAF.

But there is a clear combat advantage which will come with enhanced capability to fuel air assets more rapidly and safely.

"With a robotic boom, you are increasing your combat capability through enhanced efficiency.

"You can also achieve a reduction in maintenance as you work through ways to efficiently operate the the boom.

"What we are talking about is taking force projection to a new level.

"If you can have our fighters on station-longer and delivering combat effects, because you can tank them more rapidly, that will be a significant gain."

"We are a small Air Force.

"If you look at the history of small air forces, they win or lose on the first day. You want to be ready for the first day.

We next discussed the C-27J and it should be noted that Air Commodore Kourelakos was the transition officer in charge of the C-27J effort.

He highlighted that he saw the C-27J as a very flexible aircraft able to land in Australia and in the periphery of Australia on a much wider range of airfields than even the C-130.

He told us that they have even practiced operating a C-27J on a highway.

The Special Forces have gotten the point of why this is a good capability for the ADF, but the RAAF is working the issue with the broader Australian Army.

They are engaged in the upcoming Hamel exercise and other events to familiarize the Army with its capabilities for operation on Australian territory or the periphery.

In our discussion later in the week with the Commander of Combat Support Group, we focused on the need to provide for more flexible basing within Australia to deal with the kinds of strike threats being posed by adversaries in the region.

Clearly, the C-27J could be part of the ADF's response to shaping more mobility in the air combat force.

In short, the new Air Mobility Commander is focused on leveraging the lessons learned from the Middle East engagement and shaping a way ahead for the next round of innovation, one driven by developments in the Australian strategic neighborhood.

Interview conducted March 12, 2018.

The Perspective of Air Commodore Kitcher, the Commander of the Air Combat Group

During a visit to Royal Australian Air Force (RAAF) Base Williamtown in March 2018, Murielle Delaporte and I had the chance to talk with the new commander of the Air Combat Group, Air Commodore Kitcher.

RAAF Williamtown is undergoing significant infrastructure modernization as it prepares for the F-35A and as the RAAF's Air Combat Group (ACG) spearheads the transition in the air combat force.

They are undergoing a quite rapid transition from a legacy aircraft to a fifth generation force in terms of completely retiring their Hornets in favor of acquiring their F-35As.

ACG is moving from flying a legacy Hornet force along with Super Hornets and the E-7 (Wedgetail) to one in which Growlers, E-7s, Super Hornets and the F-35As are integrated to shape the new generation air combat capability.

This is a unique combat capability and represents a shift to the RAAF working with the USAF alongside their continuing long standing and excellent working relationship with the USN.

From this, the RAAF will shape something a bit different than the US forces will fly themselves.

We've had a long and very fruitful relationship between the Royal Australian Air Force and the US Navy.

"We have flown the P-3 and now the P-8.

"We have operated the Classic Hornet since, since 1986, and more recently, the Super Hornet, and the Growler.

Second Line of Defense

"It's been a long and enduring relationship, which has proved beneficial to both, and certainly we couldn't have got where we are with Super Hornet and Growler without the outstanding support the US Navy provided us.

"With the F-35A we're expanding our relationship with the US Air Force.

"And clearly standing up our squadron at Luke AFB and working with the USAF has been beneficial and a key driver to this evolving relationship."

BUILDING A 21STCENTURY AIR COMBAT INFRASTRUCTURE

During a visit to Williamtown, two years ago, I visited the base with an eye to looking at infrastructure changes.

Those changes were just charging with one of the first F-35A buildings just being built.

Now two years later, infrastructure is being built up significantly and we toured the base to see many of these changes.

Air Commodore Kitcher talked about the changes which are designed to augment the ability of the base to operate with the new aircraft but also to enhance the ability to command the evolving force.

ACG Head Quarters is located in a building that was a former battery shop. Now a modern building to support the command, as well as other Headquarters and commands from RAAF Williamtown is being built.

The base is being wired to handle the advanced data systems being established with a clear eye to efficiency, effectiveness and security.

"We are seeing two basic types of change.

"The first involves the base refreshing itself. This involves base redevelopment with the base infrastructure being renewed and replaced, including runway and taxiway extensions.

"The second involves building the infrastructure and support facilities for the F-35A squadrons which will train and operate from the base."

The OBISC or On Board Information System Center for the F-35A is built with personnel working in the Centre.

The Number 2 Operational Conversion Unit (2OCU) building is largely complete and will support the training squadron but will also house Number 3 Squadron (3SQN) when they return from the US at the end of 2018.

"3SQN will come back to Australia at the end of the year and work on the Australian Validation and Verification Activities for F-35A.

By the end of 2020, they will move into their own facilities and the training unit (No 2 Operational Conversion Unit (2OCU))) will move into the buildings vacated by 3SQN.

"2OCU will look after all aircrew and maintenance training for the RAAF F-35 capability."

By the end of 2020, there will be over 30 F-35s at the base "which is initially sufficient aircraft for 3SQN and 2OCU, and that's our Initial Operating Capability number of aircraft."

The basic change from Hornet to F-35A at the base is driven by the data rich nature of the aircraft and the security changes associated with handling and processing the data.

From this point of view, working with Super Hornets has been part of the overall transition as well as it introduced the RAAF to the challenge of handling data differently from our legacy aircraft.

"We need to be able to port various security grades of data into and around the facilities on the base.

"AF learnt many lessons when introducing the Super Hornet and we will build on managing those sensitivities for the introduction of the F-35A."

THE IMPORTANCE OF LUKE AFB IN THE F-35 GLOBAL ENTERPRISE

The F-35 community has been stood up at Luke AFB with various nations training together at the facility for the initial cadre of pilots and maintainers generated by the Luke AFB training facilities.

"We have been impressed by the approach and attitude of the USAF trainers as we are working closely with them in training 3SQN aircrew and maintainers.

"And we have been extremely impressed by the attitude from USAF leadership which allowed RAAF personnel to fully integrate the with the US folks in the 61stFighter Squadron at Luke.

"It would have been very easy to have two teams just working out of the same squadron, but that's exactly what the USAF did not do..

"The USAF and RAAF have worked in an integrated manner, which the RAAF is extremely thankful for.

"For example, RAAF personnel have fulfilled key squadron executive positions such as flight commander."

TRANSITION DYNAMICS FOR THE RAAF

Air Commodore Kitcher highlighted the strategic goal of ACG with regard to the transition as follows: our challenge is to actually transition to the new capabilities in minimum time whilst ensuring we keep the overall force healthy."

They have an aggressive schedule with regard to F-35A transition.

They are transitioning from four Hornet to four F-35A squadrons in just four years.

"That is a more rapid change, and a more aggressive schedule than any other F-35 user is on track to do."

And in that transition, a key objective is establishing a "healthy training system in Australia."

And this training system will be supporting F-35As at Tindal Airbase in the Northern Territory as well.

That base is undergoing a significant infrastructure rebuild as it will receive F-35As early next decade as well.

Incorporating the F-35A, the Super Hornets, the Wedgetails and the Growlers into an integrated air combat force is the broader transition facing the RAAF.

The challenge, which is a good one to have from the standpoint of Air Commodore Kitcher, is to learn how to fight effectively with a fifth generation enabled force.

"Learning to fly the F-35A is not the hard part.

"Working the mission command piece is a key driver of change for sure.

Second Line of Defense

"And although we are working closely with the USN and the USAF, we will do things differently as we integrate our unique force package and adapt it to Australian conditions."

Another part of the transition is working the sustainment piece.

"We need to ensure that we have the required number of experienced and capable technicians to generate the number of sorties we need to generate, and the sortie rate is supported by the engineering and logistics systems."

And we discussed another key aspect of combat transition, namely learning or shaping the C2 piece of the force evolution.

What can be overlooked with regard to the F-35 is that it is many ways part of the transition to distributed C2 rather than being viewed as a classic ISR capability, whose function is to distribute data widely in the battlespace.

Given the challenge of operating in a contested environment, within which adversary's will seek to disrupt the ISR flows which the US and the allies have been able to generate within previous land centric wars, a key challenge will be to take decisions in a contested environment.

As Air Commodore Kitcher said: "With the fifth generation aircraft, there are key missions they need to perform themselves and just do it, potentially without proliferating information support to the broader force.

"Everyone's going, "But I need the information that can come off the aircraft.

"We need to be able to say no you don't, in this particular case, you don't need that information right now, you may get it later."

"It is about sorting out and collectively agreeing, from the tactical squadron to the higher HQ's, what we should choose to do versus what we can do," Air Commodore Kitcher said.

And that is a good way to end.

Clearly, Air Commodore Kitcher and his team are focusing on what needs to be done to deploy, develop and shape a fifth generation enabled force and prioritizing and executing those needs to get the job done.

Interview conducted March 13, 2018.

Air Commodore (AIRCDRE) Craig Heap, the Commander of the RAAF's Surveillance and Response Group (SRG).

During my visit with Murielle Delaporte to RAAF Williamtown in mid-March 2018, we had a chance to meet with Air Commodore (AIRCDRE) Craig Heap the Commander of the RAAF's Surveillance and Response Group (SRG).

I have had a chance twice before to talk with AIRCDRE Heap as well as to visit other bases where the SRG operates to gain knowledge and understanding of how this diverse command, which is critical to the RAAF's future capability integration as the RAAF evolves, operates.

Indeed, the various Wings in the command can be seen to be operating capabilities that significantly enhance the situational awareness of the Australian Defence Force and the C2 capabilities of any coalition operation.

Several new capabilities are being added, along with the modernization of core competencies and skill sets to provide for an enhanced ability to protect Australian territory and wider interests as Australia faces dynamic changes in the Pacific regions strategic environment.

One key way that the SRG is contributing to greater capability in the new environment is redundancy and cross support of a variety of platforms and systems to provide greater assurance that the ADF can operate in a contested environment.

With the addition of the P-8A Poseidon, the Triton, of new space capabilities, enhanced ground-based radars, enhanced Air Traffic control radars and systems and the modernization of Wedgetail, the RAAF is seeing an enhanced capability to have greater situational awareness and information to inform and guide the force as Task Forces are assembled to support operations.

At the heart of the change in shaping a more integrated ADF is the ability to shape flexible task forces crafted to deal with specific missions and to do so in contested environments.

This is a work in progress, but the new and evolving capabilities of the SRG are key enablers of such an evolution.

Take Triton as a key example.

The RAAF is standing up its P-8A and Triton force at RAAF Edinburgh in South Australia.

The two are physically "replacing" the P-3's classical maritime patrol and response capability, but are actually capable of much more than their predecessor, and therefore need to be considered through a different lens.

With regard to Triton, AIRCDRE Heap highlighted how the new platform would add a significant new capability not simply to provide greater SA but to drive more effective decision-making in the operation of the ADF.

Notably, it can operate over Australian territory or in the maritime reaches to provide a more persistent and rapidly deployable surveillance capability.

Triton will enable ADF task forces to gain swift and credible real time information to shape not just where to go, but how to build an appropriate task force for a specific mission.

"For example, in a HADR event, the first asset to arrive in the future would conceptually be a Triton.

"Currently, we would normally send a P-3 out to conduct ISR.

"For a Pacific island scenario, with tasking and then extreme time and space issues, it can take about 12 to 24 hours to get an asset on station, let alone have an analysed product to inform higher decision making.

"With Triton it will deploy much more rapidly with tremendous persistence and an ability to push various critical pieces of information back in real time.

"The result is that we will know what to put on the C-17, or the amphibious ship as we send aide to the country suffering the HADR event.

"We will know that a hospital is damaged or an airfield unusable or degraded, including what we will need to restore essential services.

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"And with that information we can better prepare an appropriate Task Force to support the nation".

"The Triton piece is very important because it's a different concept of operation, Wide Area Surveillance WAS (WAS).

"With manned P-3s and P-8s we have to go to the event. With Triton we can deploy the manned assets to the area of interest prior to engaging the rest of the force, to more efficiently and effectively assign resources and taskings".

AIRCDRE Heap emphasized as well that Triton plus the manned response aircraft, plus space provides redundant capabilities, and such capabilities are crucial in contested operations.

Without redundancy, one has less assurance of the flow of information to deploy and execute the mission's central to the force.

The SRG originated by combining two legacy forces in 2003; the P-3 force and the ground-based Surveillance and Control elements; both Air Battle Management and Air Traffic Control, including battlespace control. The P-3 capability was designed for classical maritime patrol and response such as ASW and ASUW, which then evolved into overland surveillance as well. The ground-based capabilities, which included the continually evolving Jindalee over the horizon radar and space capabilities.

There is a diverse portfolio of platform capabilities in the SRG, however, the digital nature of the force is shaping flows of information to manage and to support command and control regardless of the composition of the task force.

The new platforms and capabilities are not stove-piped but coordinated with stakeholders in the evolving integrated approach of the RAAF and the ADF.

The shift from P-3 to the P-8/Triton WAS dyad is a significant way forward as both are software upgradeable platforms with their data analyzed to provide a more cohesive and coherent SA narrative to the force as it operates regardless of location.

My visit to RAAF Edinburgh highlighted this point in terms of the infrastructure being built to support the two platforms.

At the heart of the enterprise is a large facility where Triton and P-8 operators have separate spaces but they are joined by a unified operations centre.

It is a walk through area, which means that cross learning between the two platforms will be highlighted.

This is especially important as the two platforms are software upgradeable and the Aussies might well wish to modify the mission systems of both platforms to meet evolving Australian requirements. They are leveraging their cooperative partnership with the USN to maximise these outcomes, which is also tremendously beneficial to the USN.

The ground-based radar capability will be significantly modernized with the intent to maximize support to the land and maritime-based missile systems acquired by the Australian Army and Navy, while also introducing an Air Force capability in accordance with the Australian government's white paper intent.

And this piece is being actively worked between Army and the Air Force to ensure that their systems work together as an integrated blue force rather than exposing the force to fratricide risks. The first Army junior NCO from 16 Air Land Regiment has recently graduated as an Air Surveillance Operator with SRG.

This trend of joint education and alignment, including the sharing of specialized skills across all Services, will be further normalized in the future, setting the ADF up well to maximize the future introduction and integration of these complex but decisive capabilities.

The goal is to work to ensure integration of Land 19 with Air 6500, two key Army and Air Force programs designed to provide for better integration of defensive capabilities.

Air 6500 will replace the legacy Vigilaire system, with a follow on system, while providing a much more capable integrated air defence system for the wider ADF, while Land 19 Phase 7B from Army will look at the closer range fight.

SRG is a key player in this effort and will assist in shaping a more integrated approach.

Number 41 Wing within SRG provides persistent (24/7) ground-based surveillance of Australia's air space and air battle management for the ADF. Number 41 Wing has the task of generating theRecognized Air Picture from all sources to inform higher ADF situational awareness and decision-making.

As this capability evolves with technology, mobility is being enhanced to provide support for a deployable force. This is important to deliver high intensity combat effects while supporting power projection of the force against threats from adversaries capable of operating at a high tempo.

Within SRG's 41 Wing is also No. 1 Remote Sensor Unit or 1RSU. 1RSU is the Royal Australian Air Force unit responsible for operating the Jindalee Operational Radar Network (JORN) and many of Australia's emerging space capabilities. While 1RSU's operations center is located at RAAF Base Edinburgh, the JORN sites near Longreachin Queensland,Alice Springsin the Northern Territory, and Laverton in Western Australia provide the feeds. 1RSU is the first space operations unit in the Australian Defence Force as well.

The Australian government is also investing in new land based radar capabilities and to enhancing the redundancy of the systems, again looking forward to requirements of dealing with threats in the region.

During our visit, the Australian government announced funding for AIR 2025 Phase 6 which is a mid-life upgrade to JORN. The upgrade to the over-the-horizon radar (OTHR) network is designed to 'open' the system's architecture enabling the insertion of next generation technologies and extend the operational life of JORN to beyond 2042.

As the RAAF adds new systems like P-8A and Triton, it is modifying other SA and C2 capabilities such as the ground-based C2 system and associated ground-based radar as well as a key asset operated by SRG, namely the E-7A or the Wedgetail system.

Here the software upgradeable systems on board the aircraft along with hardware modifications will be crafted to both enhance, and be enhanced by changes in other parts of the force.

The airborne radar and how it operates on the E-7A is very effective, but it is the Electronic Support Measures System as well which provides enhanced SA for the force, notably in contested and complex operating areas. Knowing the electronic environment and exploiting this advantage through electronic warfare, and superior C2 is critical, and indeed potentially decisive, in any future high intensity operation.

And Wedgetail as a multi-mission system can switch from its primary radar role to a primary ESM role as the threat and need dictates. It is empowered as well by its ability to link with other systems but "if those links are jammed or degraded in a contested environment, Wedgetail is also positioned to enable a redundant C2 solution with the system which remains"

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As we concluded our discussion, AIRCDRE Heap was asked how he would describe the difference in the threats he faced when he entered the force from the evolving threats today.

His answer was both clear and insightful.

"We have gone from dealing with relatively small tactical SA and strike bubbles, missile engagement zones in relative terms, around warships, airfields or other critical assets, to much wider, more complex and denser zones.

"We are shaping complimentary capabilities, which need to operate effectively, with levels of redundancy, in these high threat environments, while being able to defend against ever more capable threats across the spectrum of conflict.

"To achieve this aspirational goal, we need to engender a multi domain outlook, which includes not just hardware, but cross-domain education and operational practice, such as that we have seen being led through Jericho, and with the Air Warfare Centre.

"The other change is how radars operate. Legacy radars generate wave forms which we could detect, identify, classify and engage; now the systems are more complex and harder to classify. They are very complex in waveform and are often fleetingly emitting. The new systems are delivering the effects at greater range and with more fidelity than the classical parabolic radars of the 20thcentury."

"In a high intensity conflict, that all comes to a head in a technological contest to see who can achieve a sustained and decisive advantage in that electronic warfare fight.

"And then there is the parallel challenge of determining if, how, and when, through robust integrated C2 and a myriad of tactical options, you may want to effect this battlespace by kinetic or non-kinetic means".

The interview was conducted on March 14, 2018.

The Perspective of Air Commodore Ken Robinson, Commander of the RAAF's Combat Support Group

During our latest visit to Australia, we had a chance to talk with the Commander of the RAAF's Combat Support Group, Air Commodore Ken Robinson at his office at RAAF Amberley. With a country of the size of the United States but only about 25 million people and a much smaller Air Force than does the United States, it is far to say that even operating domestically, the RAAF is an expeditionary air force.

This means that it has to work its own territorial support in ways that mesh effectively with support provided for out of area operations.

It means as well that effective logistical footprint and significant use of reserves is a key part of how Australia addresses air combat support. 25% of the RAAF's rserve budget goes to CSG activities.

And given the engagement of allies coming to Australia to exercise with the ADF, consideration must be given to support for allies as well when they arrive and operate in the Australian continent.

A sense of the scope of the challenge domestically can be seen in the graphic below which identifies the basic locations of the CSG correlated with the basing situation in Australia:

The demand side of growing threats in the region, and engagement in the Middle East, and elsewhere, has put significant pressure on resources.

And threats like North Korea and others in the region, are leading to considerations for mobile basing and ways to support movement of assets in times of crisis to maximize survivability while ensuring effectiveness.

This later point is somewhat a return to the past as the Aussies used mobile basing when facing the Japanese threat to Australia in World War II.

What mobile basing might mean in today's world is a work in progress, but one which will need to deserve more attention going forward.

The basic structure of the CSG encompasses three wings with notably distinct yet complementary mission objectives.

The 96thWing focuses on fixed airbases. The National Support Base is comprised of 13 airbase squadrons and 15 aerodromes. And the baseline capabilities provided by this wing are: airbase C2, base support coordination, fuel storage and delivery, fire fighting and rescue, catering, cargo and pax handling, ground transport and ground equipment maintenance.

The 95thWing provides support for expeditionary airbases and is comprised of nine squadrons. The Wing provides key expeditionary capabilities: force generation, training and standards, tactual communications, force protection, airbase activation, airfield recovery, airfield activation, airfield recovery, airfield engineering, explosive ordinance disposal, deployable kitchens and online contingency response.

The Health Support Wing provides the support crucial to life support throughout the RAAF. The Wing has a number of capabilities, including various deployable capabilities, surgical teams, aeromedical evacuations, specialized health training and a key role for specialized reserves.

The personnel side of the Wings is a crucial part of providing effective support.

And here the Australian government has put in place a system to draw upon reserves whereby employers are incentivized to provide for flexibility for skilled personnel to serve.

There are both punitive and positive measures to ensure the flexibility of personnel being able to work in the civil sector but to serve in the RAAF as well. This is especially crucial with regard to the Health Support Wing that draws extensively upon Australia's leading health practitioners in the civil sector.

The RAAF works closely with the USAF as well both in terms of cross learning with the USAF's Contingency Response Groups as well as the USAF sorting through the growing demand for supporting mobile basing in the Pacific, in terms of flexibly moving away from an over-reliance on fixed basing in the region in times of crisis.

But as the Air Commodore pointed out, the two Contingency Response Groups in the USAF can focus full time on contingency response whereas the RAAF has to include that capability within the overall force.

We discussed at some length the challenge of rethinking mobile basing in times of crisis, which is a work in progress.

"We are having to reacquaint ourselves with some tasks and challenges which we parked to the side a bit while we were in the Middle East for so long.

"We did not have to worry so much about mobile basing to counter the principal threats in that theatre.

"The mindset is in transition now."

Second Line of Defense

This clearly is an Army and Air Force challenge.

"We are good at supporting maneuver with our tactical transport aircraft and Australia's Army aviation capability, including the Tiger Reconnaissance Helicopter, but what we need to do is move to the next level of support to maneuver the most lethal part of our air power capability across a range of airfield options."

Core capabilities such as providing fuel for air systems when operationalized for a mobile airbasing force on Australian territory are clearly different from supporting a fixed airbase.

For example, "expeditionary fuel capabilities is something that's very much on the forefront of my mind. Lean and agile support packages to operate expeditionary airfields are also key, so that we can offer the best possible maneuver options to the aviators without tying down strategic airlift."

The logistics side of enhanced support for Australian forces in Australia to deal with crisis contingencies is also a work in progress.

The Aussies rely on overseas support and training and that will continue in many ways, but there is a clear need to enhance domestic sustainability as well.

And that will encompass new ways to work with industry and to find ways to move personnel from the forces to industry and back again.

According to Air Commodore Robinson, the Air Force has introduced a type of service that allows for uniformed personnel to undertake industry placements.

This desire for closer engagement between Defense and industry is a work in progress, but clearly something, which the current Defense Minister is focused upon.

"When the Minister was visiting Amberley a couple of months ago, I was fortunate to brief her on how we are working closely with the local city council to set up a local defense industrial partnership between the base, the city council and defense industry.

"We can see the fit of such an initiative with government's efforts to deepen the role of, and opportunities for, Australia's Defense industry."

Put simply and bluntly, "I have to make sure that our airbases in Australia can effectively function to satisfy an ever broadening range of operating concepts, whether from fixed or mobile airbases. And that will require both innovation and greater agility on the support side of the equation."

The interview was conducted on March 16, 2018.

The Perspective of Air Commodore Joe "Vinny" Iervasi, Commander of the Air Warfare Centre

During my most recent visit to Australia, I had a chance to discuss the way ahead for the newly established Air Warfare Centre with its dynamic director, Air Commodore Joe "Vinny" Iervasi.

The Air Warfare Centre was launched as part of the Plan Jericho initiative at the time when Air Marshal Geoff Brown was the air chief, and was forged, designed and shape to work 21stcentury force integration, not simply to train air warriors to fight in a legacy manner.

In part this was done in recognition that the F-35 is not a legacy fighter, but a "flying combat system" which can form the foundation for a kill web approach to warfare, in which the relationship among sensors and shooters changes and with that the need for a new C2 approach and learning new ways of doing things.

As Air Commodore Iervasi puts the challenge: "How do we learn what we have not done before?

"We can train and get better at legacy approaches, but how do we learn what we have not experienced before and how do we leverage our new platforms to transform and create an integrated force?"

His focus is upon a 2-6 year period ahead and how to prepare the force to execute new concepts of operations leveraging ongoing integration capabilities.

He even projected the notion that the best outcome for the Air Warfare Centre would be to be transformed in a decade into a Joint Warfare Centre.

He sees the RAAF with their new platforms, new thinking and evolving approaches as being in a good position to lead a transition, but one which is about forging a very different force from the legacy force.

One aspect of the difference is that the separate force elements train and prepare for joint exercises, but how do they know what is an evolving joint capability and how do you train for what you don't know"

He advocated moving more training time into joint exercises and training rather than the relative high proportion of time spent on service or platform specific training.

The overall challenge facing the Air Warfare Centre is to shape a fifth generation force and how that force might come together in combat situations to prevail.

"The Air Warfare Centre is focused on the blending between bottom up initiative, top down direction, and to foment and facilitate the ideas, the concepts, the wherewithal, the tactics of actually knowing and shaping what an integrated force needs to do in the evolving combat environment we are facing."

"Because we're trying to integrate a force the way a force has never been integrated before, we're going to have to do so in innovative ways. Innovation is going to be a byproduct of integration.

"It is going to be a byproduct of immersing ourselves in current and emergent technologies and sort out what they actually might mean operationally.

"In other words, it's our drive to integration that's actually going to necessitate an innovative approach."

Throughout the interview, he was very clear on the importance of breaking out of legacy patterns and thinking and finding ways to train for the future fight with the force you are crafting.

"Our senior leadership, including myself, has never grown up in the combat environment which is now evolving rapidly. We need to unlearn as well as learn to shape an effective way ahead."

How do you shape a future force structure based on where you need to go, rather than what you have inherited?

From this point of view, how do you leverage the simultaneous acquisition of the F-35 by Australia and its core allies to drive change in new ways rather than simply treating it as nice new toy?

Second Line of Defense

Illustrative of his approach is setting up a working group to meet in Adelaide later this month to work on ways to work leveraging the F-35. Nellis, NAWDC, the RAF Air Warfare Centre as well as the Aussies will meet in Adelaide to discuss ways to think about fifth generation operations.

"Each of our warfare centers inherently has a particular strength.

"How do we leverage those strengths and come up with an approach where we can generate collectively initiatives to test and experiment and drive operational changes in the joint force?"

"How do we actually create an expanded multi-disciplined team and collaboration environment in Australia such that we are open to the opportunities that present themselves?

"Doing things better is the bottom line.

"When I talk about multi-disciplined teams, I am speaking broadly. I am not just focusing on the operators of our airfleets.

"It's the engineers, scientists, industry, and academia coming together with operators to develop new concepts for emergent domains, specifically cyber and space.

"What we're attempting to do in our air warfare center is create multi-disciplined teams physically co-located at our major bases Amberley, Williamtown, and Edinburgh, with each service's main warfighting elements."

"For example, Williamtown is close to Sydney where we've got Forces Command HQ for Army and Fleet Command HQ for Navy. Up in Brisbane, we have HQ 1 Division and HQ of the Amphibious Task Group in proximity to Growler, Super Hornet, Combat Support Group and a large portion of our air mobility fleet."

"Our core integrators are our air warfare instructors and we see them in the role of driving operational integration initiatives within a 2-6 year time line of implementation."

In effect, the Air Warfare Centre is generating various vignettes of the evolving operational environment and then testing capabilities, and new ways of using those capabilities, against that projected operational environment.

And by working within a 2-6 year time frame, they can be realistic, drive change and not get excessively metaphysical.

It is not about the world in 2030; it is about driving change for a fifth generation enabled force able to shape a more effective and integrated force in the near to mid-term.

And doing so, with close collaboration with the other services and the allies who are themselves rethinking their approach to combat operations.

The interview was conducted on March 23, 2018.

The Perspective of Group Captain Steve Pesce, Officer Commanding 86 Wing

During a visit to Amberley Airbase, Murielle Delaporte and I had a chance to talk with Group Captain Steve Pesce, Officer Commanding 86 Wing, comprising the RAAF's C-17, KC-30A, B300, CL604 and B737 fleets.

We discussed his perspectives on the future of air tanking, and specifically the next steps in the evolution of the KC-30A, including enhanced sustainability in combat operations.

The development of the Automatic Air-Air Refueling (A3R) boom to the KC-30A is viewed by the Group Captain as both part of the strategic evolution of tanking and as a significant upgrade to the KC-30A as an operational platform.

He has been involved with the KC-30A program for about 10 years, and has seen the aircraft move from design to reality and to become "the preferred tanker" in Middle Eastern operations.

He sees automation and robotics as part of the change involving the evolution of tanking itself.

From his perspective, in a conflict against a "near-peer" adversary the RAAF and allied forces may not have the luxury of secure tanking in uncontested airspace.

Air forces will gain transient advantage rather than total control of the air and will support surface assets that will be more dispersed across a larger Area of Operation (AO).

Demand for AAR (and air mobility in general) will increase as the survivability of a large tanker is reduced.

Distributed operations in contested airspace will become a norm, and that means in his view the end of the classic larger tanker operations.

The manned tanker will operate further away in the battlespace and become the mother ship for tanking remotes operating as refueling nodes to expendable assets deployed forward,

"My view of the future battlespace is that sensors and shooters will be more proliferated, integrated and reach further and with greater precision.

"There will be a natural move towards dispersion to improve survivability and delivery of fuel will be critical.

"The future of a large tanker will be to support more distributed and dispersed operations and we will be looking at small tactical refuelers providing fuel to tactical air combat assets – these tactical assets will likely be cheaper, unmanned and more expendable.

"That is where A3R comes in.

"I see an advantage in the automatic boom because it reduces the workload on the operator who in the future may be managing or controlling formations of UAV during AAR.

"As we learn to use this technology, it will be part of shaping the skill sets to transition to the next phase, of a large tanker replenishing smaller, automated tactical refuelers."

Another aspect of change associated with KC-30A is part of the evolution within the battlespace as seen by Group Captain Pesce.

Namely, the proliferation of communications and sensor technology throughout the air combat force will include larger platforms such as C-17 and KC-30A, by including new SATCOM and other linkage technologies.

This is designed to support not only a dispersed force but also provide network redundancy in a disrupted and contested EM spectrum.

In the near term, the RAAF is working with Airbus Defence and Space and with other tanker allies to enhance the sustainability of the MRTT.

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"We use the MRTT as a multi-mission asset and do not have the luxury of a larger force like the USAF which can afford to have a specialized tanker. We use the KC-30A as a multi-use platform supporting a multi-mission force.

He noted that multi-mission philosophy extended to the maintainers of the tanker, which are part of a broader RAAF effort to rotate maintainers throughout the air combat fleet to gain proficiency throughout the force.

Such multi-platform proficiency was viewed as an essential capability to support a small force operating as a force package either within Australia in some future military contingency or in a force projection package away from Australian territory.

"Our maintainers are initially trained with regard to specific platforms but we will rotate them across multiple platforms as well. A technician might work on a KC-30A for six years and become a maintenance manager.

"Typically, one would then be promoted to say a Sargent and then those Sargents might then be posted to a different aircraft type, like F-18s.

"At the same time, we will have sergeants from F-18s posted to KC-30A and they will then need to be retrained on that platform.

"This approach comes at a cost. But the clear gain is that you have a broader pool of cross-trained workers.

"As a smaller air force, we need an agile and multi-trained maintenance force to enhance our effectiveness."

For Group Captain Pesce, a key challenge is "to enhance the sustainability of the fleet. It is a very high demand asset and indeed we are using the tanker at twice the level we anticipated.

"This means we have to look at ways to extend the life of the operational fleet and to improve the sustainment approach.

"A challenge faced by all military platforms leveraging a large commercial fleet is that the configuration used by the military is simply a small subset of a much larger commercial fleet, whether 737s or A330s.

"This means that the configuration of the commercial aircraft is always evolving, whereas the military wishes for configuration for the military asset to remain common.

"And a common configuration enhances our ability to work with allies flying the same platform as well."

"The key discussion we are having with Airbus focuses on configuration control for the fleet in order to reduce costs of sustainment for the users.

As the fleet of tankers gains more operational experience, more accuracy is achieved with predicative knowledge concerning the key military parts of the A330, which has been transformed into a tanker.

And getting better domain knowledge of predictive parts performance is a key part of ensuring the timely supply of parts to ensure that the dispatch rates of the fleet remain high, again because it is a high demand asset.

Improvements in logistical support are a key way ahead for the KC-30A in the RAAF.

As Group Captain Pesce concluded: "If you are a small air force, you want as small a logistics footprint as possible to ensure optimal combat effectiveness."

The interview was conducted on March 15, 2018.

The Perspective of the Growler Transition Team

The RAAF has been in the throes of significant modernization over the last decade as the C-17, KC-30A, Super Hornet and the Wedgetail have come together to shape an integrated and effective power projection force.

The next wave of change is spearheaded by the F-35. But the introduction of the Growler is a part of this transition as well as the RAAF and the Australian Defence Force learn to operate more effectively in the electromagnetic spectrum and to reshape operational approaches to the use of non-lethal and lethal weapons.

The RAAF will see changes to Wedgetail along with the introduction of Growler and the F-35 and these three aircraft interactively will deliver new ways to fight in the tron warfare combat space.

The RAAF leadership is clearly focused on the air force as an integrating force, that is, as a force driving a way ahead for the whole of the ADF.

During our visit to Amberley Airbase in March 2018, Murielle Delaporte and I had a chance to meet with two key members of the Growler transition team to get an update on the progress since the August 2017 seminar on Electronic Warfare held by the Williams Foundation.

We met with Group Captain Timothy Churchill, Director of the Growler Transition Office and Wing Commander Taffie Smith, Deputy Director of the Growler Transition Office.

“Our intent in the Growler Transition Team in the Air Force is to actually start using Growler as a catalyst to understand fighting in the electro-magnetic spectrum.”

Much like the broad perspective delivered at the Canberra conference in August 2017, the Growler is not seen as an end in itself but a catalyst for change by providing hands on training, and combat experience to drive an overall RAAF transition.

At Williamtown, we discussed how Growler has been used both on the Blue and Red side at the same time, to change how the strike force operates both defensively and offensively.

This is the kind of change, which the RAAF is looking to drive with the addition of Growler.

Operating in a contested electro-magnetic environment as one builds out a distributed force will require what the team refers to as “trusted autonomy” in terms of recognizing friend and foe and working with trusted information and decision making inputs, outputs and throughputs.

By flying Growler now, the RAAF and the ADF gain domain knowledge of how to shape the force going forward both to operate in the contested tron environment and to operate in a way that allows a distributed force to be effective.

The RAAF can be a change agent not just for Australia but for Australia’s allies as well and this true as well for the tron warfare environment as well.

“I see Australia is actually in a really unique position, because we’re actually going to transition our whole air combat fleet to fight in terms of a fifth generation warfare approach.
Second Line of Defense

"And we will do so quite a lot before the totality of the USAF or the totality of the U.S. Navy."

For the team, they believe that the tron warfare domain is much more significant and dynamic in terms of impact than those who take a narrower look at EW and see it as a specialized weapon set.

And this will impact significantly on the introduction of new capabilities such as UAVs and other systems relying on software and artificial intelligence for these systems will be operating in a contested tron warfare environment, so assumptions made from operating UAVs in an uncontested environment simply have no validity going forward.

Learning how the tron warfare environment is unfolding and will unfold and learning from the cross cutting capabilities of F-35, Wedgetail and Growler will provide a key laboratory within which the RAAF and its allies can shape more effective capabilities.

Training facilities are being established in Australia both to learn how to operate Growler and to more generally conduct tron warfare across the force.

This means testing the impacts as well of using tron warfare attack tools on the blue force as well, and trying to mitigate fratricide and augment the combat effects on the Red Force.

The RAAF has begun exercising with Army and Navy to understand how best to use Growler to support the overall force, as well as for Army and Navy to consider how to evolve their own force modernization in light of the impact of a contested tron warfare capability upon their forces as well, including modernization.

Notably, as the Navy recapitalizes its fleet, understanding how the fleet will need to fight and win in the electromagnetic spectrum is a key to the future.

And having Growler engaged with Navy is part of this learning and developmental process as well.

Learning how to shape "trusted autonomy" capabilities throughout the combat force is essential as a distribute maneuver force is built out with the new platforms and capabilities being acquired by the ADF, more generally and the RAAF, more particularly.

The acquisition of Growler and how the RAAF and the ADF are leveraging the acquisition provide a particularly clear case of how they are looking at transformation. Get the new platforms into the warfighters, and have them mix it up with the force and their partners and allies, and sort out a way ahead for the further modernization of the force.

Rather than a classic requirements driven approach, they are working towards an approach where training and combat experience using new platforms is the seed corn for further change and transformation.

The interview was conducted on March 16, 2018