Accelerating the Transition to a Networked Integrated Force

SIR RICHARD WILLIAMS FOUNDATION

5/10/22

By Robbin Laird

Since 2014 the Sir Richard Williams Foundation seminars have focused on building an integrated 5th generation force. Almost a decade later, the 2022 seminars reflect on the journey towards a 5th generation force and identify gaps, opportunities, and priorities for the development of next generation capability in the face of new threats and new risks. The seminar in March identified key lessons from the transition to a 5th generation force. It highlighted changes in the strategic environment and provided both ADF and allied assessments of how to shape an effective way ahead.

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Introduction 3

The Seminar Approach, Intent and Program 4
- **Aim** 5
- **Background** 5
- **Lessons and Changes** 5
- **Industry Perspectives** 6

ADF Perspectives on the Way Ahead for the Networked Integrated Force 6
- **Air Marshal Mel Hupfeld, Chief of the Air Force** 6
- **AVM Robert Chipman, Head of Military Strategic Commitments** 8
- **MAJGEN Susan Coyle, Head of Information Warfare** 10
- **BRIG Ian Langford, Director General Future Land Warfare** 11
- **CDRE Darron Kavanagh, Director General Warfare Innovation, Royal Austrian Navy** 12
- **Tony Dalton, Deputy Secretary National Naval Shipbuilding** 14

Australian Allies Provide Assessments of Ways Ahead for Networked Integrated Force 17

An Italian Air Force Perspective 19

The Perspective of PACAF 23

The Perspective of MARFORPAC 28

A Royal Air Force Perspective 34

Defense Industrial Perspectives 38
- **Tom Rowden** 38
- **Rod Equid** 39
- **AVM (Retd.) Chris Deeble** 41

"Australia is Facing its German Moment" 42

The Way Ahead for the ADF: Mastering the Art of Warfare 44

Looking Back and Looking Forward: The september 2022 Williams Foundation Seminar 45

Speakers Bios 47
- **Air Vice-Marshal Robert Chipman AM, CSC, Head Military Strategic Commitments** 47
- **Lieutenant General Aurelio Colagrande, Italian Air Force Deputy Chief of Staff** 48
- **Major General Susan Coyle AM, CSC, DSM Head of Information Warfare** 48
- **Tony Dalton AM, Deputy Secretary National Naval Shipbuilding** 49

Second Line of Defense

Air Vice-Marshal Chris Deeble AO, CSC (Retd), Executive Director, Strategy, Northrop Grumman Australia 49
Rod Equid, Chief of Enterprise Focus Areas, Raytheon Australia 50
Air Marshal Mel Hupfeld AO, DSC Chief of Air Force 50
Commodore Darron Kavanagh AM CSC, RAN Director General Warfare Innovation, Royal Australian Navy. 51
Peter Jennings PSM, Executive Director, Australian Strategic Policy Institute 52
Brigadier Ian Langford, DSC and Bars (PhD), Acting Head Land Capability 52
Tom Rowden Vice President International Strategy and Business Development, Lockheed Martin Rotary and Mission Systems 53
Lieutenant General Steven R. Rudder Commander, U.S. Marine Corps Forces, Pacific and Commanding General Fleet Marine Force 53
Air Chief Marshal Sir Mike Wigston KCB, CBE, ADC, Chief of the Air Staff 54
General Kenneth Wilsbach, Commander, Pacific Air Forces 55
Air Marshal Geoff Brown AO (Retd), Chair, Sir Richard Williams Foundation 55
John Conway, Sir Richard Williams Foundation 56

The Program 57

INTRODUCTION

On March 24, 2022, the Williams Foundation held its first of two seminars to be held this year.

The seminar was the latest in a series of seminars which started in 2014, and have been focused on the evolution of the ADF to deal with the evolving threats and challenges facing Australia, and its core allies.

The first seminar dealt with the launch of the fifth-generation force, and then over the next few years focused on key elements and building out the force and then since 2018, there has been an increasing focus on shaping new capabilities to extend the reach and the lethality of the force in the growing threats in the Indo-Pacific region.

A key thematic approach woven throughout the assessment process is the challenge of shaping an ADF that is more capable of being built "joint by design."

And the point of that is to get full value out of any new capability introduced into the force, and, over the past few years, this has been joined with the theme of enhancing Australian strategic resilience and sovereignty with a broader encompassing of Australian political, economic and military capabilities becoming more integrated as well.

This process is reminiscent of what I have seen in the Nordic region, where since 2014, the Norwegians, for example, have focused on "total defense," or upon how to take a whole of society and government approach to defense. This has been driven by the global challenge posed by the 21st century authoritarian powers whose goals are clearly to reshape the global order to their advantage as well as dealing with the consequences from the breakout of a war with global consequences and impacts, namely, the Russian invasion of Ukraine.

Although the title of the seminar may seem narrowly focused on force building, it was not.

We have entered a new historical era of global conflict, and the challenges posed in the seminar are really about how Australia and its allies shape an effective way ahead.

The next seminar to be held in September 2022, will leverage the most recent seminars, those in 2021 on autonomous systems and building a new space enterprise, and the March 2022 seminar focus on the next steps for joint force design, and address the broader question of force building to deal with the new strategic environment.

Two particular presentations at the seminar underscored the nature of the transition facing the ADF and Australia as a whole.

The first was by Peter Jennings, the executive director of the Australian Strategic Policy Institute (ASPI) and the second by Air Vice-Marshal Robert Chipman, Head Military Strategic Commitments, responsible for the strategic level management and situational awareness of current and potential Australian Defence Force Commitments.

Jennings underscored the core point of the challenge we face, namely, a significant strategic shift in the global environment.

As Jennings put it: "the world's two most powerful authoritarian regimes have made it very clear that their goal is to break the international order and to remake it under their control. Beijing and Moscow's separate and shared interests have not been hidden and they made clear publicly for at least a decade. One thing you can say about these authoritarian systems is that they do not disguise their plans."
Second Line of Defense

And to meet this challenge on the military side, the point is about having extant capability which can meet the challenge, not building an exquisite defense force in some future point in history.

Jennings went back to his 2018 Williams Foundation seminar where he advocated that Australia add a bomber to its capabilities, in this case to join in the U.S. program to build the B-21.

And the underlying point about this is to add strike capabilities in the near term, not the long-term. He argued for the need to jump start Australian defense efforts along the lines of what he called the new German moment, when in facing the war in Ukraine, German leadership have been shocked into a reality zone on defense.

The good news in my view is that Australia has been focused on reality for far longer than Germany, and at the end of the day many of the key elements for shaping an effective way ahead.

And that point was highlighted in the presentation by the former Plan Jericho, co-head, Air Vice-Marshal Robert Chipman. In his presentation, Chipman underscored the importance of integration as a force multiplier which has been a hallmark of when the Plan Jericho effort was first introduced in 2015.

But since that time, such capabilities need to be joined with Australian strategic resilience.

As Australia works enhanced sovereignty and resilience, this effort requires skillful work on the changing nature of alliances as well.

This is how Chipman put it: "There are limits to what a middle power can achieve, that's why alliances and partnerships are so important. Allies don't surrender sovereignty to each other, they share it; allies and partners strengthen national power and help mitigate the risks of critical vulnerabilities.

"What does this mean for defense efforts? We need sailors, soldiers, and aviators and public servants who are masters of their domains. We need experts who can integrate across domains, and we need experts that can provide the policy advice and strategy to ensure that our military power is delivered as a coherent expression of national power.

"There's a human dimension to this challenge, building a culture that is biased towards teaming and constantly learning. There's a procedural dimension to this challenge, creating space for innovation and fast adaptation. Sharing information to strengthen coordination and resilience, accelerating the speeds of decision and corresponding actions.

"And there's a technical dimension to this challenge, prioritizing integration over platform optimization, encouraging the early adoption of new technologies, introducing advanced capabilities and baking in interoperability so that we can mesh with our allies and facilitate cooperation with partners."

In short, the March 24, 2022 seminar provides a snapshot of where the ADF along with core allies are with regard to the challenge of force integration.

But how best to shape an effective way ahead to prevail against the 21st century authoritarian powers?

And as Jennings cautioned, answers to such a question go beyond simply shaping an exquisite networked force, but requires a broader whole of society and whole of government effort.

THE SEMINAR APPROACH, INTENT AND PROGRAM

Williams Foundation Conference, Accelerating the Transition to a Networked, Integrated Force,

24 March 2022

Aim

The aim of the March 2022 seminar is to examine progress in the establishment of the 5th generation force and identify lessons which further inform and accelerate Government and industry efforts to design, build, operate, and sustain increasingly lethal and survivable air and space capability.

Background

Since 2013 the Sir Richard Williams Foundation seminars have focused on building an integrated 5th generation force. Recent seminars have evolved from the acquisition of new platforms to the process of shaping and better understanding the environment in which the integrated force will prepare and operate. Moreover, they have highlighted the challenges of acting independently at an accelerated tempo and in sustained, high intensity, complex operations across all domains.

Almost a decade later, the 2022 seminars will reflect on the journey towards a 5th generation force and identify gaps, opportunities, and priorities for the development of next generation capability in the face of new threats and new risks.

Despite the operational challenges, the framework and apparatus of the 5th generation force is substantially in place. And while there is still plenty of work to be done, the shift from a focus on platforms to a broader appreciation of an integrated 5th generation system of systems represents an important milestone.

The scale of this achievement will be recognised in the seminar and will underscore the critical and ongoing importance of a highly skilled and increasingly integrated workforce across Defence, industry and academia.

The March seminar will set the scene for the September seminar where future force structure and preparedness considerations will be examined to further exploit and accelerate the next generation capabilities.

Lessons and Changes

The seminar in March will identify key lessons from the transition to a 5th generation force. It will highlight changes in the strategic environment and the increasingly sophisticated and time-sensitive 'lethality-survivability-affordability' trade-off necessary to build a balanced and relevant force.

While lethality and survivability have always important, what is now different is that they are both increasingly difficult to achieve. And the time imperative means we are always working against the clock to develop and deliver the capabilities essential for the execution of 5th generation operational concepts.

However, despite numerous successes we still find it difficult to rapidly link advanced concepts to fielded operational capability. The seminar will examine the gap between new technology and operational needs, and question whether the current process is fit for purpose. And if not, what needs to change?

The session will consider next generation air power capabilities across each of the Services, fixed and rotary wing, crewed and uncrewed.

Session one will focus upon what has changed since the original concept of integrated 5th generation air combat capability was first introduced into Australian defence planning and thinking. It will highlight the most significant changes to the strategic environment and how survivability has become more difficult to achieve due to an increasingly challenging threat environment.

Second Line of Defense

It will show how the capability building blocks highlighted in previous seminars (electronic warfare, strike, unmanned systems, training, and space etc.) are now being conceived as an integrated system of systems able to compete across each domain.

The second session will focus on the 'Innovation to fielded capability gap'. It will provide an insight into what has been achieved to date with a particular focus on the defence industry contribution to the establishment of acquisition and sustainment systems. Some areas will be identified as work in progress, and in others where new relationships and ways of working have delivered increased capability and capacity.

The final session will seek gaps and opportunities and areas which are likely to need significant further investment and prioritisation at the enterprise level. Service chiefs will provide insight into their thoughts about the future operating environment and key observations and lessons from the transition to a networked integrated force. This will set the scene for the next seminar in September.

Industry Perspectives

Industry participants are invited to contribute to the discussion about accelerating and enhancing lethality, survivability, and affordability of the integrated force. The industry perspective should address policy and process improvements as well as the future opportunities provided by new technology and an increasingly integrated defence and industry workforce management model:

- Sustainment and readiness
- Sensors
- Communication and Information systems
- Networked Weapons
- Infrastructure

ADF PERSPECTIVES ON THE WAY AHEAD FOR THE NETWORKED INTEGRATED FORCE

At the seminar, six ADF officers provided insights with regard to the way ahead for the ADF in building out its networked integrated force.

The RAAF perspective was provided by Air Marshal Mel Hupfeld, Chief of the Air Force, by AVM Robert Chipman, Head of Military Strategic Commitments. MAJGEN Susan Coyle, Head of Information Warfare, BRIG Ian Langford, Director General Future Land Warfare, CDRE Darron Kavanagh, Director General Warfare Innovation Royal Austrian Navy and Tony Dalton, Deputy Secretary National Naval Shipbuilding.

Together, the speakers provided an overview on the state of the force as well as a variety of perspective on the way ahead.

Air Marshal Mel Hupfeld, Chief of the Air Force

Air Marshal Hupfeld, now head of the RAAF, was previously head of Force Design, and then Joint Operations, came to the Air Force position through a significant focus on joint by design efforts. He noted throughout his remarks how challenging it is to get a common culture to drive integrated force operations, but also cautioned that as the ADF works such an effort, it requires as well a wider national effort to fully deliver a common Australian defense policy optimized to defend Australia and its interests.

This is how he put it: "Across defense now, we have a defense purpose that's clear and articulated. We have missions that they're all nested under the one mission set. We are getting alignment on common purposes, common interest, common values. And if you get all those aligned, then can achieve that accelerated transition for a networked integrated force which we are discussing in the seminar."

Hupfeld also noted an important point about platforms. New platforms can perform forcing function roles for the force. Air Marshal Hupfeld noted that LHD acquisition as done so for the joint force, and certainly the F-35 has been a major driver of change.

As Hupfeld noted: "The F-35 replaces nothing, but changes everything. And the term fifth-generation really started to drive more focus on integration."

FIGURE 1 CHIEF OF AIR FORCE, AIR MARSHAL MEL HUPFELD, AO, DSC, HOSTED AN AIR MARSHALS SYMPOSIUM AT RAAF BASE POINT COOK, MELBOURNE, ON TUESDAY, 29 MARCH 2022.

In a presentation by then head of the RAAF, Air Marshal Davies, I highlighted this important question when discussing innovation and integration. The point is often made that to get where the integrated force needs to go, it is important to get out of stove-piped platform focus and become platform agnostic. Such a conclusion is fine as far as it goes, but platforms are the operating entities from which force viability, capability and integration are generated.

And when discussing the way ahead for platforms, Davies highlighted the importance of gaining a joint force perspective with regard to doing so, and he discussed this from the standpoint of the Air Force's Plan Jericho approach.

As he noted in a 2017 interview which I did with him: "A key benefit from the Plan Jericho approach is reshaping the language. It is not about how does this new platform fit into the force as it is, it is about how Second Line of Defense

does this new platform enable the force to fight the way we need to be able to in the future? It has to be realistic but in a sense the reality we are looking at is not just the Air Force as it has fought in the past and present, but the Air Force as it vectors towards the future fight.

If you don't do this you will be only discussing and debating platforms in the historical combat space. And when we come to new platform decisions, we are positioning ourselves to ask the right question of the services: How does a particular platform fit how we will need to fight in 10 years' time? Is the Navy or the Army or the Air Force entitled to that particular capability choice if it doesn't fit that criterion?"

AVM Robert Chipman, Head of Military Strategic Commitments

The Plan Jericho reference provides a good transition to highlighting the presentation by the original co-director of Plan Jericho, AVM Chipman. This is how he put the contribution of the Plan Jericho launch and effort on the ADF: "Faced with the challenge of accelerating the transition to a network integrated force, Plan Jericho delivered an organizational change program."

And the challenge of shaping a more lethal and effective ADF has simply grown over the past few years. As AVM Chipman underscored: "Integration was originally about connecting specific platforms to build a system. We had fighters, bombers, electronic attacking aircraft, airborne early warning and control, platforms with specific roles networked to function as a system. This delivered a decisive advantage that we continue to extend and optimize delivering system performance beyond the sum of its parts, conquering quantity with quality.

"But that technological advantage is eroding and some of the trends in technical development aren't favorable to us. Our adversities are building capabilities that target the vulnerabilities in our system and denies the advantage of integration.

"At the same time, they have deployed technologies and weapon systems that demand even greater integration from us. We now need a network of sensors, geographically dispersed on the ground, at sea, in the air and in space, operating over a broad bandwidth just to track threats to our mainland. In the same way we need a network of effectors with mutually supporting and reinforcing fires to provide the survivability and lethality to project, penetrate and deliver effects to our adversaries.

"We are locked in a race to integrate new technologies into these sensor and effective grids. Extending the performance of human competition through artificial intelligence and extending the boundaries of human competition to new domains. And our integration advantages are now hotly contested right across the spectrum of conflict."

He focused on the importance of integration not just within the ADF but within the Australian defense write large, in terms of government activities and social resiliency. "The ADF contributes to national power as an integrated force. We strive to strengthen and reinforce integration within the ADF and across domains, addressing the human procedural and technical dimensions to integration, we must elevate our thinking further for to achieve our mission. Military power needs to be integrated with other elements of national power."

In my own view, the build out of more flexible distributed integrated forces allows for expanded capability to operate throughout areas of interest.

But to get the real advantage for such evolution of forces, it is crucial that the civilian side of government work their own capabilities for more effective crisis management.

This is how AVM Chipman characterized this challenge: "We compete by influencing others to our cause, by generating sufficient strategic weight to attract partners to our orbit rather than seize space to our adversaries. We compete by promoting an open, liberal, prosperous region that respects sovereignty not by bending others to our will through manipulation and coercion. We compete by contesting, demonstrating resolve at the intersections of national interest, exercising our freedoms abroad and protecting our sovereignty at home.

"And we compete by posturing and preparing forces ready to respond, should the competition heat up further. And all the while preserving pathways for de-escalation through our discipline and ethical execution. All ADF activities, signal capability and intent, and all our activities must be a deliberate expression of our national will. We enhance the credibility of our national resolve when all of our collective actions are aligned to it."

FIGURE 2 AIR VICE MARSHAL CHIPMAN

From the beginning of the Williams Foundation seminars since 2014, force integration has been a key theme. What has changed since the outset is a focus on longer-range effectors and upon the resilience challenge and how to meet it.

AVM Chipman put this challenge very well in this illustration: "Air Force is close to enhance its maritime strike capability, with an integrated package of F-35s and F-18 Super Hornets armed with Long Range, Anti-Ship Missiles. Guarded by P-8s and MQ-4 Tritons, controlled by E-7 Wedgetail, and projected by KC-30s. Collectively, this package can strike with confidence against any enemy vessel in our region but what happens next?

"When the aircraft return to unprotected airfields, and are refueled, and re-armed by fragile supply chains, or when our financial system is brought to the brink of collapse, and critical infrastructure is rendered

Second Line of Defense

inoperative, or government services disrupted in retribution. A boxer needs a powerful right hook, but he can't use it if he can't protect his chin. Integration is a force multiplier, but it also demands resilience."

MAJGEN Susan Coyle, Head of Information Warfare

The presentation by the Head of Information Warfare built out from Chipman's core point that integration needs to be built out from a foundation of resilience. She cautioned throughout here presentation that in the cyber and information warfare domain, that this is not only challenging but an ongoing task, notably in terms of conflict with peer competitors.

She noted that "it's network-centricity that offers the real force multiplier effect for a fifth-generation joint force." But that this capability requires an ongoing effort, and simply cannot be assumed by flying fifth generation platforms, for example.

She underscored the nature of the challenge as follows: "The framework and apparatus of the fifth-generation force is substantially in place. But is it? Is that as true as we think it is? Are we resting on our laurels by not pushing even further?

FIGURE 3 MAJGEN COYLE

"As we've gone from a fairly aggressive acquisition of link enabled platforms, have we made sure that our network backbone has the capacity to satisfy our demand? As more assets come into service with wide ranging functionality and security overheads, have we put the right testing and training in place so that we know the network can be fully integrated? Are these data links resilient enough to get the job done?"

MAJGEN Coyle made a very crucial point that there is need to invest in the foundational networking capabilities of the fore proportionate to investing in the weapons and platforms which operate within such a networked force.

"We've definitely been investing in appropriately skilled and clear network engineers, test and evaluation equipment, and significant processes, secure facilities where this could occur, haven't we? Because if we don't, we'd risk losing the force multiplier effect that our networks provide. And so the fight wouldn't be one for the joint force. It would be one in which every service operated independently…."

Recognizing that the ADF is building a fifth-generation force can see the F-35, for example, as a catalyst for change, but working through how to leverage those dynamics to shape a capable integrated and networked force is crucial as well.

Here is how she put it: "Air force has led the way in achieving fifth generation capabilities, but we need to be clear on the difference between leading the way and leaving the joint force behind. Much like the force projection that outpaces its logistics, a fifth-generation air force that doesn't realize that it's just the tip of the spear is one that fundamentally could find itself out of balance."

How then to close the gap? Here is what she identified as a way ahead. "Center led design of the joint forces' backbone is critical. It needs to be deliberate, and it needs to be data-centric. Instead of bespoke systems and networks that make it harder to integrate as a joint force, look for opportunities to be more joint."

And she had this advice for the defense industrial sector based on this requirement: "For our industry partners, the future is open architecture that let us share with partners of choice, not proprietary systems. Alternates may let you corner the market, but it's one in which defense has a rapidly decreasing interest, and it's worthy of making sure that your supply chains are cyber worthy because that's increasingly becoming a discriminator as well. The cost for defense to deal with those vulnerabilities and the fact that they may make your solutions unpalatable."

BRIG Ian Langford, Director General Future Land Warfare

In BRIG Langford's presentation he focused on the question of what constitutes combat success and victory when engaged in network enabled warfare. Disrupting networks, subverting networks and various forms of network disruption now become key tools shaping a path to victory, notably in limited war.

FIGURE 4 BRIG LANGFORD

And certainly, from this standpoint, namely, a network enabled force and joint C^2, the color of the uniform within the joint force becomes less significant in determining the contribution of a particular warfighter. The ADF as a whole faces this challenge: "How do we provide the kind of baseline network assurance when it comes to integration?"

In a way, Lanford was highlighting the question of the network foundation as a key element for enabling the integrated force and its path to success, similar to what MAJGEN Coyle was highlighting. For example, he asked the following question: "what is the significance of an undersea cyber community in terms of our own resilience, our agility, and our integration."

And certainly, the ADF as a force for a medium power faces the challenge of deterrence of larger powers in the region. Here he noted:" To quote a former prime minister of Singapore, "How does a small fish in a pond of big fish become a poison shrimp?" How do we provide the kind of deterrence functions in a period where we are always at risk of being out escalated and how do you provide those shaping, or pre conflict, or competition effects? and are credible?"

BRIG Langford underscored the importance of decision superiority in shaping favorable outcomes. "It is about being able to generate relative tempo and superiority at certain points in the conflict that enable victory going forward."

CDRE Darron Kavanagh, Director General Warfare Innovation, Royal Austrian Navy

CDRE Kavanagh provided a Royal Australian Navy perspective on the way ahead with regard to the integration of the maritime domain within an integrated warfighting force. Cavanagh's presentation certainly recalled a core point made by Vice Admiral Barrett at 2016 Williams Foundation seminar when he underscored the following: "we are not building an interoperable Navy; we are building an integrated force for the Australian Defence Force."

FIGURE 5 CDRE KAVANAGH

Kavanagh highlighted the importance of the evolving role of the maritime force in the offensive-defensive enterprise which a kill web force embodies. "The proliferation of advanced technology and the associated rapid advances in offensive systems such as high-speed and sophisticated anti-ship missiles means that we, more than ever before, need to critically analyze and prioritize our capability development plans to ensure the necessary force protection measures are available while simultaneously developing offensive systems and war-fighting procedures that will contribute to our mission's success."

The challenge of getting operational decisions done rapidly and correctly at the point of interest is increasingly crucial, which is why decision making at the tactical edge enabled by new ISR and C2 capabilities is increasingly important for an evolving maritime force.

This is how CDRE Kavanagh framed the challenge: "The speed at which decisions must now be made and are being made by our adversaries and the need to incorporate data from a multitude of sources is key. Intelligence must be analyzed and interpreted quickly to serve the war fighter. The concepts of what are the weapons in our critical capabilities is changing.

"From the traditional platform centric views towards innovation and artificial intelligence, robotics, and sophisticated senses amongst many others, so that we can achieve cognitive superiority and decision-making advantage over an enemy by being networked and integrated across our three defense services. Our ammunition is actually information and our success will be dependent on how accurate and relevant it is and our skill in using it. Our transition to developing this capability is critical.

"Now, the Navy sees itself as providing, not just traditional sea power with our ships and aircraft and submarines, whether they're crude or uncrude, but through intelligent and integrated networking across defense. We are an integral part of a potential response that presents any adversary with an unacceptable level of risk to deter aggression against Australia and our national interests."

Second Line of Defense

And by building out the networked distributed but integratable force, Navy is in a good position to leverage maritime autonomous systems.

Put another way, by building the proper foundation it is possible to add new ISR capabilities, for example, which lead to enhanced decision making rather than information overload.

This is how Kavanagh framed the opportunity being opened up by maritime autonomous systems:

"In the maritime context, it's clear that our journey towards a networked integrated force is essential to enable Navy to leverage the full capabilities that autonomous uncrewed and optionally crewed systems can give us. There are real opportunities to leverage those systems, to deliver effects in a more asymmetric manner, using their attributes of low-cost mass. I.e., the use of the smart, the small, the many, the cheap to complement our traditional complex large, few, expensive, crude platforms."

If we return to the point made in BRIG Langford's presentation concerning the importance of mastering the disruption and decision-making cycle in conflict within network warfare, Kavanagh adds this nuance: "More than ever, success in warfare is likely to depend on our capability to think creatively, to manage our information as a weapon of warfare. Tactically, we must use our technology and expertise to disrupt and degrade our adversaries' decision-making. And we must ensure that our decision-making is sound and timely, base it on the best available inputs and trust it."

Tony Dalton, Deputy Secretary National Naval Shipbuilding

During the time in which the Williams Foundation seminars began to assess the standup and evolution of the fifth generation enabled ADF, the commitment to shape a naval shipbuilding enterprise became a key piece for shaping the sovereignty piece for the way ahead for the ADF.

The question of what exactly is sovereignty in defense is a key one, and one which was addressed in some detail in the second seminar of 2021 in terms of debating what space sovereignty for Australia might mean.

At that seminar, AVM (Retired) Chris Deeble, now CEO Northrop Grumman Australia, provided a useful perspective on the sovereignty issue.

"What is sovereignty? The pursuit of sovereignty shouldn't be an excuse for wanting to do everything. Sovereignty and resilience go hand in glove from my perspective and how we build that strategy. When we think about space, we often think about the things that make for great photo opportunities. A launch, a satellite, those great pictures of a satellite orbiting around. They make the great photo opportunities. These are going to be important that supply chains that underpin that, will remain important for us. But we must prioritize our effort and investments.

"We must ensure that from the get-go, we create that viable, scalable, innovative, and sustainable space ecosystem. And it must be underpinned by business cases that can goes to the viability and sustain sustainability at the end of the day

"This will be a significant challenge for us as we move forward. Defining things in requirements terms is going to be difficult. We will have to be thinking about that in outcomes terms. As a space nation, we must have a clear strategy that articulates our sovereign security and resilient space capability outcomes. We must develop a cohesive and aligned national strategy that meets both the civil and defense needs now and into the future.

"We must ensure that we prioritize and align our investments. We cannot lose sight of the underlying business cases. We can't do it all. We have to create a sustainable viable outcome for us as we're moving forward. The lexicon is changing, it's a great first start.

"But if we want to be a space nation, if we want to create space ecosystems for the nation, if we want to have a viable, enduring, sustainable, scalable industry, from now and into the future, we have to turn that rhetoric into reality."

And that the March 24, 2022 seminar, AVM Chipman provided an additional way to define sovereignty among allies. This is how he put it: "Allies don't surrender sovereignty to each other, they share it, allies and partners strengthen national power and help mitigate the risks of critical vulnerabilities."

So what does sovereignty mean with regard to a national shipbuilding enterprise in Australia?

Dalton asks: "What is a sovereign capability? How do you define what a sovereign capability is? And how does that come together in what we do and what we deliver to generate out sovereign capability?"

The first part of his answer with regard to shipbuilding is the importance of having within Australia the know-how and know why with regard to modern shipbuilding.

The second part of his answer is the importance of having that core knowledge capability in order to sustain, maintain and evolve the force.

The third part of his answer revolves around the core need for resilient supply chains, and by building ships in Australia, the supply chain piece is crucial not just for the build phase but the sustainability phase as well.

And the ability to integrate new ships into the ADF requires as well significant domain knowledge with regard to the ongoing upgrade process, notably with a software upgradeable force. This is how Dalton put it: "We need to be able to use the knowhow and the know why we get out of our building programs to be able to then upgrade it and take it into the next level of operations. We need to understand the design assumptions."

He provided an example with regard to the upgrade process on the venerable Collins class submarines. And this is how he highlighted the relationship between understanding design assumptions and the ability to update a class of ships.

FIGURE 6 TONY DALTON

"With regard to our Collins class submarines, we really are going all the way back to what were the original designs to build that class. How do we actually insert a new main motor in that boat? How do we insert new diesel generators in that boat? And that raises some really interesting questions. To insert a new diesel jet generator which weigh a lot less than the 1980s diesel generators, that raises design challenges.

"If you take 12 tons out of the back of the boat, the balance of the boat changes. The other really interesting thing around diesel generators is that on a conventional submarine, how we refresh the atmosphere inside the boat is by running the diesel generators. And it sucks air in through the snort and it refreshes the atmosphere. New diesel generators are much, much more efficient than 1980s diesel generators. And in fact, they use 50% less air, which is a good thing unless you're in a submarine and you're trying to change the atmosphere over in a very short period of time.

"Understanding design assumptions and design principles that you get from building is a really important aspect that you then can take into upgrades into the future. And the Navy is committed to an evergreen process which revolves around positioning for a lifetime of upgrades,"

At the first 2021 seminar last year, Chief of Navy, Vice Admiral Noonan, highlighted the impact of an evergreen process for naval modernization and in doing so underscored the importance of the made in Australia piece at the center of Dalton's presentation.

"The joint integration piece is critical. I cannot stress that highly enough in terms of we must ensure that these systems are integrated. Not just integrated into the platforms or their parent platforms but integrated into the force.

"And they are capable of being evergreen. This is the new term for spiral development. It's about ensuring that we have systems that remain contemporary, and I am challenged on a daily basis about capability gaps and about deficiencies in the long lead times that require us in the shipbuilding space. It takes about 10 years to build a submarine, or five years to build a frigate.

"And are we incorporating old technologies? Bottom answer is no, in that we are designing future and evergreen in growth into our platforms. And I think that's a very important concept that we have not always fully grasped.

"Finally, is the importance of made in Australia. Our systems must be designed for the very unique circumstances that we operate in, particularly in the maritime environment."

AUSTRALIAN ALLIES PROVIDE ASSESSMENTS OF WAYS AHEAD FOR NETWORKED INTEGRATED FORCE

Because the seminar was held in the same week as the RAAF's Air and Space Power Conference 2022 (entitled "Resilience and Innovation in Air and Space," there was a clear opportunity to leverage that conference for the benefit of the Williams Foundation Seminar.

At that conference, the Australian Minister for Defence Peter Dutton announced the establishment of the Defence Space Command, a subject which was treated in significant detail in the last Williams Foundation seminar held last year, entitled "Requirements for Sovereign Defence Capability."

At the Williams Foundation seminar, two American officers spoke, General Kenneth Wilsbach, Commander Pacific Air Forces and LtGen Steven Rudder, Commander, U.S. Marine Corps Forces, Pacific and Commanding General Fleet Marine Force, one British officer, Air Chief Marshal Sir Michael Wigston, Chief of the Air Staff, Royal Air Force, and Lt. General Aurelio Colagrande, Italy Deputy Chief of Air Force.

First, either discussed directly by the speakers or assumed in their analyses was the changing nature of the strategic environment, and the need for significantly enhanced ready forces while transformation towards a more integrated force was underway. It is not just about possessing a small number of sophisticated platforms, or even integrated sophisticated platforms, it is about effective decision making in a contested environment.

Second, working ways to enhance how the operating forces work together **now** is a foundation for shaping a way ahead. Lt. General Aurelio Colagrande highlighted the successful efforts to enhance Eurofighter deployed integration in delivering enhanced combat capability in operating airpower in the Baltic region as one key example.

Third, LtGen Rudder highlighted how the Marines, the first to operate the F-35, had evolved their capabilities to operate afloat and ashore with allies, such as demonstrated in recent Pacific exercises or "rehearsals" as he called them with the United Kingdom and their Queen Elizabeth carriers.

The USMC and the UK have worked for many years on air combat integration first in the United States and then in the UK and elsewhere for their F-35s. Training the maintainers and the pilots for both forces from the ground up have delivered unique integrated capabilities and is suggestive of the kind of integration which is possible if training and operations are brought more closely together.

The RAF Chief of Staff underscored how he saw this process, highlighted by the MARFORPAC Commander:

"I can't think of a better example of multi-domain integration than the UK carrier strike group that deployed last year in the Indo-Pacific region, as far as Japan. It brought to life, the deeper UK focus on the Indo-Pacific, a region the Integrated Review identified as critical to our economy, our security, and our global ambition to support an open and resilient international order.

"At the heart of that carrier strike group, of course, is our ability to operate fifth generation combat aircraft from the sea. Lightning is a phenomenal war fighting machine, from land or sea. And last year 617 Squadron

Royal Air Force and VMFA-211 from the U.S. Marine Corps demonstrated that enormous utility from the Royal Navy's HMS Queen Elizabeth."

Fourth, in discussing the Integrated Review, Air Chief Marshal Sir Michael Wigston highlighted a number of key developments suggestive of the broader approach of the allies in working force integration.

This is how he put the significance of the C^2 and ISR efforts in providing for such an outcome:

"To operate and fight together, we need to connect together. That functioning interoperable digital C^2 network is one of the most important technological challenges we all share. And after many years observing PowerPoint slides with lightning bolts connecting platforms, I am delighted to say that it is something that we are on the threshold of delivering at long last in the real world too.

This is the combat cloud. We've long talked about, brought to life. Data from every sensor on any platform in the operating space, processed in real time, at the edge into useful information, flagged to any user with a need for that information, accessed remotely, fused with what is already known to give of situational awareness at any level and enabling better decisions than our adversaries, all executed at the speed of light."

Fifth, the PACAF Commander, General Kenneth Wilsbach, focused much of his presentation on how to shape a way ahead for force connectivity, notably in regard to how the USAF is addressing what it calls Joint All-Domain Command and Control (JADC2).

But as an operational commander, he did not focus primarily on the long-term vision, but on how to get enhanced warfighting capability now with regard to the operating forces.

A key example he provided of what is the current focus and reality was his discussion of the recent Cope North 22 exercise.

"We focused on network integration during our recent Cope North 22 dynamic force employment exercise alongside Australia and Japan. Cope North allowed us to build our tactics, techniques and procedures in support of agile combat employment, or ACE, our operational concept that projects air power via network of distributed operating locations throughout the Indo-Pacific. The Australian air force, as well as the Japanese air force were both experimenting with ACE as well as the USAF.

"During the exercise, we executed 2000 sorties across seven islands and 10 airfields demonstrating operational unpredictability and redundant C2 that enabled rapid employment of fourth and fifth generation air power. Our assessment of the exercise showed that we were able to finer interoperability as we work toward the achievement of a networked force with our allies and partners."

In short, the demand to fight tonight requires operational innovation delivered in the near to mid-term, not just in some abstract future. In fact, that future may never arrive.

As we are seeing in Europe, some were prepared and many were not for the stark reality of what 21st century authoritarian powers are about in world where globalization was assumed to eliminate such events. Peter Jennings referred in his insightful presentation at the seminar that Germany has had its "German moment" in being shocked into reality. We shall see but the challenge is to deliver credible force now in decision-making environment where the 21st century authoritarian powers take seriously what the West is doing.

It is not about a power point presentation deck of what a credible future force might look like in a distant future.

AN ITALIAN AIR FORCE PERSPECTIVE

The Italian Air Force is part of the broader European defense transition in which the shift from the land wars to direct European defense is underway. The Italians have not only bought two variants of the F-35 but build the aircraft in Italy as well as delivering aircraft from their factory to the Netherlands.

The IAF and the Italian Navy both operate F-35s with the challenge still being working integration between both services as well. The Italian Navy trained last year off the East Coast of the United States and did initial exercises between the ITS Cavour and the USS Gerald R. Ford.

In addition, Italy flies the Eurofighter as a key combat aircraft and has worked integratability between the Eurofighter and the F-35 as well as having spearheaded enhanced integration of Eurofighters within Europe itself.

Lieutenant General Aurelio Colagrande, Italian Air Force Deputy Chief of Staff, started his presentation to the Williams Foundation seminar by underscoring that although Italy and Australia are geographically far apart, their work on airpower modernization is not.

This is how he put it: "Even though we are on the opposite sides of the world, therefore apparently very far away and with a different viewpoint on space and time, in the operational environment, Australia and Italy are closer and similar than ever before. We fly some similar aircraft, like the C-27 and the F-35. We've been in the same coalition in Iraq and in Afghanistan.

"The entire world is changing faster and faster so that a regional issue now become immediately part of the geopolitical landscape…. From a global perspective, we act in the same realm. As air forces, we operate in a domain strongly dependent on technology in order to deliver air power rapidly and everywhere."

I have spent a great deal of time with Italian Air Force when they were first procuring the F-35 and the head of the Italian Air Force at the time, highlighted how acquiring of the F-35 would drive significant cultural change in the IAF, an argument very similar to what Air Marshal Brown was making at the same time in Australia.

This is how Lt. General Preziosa put it in a 2015 interview with me:

"The F-22 and the F-35 are called fifth generation aircraft, but really the F-35 is the first airplane built for the digital age, we are rapidly moving from the dog-fight concept to the data-fight evolution of the broad utilization of air power. It was conceived in and for that age, and is built around the decision tools in the cockpit and is in fact a "flying brain." And that makes it different from other aircraft. It is a multi-tasking aircraft, and fits well into the I-phone age. Other aircraft – with the exception of the F-22 – are built to maximize out as multi-mission aircraft, which execute tasks sequentially and directed to do so.

"The F-35 fleet thinks and hunts and can move around the mission set as pilots operate in the battlespace and leverage the data fusion system. It is a battlespace dominance aircraft; not a classic air superiority, air defense or ground attack aircraft. It changes the classic distinctions; confuses them and defines a whole new way to look at a combat aircraft, one built for the joint force age as well. The Army and the Navy will discover, as the F-35 fleet becomes a reality, how significant the F-35 is for their combat efforts."

Second Line of Defense

In his remarks to the Williams Foundation seminar, Lieutenant General Colagrande provided an update on this perspective based on the experience of the past several years of the IAF and the F-35. "We immediately felt the need to generate a national plan to evolve with the entire organization in a fifth-generation Italian air force, where consolidated competence, new scales, different mindset, modern airmen are all vital ingredients to effectively perform an entire set of new capabilities together with legacy system.

"In this air force evolutional journey, we face new challenges that we are trying to manage with new and innovative solutions, finding new partners and associates. Of course, we are just at the beginning of our trip, but the initial outcomes are definitely reassuring, and the quality of our approach seems just right."

He argued that the challenge facing an operational air force is to be able to "plug and fight" with the systems they have. As he noted: "New capabilities have never been 'plug and fight'. It is difficult to gain rapid full operational advantage from a multitude of new capabilities because to fully exploit them, it is necessary to be equipped with greater technical competence as contemporary weapons systems are much more capable than those in the past.

"This condition highlights more than ever how the human being is the weakest part of the equation. Since to fully exploit a new weapon system, there is a need for a specific dedicated, progressive training to the end users. To that end, interpretability and collaboration are key elements in order to be effective."

He then went on to discuss a very interesting Eurofighter integration effort which has happened under the radar of public recognition but suggestive of the kind of force integration efforts among allies which are critical to be able to fight more effectively tonight.

Lieutenant General Colagrande highlighted this development in the following manner: "Plug and Fight is a name of a successful endeavor that the German Air Force conducted together with our British friends of the Royal Air Force and with us.

FIGURE 7 LIEUTENANT GENERAL AURELIO COLAGRANDE

"Within the NATO and as air policing framework in Europe, the German Air Force, Royal Air Force and Italian Air Force, are now able to operate in a completely mixed Eurofighter squadron, sharing not only aircraft or spare parts, the so-called material component, but also operational, maintenance, logistic procedures, and more important the will to succeed in doing operations together.

"This may appear as an easy operation, but it was actually the end state of a very intensive journey started a few years ago with the launch of the European Typhoon Interoperability program. German Air Force, Royal Air Force and Italian Air Force worked out to put in place technical arrangements, to write handbooks for flying ops, ground ops, spare parts management, and maintenance, and so on.

"We needed to train on a regular basis to stay proficient in performing the mission. Indeed, thanks to this initiative, at the beginning of March this year, the German Air Force and Italian Air Forces have successfully supported together a real air policing operation in Romania. And we will probably do the same in the next month with our UK friends."

This Eurofighter interoperability effort has been and is indeed a major challenge.

But doing so can obviously deliver more significant coalition capability rathe rather than simply having nations operating the "same" aircraft but actually not being able to integrate those aircraft into a cohesive combat capability.

Second Line of Defense

I first visited the European Air Group based at High Wycombe in 2014 and the focus of that first meeting was on 4th-5th generation integration. I went back over the next few years, and saw how his coalition building group was broadening their efforts to include meeting the challenge of Eurofighter integration.

The European Typhoon interoperability program to which Colagrande referred is indeed the EAG program. During a 2016 visit to the EAG we discussed the European Typhoon interoperability effort being led by the EAG. This was what I wrote at the time about the effort:

"The session was led by Brigadier General de Ponti, Deputy Director, of the European Air Group and joined by the "drivers" of the ETIP (Euro Typhoon Interoperability Project) as well as organizers of exercise efforts to shape a new approach, namely Lt. Col. Jacobo Lecube of the Spanish Air Force and Lt Col. Marco Schiattioni from the Italian Air Force and Chief of Staff Col. Stephane Pierre, of the Belgian Air Force.

"The overall focus of the effort is upon shaping a more common fleet approach among Eurofighter nations. Although four nations came together to build a common airplane, the planes have been used by four different air forces with limited overlap in standards and operating practices. As the Euro-Typhoon is clearly a key element for the future of European airpower and with the coming of the F-35 to Europe, this makes little sense.

And what the European Air Group is focused upon are practical ways to shape more common fleet approaches among the air forces, which fly Euro-Typhoon. Also, shaping a common template in doing Baltic air policing in which Eurofighter/Typhoons are becoming a frequent asset in executing the mission provides an obvious opportunity to find ways to shape common procedures and support approaches as well.

The problem was simply put by one of the participants: "When an Italian Eurofighter lands on a German base, it cannot use the ground support equipment or change a tire, because the standards are different. These are procedural issues, which may make sense in terms of national norms but not in terms of common fleet operations. Through this project we seek to end differences which get in the way of common operational support."

According to BG de Ponti: "The Eurofighter-Typhoon project is an important effort for our air forces. It is about the co-evolution of Typhoon with the shaping of a 4th-5th generation integrated force. It is two prongs of shaping more effective European airpower. It is a building blocks approach to shaping evolving capabilities."

Such an effort is what force integration among allies requires. But the better outcome is to shape common approaches at the outset of building new platforms and doing so with common C2 and ISR connectivity as well, if indeed the integrated networked force is to have its full impact on warfighting and deterrence.

Lieutenant General Colagrande underscored the importance of being to leverage new capabilities throughout the combat force and this required significant emphasis on training and innovation in force operations as well.

This is how he characterized how the Italian Air Force is addressing this challenge: "We soon initiated an operational testing and evaluation process that now includes both the A and B variant for novel interoperability. We participated with the F-35 air policing in Iceland. We proved our air power expeditionary concept together with our Italian Navy and the British ones. We launched a very challenging operational training infrastructure program in Sardinia, an Italian island in the Mediterranean Sea where we have lot of airspace, air to air, air to ground, EW and lots of test ranges and good weather throughout the year.

"Furthermore, in Sardinia, we are setting up our international flight training school where we will train in the phase four advanced training, our future fifth generation pilots. Within the OTI framework, we are investing in connectivity network in order to offer a real effective advanced training.

"And through it, we intend to achieve one of the most challenging objectives, the integration between legacy and new generation weapon system for exploiting the main operational output of the fifth-generation assets that we believe is the ability to be task enablers and force multipliers.

"And we also conducted a pure fifth generation event, the Falcon Strike 2021. The first major European exercise for fifth generation aircraft, but not just with them, but for them, in a highly contested and congested scenario, a multinational coalition from United States Air Force, United States Marine Corps, Royal Air Force, Royal Navy, Israeli and Italian Air Force F-35s participated with the exercise.

"Focusing on fifth generation requirements, testing new sea-basing approaches to air operation, exploring new fifth generation rules of engagement that allow a high level of delegation of decision-making to the lowest possible level, the cockpit. All small steps of course, but all pieces of an overall increased level of performance for the entire air force."

He highlighted the cooperation in the UK-led Tempest program as one element of the way ahead for the Italian Air Force as well. "The next generation fighter will not be just a simple aircraft. It will be a system of systems with very strong and secure connectivity. It must be conceived through an open system architecture to accommodate the required agility, the future technological developments and better compensate for any changes or updates to the operational requirements."

He provided a significant cautionary note as well in his presentation.

The cutbacks in defense in Europe have been significant and have left Europe more vulnerable than is prudent. "The Italian Air Force has witnessed a significant reduction in aircraft numbers over the past decades. We developed the idea that greater quality may compensate for less quantity, but quality cannot substitute quantity. Technological quality advantage allows us to achieve the superiority in the operating area of a permissive scenario.

"But such an approach is not an applicable paradigm in the military comparison with a peer-to-peer or near-to-peer competitor who accounts for hundreds of military assets, or when simultaneous commitments or more than one operation operate far away from each other.

"In other words, mass still has its importance as we are learning by the last updates coming from the east European flank. Going back to quality versus quantity concept, we should think about the fact that quantity is by itself a quality.

"The technological trap mechanism even more obvious when it comes to weaponry. State of the art weapons are so expensive to develop, acquire, and in many cases, integrate, that you end up buying too few of them, depleting the stockpile below a minimum acceptable level, thus creating a serious gap when it comes to operations. Once again, it is evident that mass enables either by a lower technological level or with new industrial or commercial solutions for greater combat capability."

THE PERSPECTIVE OF PACAF

General Kenneth Wilsbach, Commander, Pacific Air Forces, is no stranger to the Williams Foundation.

Second Line of Defense

When the seminars held by the foundation began in 2018 focusing directly on the strategic shift from the land wars to building the resilient and longer range force for deterrence in the 21st century, General Wilsbach, then Commander of the 11th Air Force, provided his assessment of the challenges facing the U.S. and the allies in the Pacific region moving forward.

At that seminar, he highlighted a key element for the way ahead, namely, force distribution of airpower, and he introduced what he would later call agile combat employment.

"From a USAF standpoint, we are organized for efficiency, and in the high intensity conflict that we might find ourselves in, 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, as we most know, 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 you are at, 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, very large organizations, and we stove pipe the various career fields, and one commander is not in charge of the force that you need to disperse. We're taking a look at this, of how we might reorganize, to be able to employ this concept in the Pacific, and other places."

Now as PACAF Commander, Wilsbach has made this a core effort for the command.

When visiting Hawaii this past summer, I had a chance to talk with the PACAF key strategist about how the command was addressing this key way ahead. And this is how BG Winkler, then Director of Strategic Plans, Requirements and Programs at the Pacific Air Force, underscored the effort:

"PACAF has done a pretty decent job over the last three years of getting the Air Force to embrace this idea of agile combat operations and to export it to Europe as well. The whole idea, if you rewind the clock to the mid 80s, early 90s, was that every single base in the United States Air Force that was training for conflict would do an exercise where you'd run around in chemical gear.

"At that point in time, there was a large chemical biological threat, and the Air Force recognized that it needed to be able to survive and operate in that chemical threat. So, we trained to it.

"I think the new version of that chemical biological threat is the anti-access area denial umbrella. The idea of agile combat employment is our capability to survive and operate and keep combat momentum underneath the adversary's anti-access area denial umbrella.

"Basically, we are focusing on our ability to survive and operate in a contested environment. PACAF has taken a realistic approach that is fiscally informed because it would be very difficult for us to go try to build multiple bases with 10,000-foot runways, and dorms, and ammunition storage all over the Pacific."

"What we've done instead is concentrated on a hub and spoke mentality, where you build a base cluster. That cluster has got a hub that provides quite a bit of logistic support to these different spoke airfields. The spokes are more expeditionary than most folks in the Air Force are used to.

"The expeditionary airfield is a spoke or a place that we operate from. It's not 10,000 feet of runway, it's maybe 7,000 feet. We're probably not going to have big munitions storage areas, there's probably going to

be weapons carts that have missiles on them inside of sandbags bunkers. And we're going to look a lot more like a Marine Expeditionary base than your traditional big Air Force base. It'll be fairly expeditionary."

What General Wilsbach highlighted in his presentation to seminar was the challenge of building the networks to provide for both force distribution and integration.

By shaping a distributed but integrated force, one can create what Wilsbach called **the "stacking of effects."**

"Let me explain a little bit about what I mean by stacking of effects, because we found that when going after a highly defended target, it requires that the effects arrive simultaneously from multiple domains to greatly complicate the target's ability to defend itself.

"A stacked effort might be a space effect happening concurrent with electronic or cyber effects while decoys are being deployed with a submarine prosecuting the attack simultaneously with long range, precision fires that arrive simultaneously on the target.

FIGURE 8 GENERAL WILSBACH

"To do this at the speed of war, we have to have a network that's agnostic who detects, engages, assesses or targets takes the shot, whether it's kinetic or non-kinetic, doesn't really matter what matters is the speed with which we share information across the platforms and between allies and partners to enable the creation of the overall effect like I just described."

From my perspective, what the General is describing is reshaping the force from a legacy sequential strike and defense force to becoming a kill web force, able to operate at the point of interest and to be able to reach back to joint or coalition assets to create the desired combat or crisis management effect.

Second Line of Defense

How is the USAF focusing on how to do so?

This is how General Wilsbach put it:

"How do we intend to create such a capability?

"First of all, the U.S. intends to create a more networked force by reinvesting funding from legacy retirements, to into advanced military technologies through continued development of a robust and resilient command and control system and by ensuring joint and coalition interoperability across all domains….

"Additionally, we shouldn't be flying fit generation platforms with third or fourth generation weapons. I believe we should be investing in directed energy as well as fifth generation munitions and beyond.

"And I've not been quiet about my advocacy of the E7, I believe this is essential for us. And as the original customer for the E7, Australia fully understands the long-range surveillance communications and C^2 capability E7 provides.

"Adding this additional platform to the U.S. fleet would increase our interoperability with the Royal Australian Air Force and we know the Australian teammates will be able to accelerate our learning curve on the E7….

"Our air force must focus on using information and technologies such as advanced computing and technologies, as well as artificial intelligence, integrating these into future military capabilities. Our next generation air dominance program is applying this methodology to the development of six generation aircraft that will possess the ability to survive, persist, and deliver lethal effects within the most challenging threat environments."

The command-and-control piece of all of this is crucial to how one can distribute force, understood as the distribution of a nation's assets or working with core allies as part of an overall kill web enabled force, and yet integrate those forces to deliver the desired strategic or tactical results.

How to do this is at the heart of shaping a way ahead.

How centralized?

How distributed?

And how best to find ways to empower operations at the tactical edge, yet have effective strategic understanding of what the distributed force is actually delivering?

Much of last year, my colleague Ed Timerplake and I spent considerable time with the 2nd Fleet and Allied Joint Force Command, where Vice Admiral Woody Lewis and his team were standing up a new command capability for the North Atlantic.

At the heart of their efforts was shaping new ways to deliver mission command to a distributed force. They exercised several times throughout his command tour ways to execute mission command through mobile command posts.

That is the Atlantic region, but of course, the Pacific is far vaster, and in one of the great name change mistakes in human history, as my colleague Ed Timperlake has noted, it was called the Pacific.

How then can both mission command and decision making at the tactical edge be done for a distributed but integrated force?

This is how General Wilsbach highlighted how he saw the way ahead in this critical concept of operations and technological domain.

“We’re working as a joint force to develop our C^2 concepts and multi domain operations approach. We are continuing the development of a robust and resilient command and control system that can quickly sense, synchronize, decide, and rapidly act with our allies and partners across all domains.

“With the help of Australians on our staff, we’ll continue to address the problem set. The joint, all domain command and control strategy that we are developing known as JADC2 recognizes our need to connect, communicate, and synchronize across all domains, as well as the need to share information at the speed of relevance. In fact, it should probably be called C JADC2 because it needs to extend to our coalition partners as well.

“A vital requirement of JADC2 is the ability to make current and future systems interoperable with systems employed by our joint and coalition partners. And once realized the JADC2 network advantage will be at seamless transfer of the right information at the right time to the right decision maker.

“And at a speed, our adversary cannot match. To realize and operationalize JADC2, the air force is focused on developing advanced battle management system or ABMS. And what ABMS is a system of systems that enables that meshed dynamic flow of data from centralized command and control points to decentralized execution points without being affected by loss of individual networks or nodes, or even a sensor.

“It’ll allow us to collect and process vast amounts of data from all domains and shared in a way that enables faster and better decision making. Imagine commanders at all echelons being able to pull in and synthesize information, and then leverage it in a way that achieves layered effects like it described earlier that shape the battle space faster than an adversary can react to it. That’s true dominance.

“In the Indo-Pacific, an integrated war fighting network is crucial to overcoming the tyranny of distance and the lack of an infrastructure connecting war fighters. In real time, we need a meshed, self-healing artificial intelligence enabled network that is not easily disconnected or vulnerable to attack. It must be user friendly, ensuring operators aren’t distracted by troubleshooting the communication systems when they should be effortlessly executing their work time tasks.

“Much like how your cell phone works, when you go to a new place, it figures out what’s up, you can tell the time you can make a telephone call, check your email, check your social media, and you don’t have to do anything, that’s how this network needs to work.

“PACAF is currently working to deliver this unified network architecture for our upcoming exercise, Valid shield, and teaming with the air staff and industry partners.

“We’re continuously experimenting with machine-to-machine interfaces and connecting military services using multiple network pass. Similar to how SpaceX Starlink terminals are being used to provide redundant internet connections in Ukraine, we intend to test commercial satellite communications as an alternative data transport method during an upcoming Valiant Shield exercise.”

The challenge still remains between empowering decision making at the tactical edge and how strategic direction is shaped.

With the presence forces or the joint task forces at the point of interest able to deploy their own ISR capabilities, their span of effective decision making expands, and with the need for speed they cannot wait for a centralized commander to make a decision not operating in their area of interest.

Second Line of Defense

This is a core challenge which needs to be met, and I mentioned earlier the innovations generated under VADM Lewis are solid beginnings to figure out how to rework mission command in conjunction with decision-making at the tactical edge empowered by the kinds of ISR innovations which are empowering the distributed presence force.

This is how BG Winkler put the challenge when we met at PACAF headquarters in August 2021:

"Our allies and partners are a huge part of everything that we're going to end up doing out here in the theater. We like to think that they are an asymmetric advantage, and the more that we can get the coalition plugged in the more effective we can be. It's not just U.S. sensors that are out there feeding the rest of the joint coalition force, but it is important to tap into the allied and partner sensors.

"I do think that we're at a precipice for information warfare, and the fact that some of the forward based sensors that we have, like the F-35, can generate way more intelligence data than our traditional ISR fleet, like the E3. Australia's flying the E7—fairly modernized, very robust ISR capabilities on those. I think there's been some discussion within the United States Air Force about whether we need to up the game and maybe make an E7 purchase, as well.

"But we are getting to that point where the forward base fighters are so much more technologically advanced than our ISR fleet, that it makes you question where the ISR node should be. I agree it doesn't necessarily need to be all the way back in Hawaii. It could be somewhere else in the theater.

"But the Air Force, as you're aware, has traditionally operated with AOC as the central node for command and control in the Pacific. We're trying to figure out as an Air Force what the future looks like. But I don't think that future is going to be five years from now. I think it might be 10 years from now.

"And in the short term, what you'll probably see is a something that allows us to operate from the AOC, protect our capabilities to operate from the air operation center, to be able to help synchronize fighters throughout the entire AOR, but then set up subordinate nodes that are probably forward of the AOC. If the AOC does get cut off or shut down, for some reason, you do still have subordinate C2 nodes in the theater that can keep the continuity of operations, and keep some battlefield momentum up, to continue to take the fight to the enemy."

THE PERSPECTIVE OF MARFORPAC

LtGen Steven Rudder, Commander, U.S. Marine Corps Forces, Pacific and Commanding General Fleet Marine Force, provided a USMC perspective on the way ahead for the networked and integrated force which highlighted the impact of the F-35 on the USMC role in Pacific operations.

He noted the Marines are operating both the F-35Bs and F-35Cs in the Pacific. By having an ability to operate both from the sea and from land, the two F-35s provided a significant fifth generation warfighting capability which can enable the Marine Corps focus on expeditionary operations. As he put it: "we'll continue to operate our F-35C from the carrier with our agreement with the Navy, but also when they're not on the carrier, we're operating them off land bases as well to give us the operational flexibility we want to achieve."

With the operation by allies in the Pacific, the Marines are able to bring their operating experience to Asian allies soon to operate the aircraft, notably the Singapore Air Force and the Japanese as well. He provided a slide in his presentation which highlighted the combined training which occurred with the Singapore Air Force

last year as well as a slide which highlighted joint operations with Japanese Self Defense Forces during last year's Talisman Sabre exercise.

LtGen Rudder understandably underscored as well the integrated operations which the USS America operating USMC F-35Bs with HMS Queen Elizabeth operating UK F-35Bs and the ability of the Marines to cross-deck between the ships.

He noted: "Our aviation communities can plug and play in coalition operations and this is key element of moving ahead with a networked integrated force."

For the Marines, airpower integration is crucial, but it is the ability to integrate from the sea to land operations which is critical as well. As Rudder put it: "we have been working on the ability to take F-35 data and to use that data for target acquisition and get such data down to our ground force."

One initiative being pursued is the deployment of ground fires, such as the Naval strike missiles, in support of naval sea control and sea denial operations, which is leveraging such a data transfer. He noted that the Marines have over the last year have been working on such an approach to force integration.

Indeed, a key way ahead for the Pacific-based Marines is to be able to support the U.S. Navy's Sea control and sea denial operations. This is another aspect being worked with regard to enhancing the ability of the Marines and Navy to deliver an enhanced network integrated force.

In my own view, the intersection between the U.S. Navy's evolving approach to distributed maritime operations and the USMC's approach to mobile and expeditionary basing are inextricably intertwined, a subject which I address with my co-author in our forthcoming book, *A Maritime Kill Web Force in the Making: Warfighting and Deterrence in the 21st Century*.

Second Line of Defense

The Marines have also created a Marine Littoral Regiment designed to provide a new way for the infantry to operate in the Pacific. And such a force clearly needs support from airpower organic to the USMC or from the joint force.

To move further down the road of a networked integrated force, Rudder underscored that "we are buying mesh networks that are able to take wave forms from space, surface, or air, and translate them into to a common operating picture for our ground forces. We are focused on enhanced shared awareness in order to be able to hold targets at risk. We need to address the threats we face in an integrated fashion."

In the interview I did this past summer at his office in Honolulu with LtGen Rudder, he highlighted how he saw the way ahead for the USMC with regard to working with allies and with the joint force.

"We are focused on shaping an effective posture that combines forward bases with rotational partnerships with key Allies. I have already highlighted how important our posture is in Japan. Employing Infantry and MV-22s from Okinawa and F-35s from Iwakuni (in southwest Honshu) we readily integrate with Japan's Amphibious Rapid Deployment Brigade."

"MRF-D plays a role as well. Six months out of the year, we rotate 2,000 Marines into Australia with ground forces, MV-22s, fires, and logistics capability. Now that the Australians are operating the F-35 and routinely exercising amphibious operations, we can work jointly on expanding high-end bi-lateral and multi-lateral operations. As a combined force, we have already increased the complexity of operations as recently demonstrated during Talisman Saber 21."

FIGURE 9 LTGEN RUDDER

"And as we build up and deploy greater numbers of forces to Camp Blaz, Guam, we will use this location as an additional posture location for 5,000 Marines and Sailors. All of these posture developments allow us to have various operational touch points from which one could aggregate force capabilities. With a combination of air and sea lift, we are designing a force with the ability to rapidly move into positions of advantage."

We then discussed the evolution of fires which the Marines can bring to the Pacific fight. With the end of the INF (Intermediate-Range Nuclear Forces) treaty, the United States can now build longer range conventional capabilities. The Marines are looking to participate in this effort, and employ them from expeditionary forward bases well inside the adversary's weapons engagement area. The objective is to contribute to SLOC defense or be additive to offensive naval fires.

NMESIS Comes Ashore During Large Scale Exercise, August 2021

A Navy Marine Expeditionary Ship Interdiction System launcher deploys into position aboard Pacific Missile Range Facility Barking Sands, Hawaii, Aug. 15, 2021. The NMESIS and its Naval Strike Missiles participated in a live-fire exercise, here, part of Large Scale Exercise 2021.

According to Lt. Gen. Rudder: "If we look forward in the not-too-distant future, we'll have the ability to have land-based long-range fires, aviation fires, and persistent high endurance ISR (Intelligence, Surveillance and Reconnaissance) with the MQ-9. We'll be able to move those capabilities with KC-130s, MV-22s, or amphibious lift allowing us to project long-range fires forward anywhere in Asia, much like we do with the HIMARS (High-Mobility Artillery Rocket System) today."

"HIMARS fits in the back of a KC-130 allowing rapid mobilization and insertion. We will exercise the same operational tactic with anti-ship capability. We want to project sea denial capabilities to cut off a strait of our choosing or maneuver into positions to create our own maritime chokepoint.

"As we saw with hunting mobile missiles in the past, having long-range fires on maneuvering platforms makes them really hard to hit. As we distribute our long-range fires on mobile platforms, we now become a hard platform to find. Our desire is to create our own anti-access and area denial capability.

"For the last several years, we were thinking about the adversary's missiles, and how they could be used to deny us access to forward locations. Now we want to be the sea denial force that is pointed in the other direction. Land based fires are perfectly suited to support naval maneuver."

"We want rapidly to move by air or sea, deliver sea denial capabilities onto land, maneuver to position of advantage, deliver fires, maneuver for another shot, or egress by air or sea. We are training current forces

Second Line of Defense

on concepts for sea denial missions supported by maneuver of long-range fires. This is a key element of the naval integration."

With a growing capability of joint sensor networks, the potential for more effective joint targeting is a reality. As the joint force focuses on dynamic targeting, services are closely coordinating fires networks and authorities. The advantage of land based expeditionary fires is that they provide persistence cover within an established air and surface targeting solution.

This is how Lt. Gen. Rudder characterized how he saw the way ahead. "We are completely integrated with naval maneuver and working hand and hand with the joint force. I MEF and III MEF have been operating seamlessly as three-star naval task forces astride Seventh and Third Fleets.

"During crises, I become the deputy JFMCC (Joint Force Maritime Component Commander) to the Pacific Fleet Commander. The MARFORPAC staff integrates with the PacFleet staff. Even during day-to-day operations, we have Marines at PacFleet planning and integrating across multiple domains. Should we ramp up towards crisis or conflict, we will reinforce our JFMCC contribution to ensure we remain fully prepared for all-domain naval force execution. This means that our anti-ship missiles will integrate into naval maneuver.

"We also aggressively pursue PACAF integration for bomber, fighter, and 5th Generation support. Daily, our F-35s are integrated into the PACAF AOC (Air Operations Center). We are focused on better integration to insure we have a common operating picture for an integrated firing solution."

Large Scale Global Exercise in WESTPAC with the HMS QUEEN ELIZABETH, August 2021

Two VMFA-211 F-35Bs, assigned to the United Kingdom Carrier Strike Group, and two U.S. Air Force F-15 Eagles, assigned to the 67th Fighter Squadron, Kadena Air Base, Japan fly over U.K. aircraft carrier HMS QUEEN ELIZABETH, during a Large Scale Global Exercise 21 mission over the western Pacific Ocean, Aug. 24, 2021.

The USMC F-35s play a key role in all of this. Although there is a clear focus on enhanced integration with the U.S. Navy, the integration with the USAF is crucial for both the U.S. Navy and the USMC.

Lt. Gen. Rudder highlighted the role which USMC F-35s play in Pacific defense and force integration. "We count on pulling fifth-gen capability forward in time of crisis. We are committed to having forward deployed F-35s conducting integrated training on a regular basis with our PACAF counterparts.

"We will also conduct integrated training with our Korean, Japanese, Singaporean and Australian partners. We are also training with aircraft carriers when they operate in the region. Notably, the USS Carl Vinson, the first U.S. Navy F-35C variant carrier."

"And the F-35B has caught the operational attention of the rest of the world. The United Kingdom's HMS QUEEN ELIZABETH is the largest fifth-generation fighter deployment ever conducted on an aircraft carrier. We are proud to be a part of that UK deployment, with a Marine F-35B squadron, VMFA-211, embarked and operating with our British partners. They are currently doing combined operations in the Western Pacific.

"We are excited to see the Italians operating F-35s off the ITS CAVOUR, and we hope by the fall of this year that we'll be landing an F-35B on the Japanese Ship IZUMO, as the Japanese look ahead to the purchase of F-35Bs. The South Koreans are considering going down a similar path, with Singapore also adding F-35s to their inventory."

"Aside from shipboard operations, the F-35B can do distributed operations like no other combat aircraft. We can go into a variety of airfields which may not be accessible by other fighter aircraft, reload and refuel, and take back off again, making the both aircraft and the airfields more survivable."

The Marines are the only combat force that tactically combine fifth generation with tiltrotor capabilities. This combined capability is crucial for operations in an area characterized by tyranny of distance. The MV-22 Ospreys can also carry a wide variety of payloads that can encompass the C2 and ISR revolutions underway. And if you are focused on flexible basing, the combination of the two aircraft provides possibilities which no other force in the world currently possess.

But shortfalls in the numbers of aircraft forward create challenges to unleash their full potential for enabling the Marines as a crisis management force and enhance the Marine Corps contribution to the joint force. The nature of distributed operations in the Pacific demands long range aircraft like the MV-22 to sustain the force. The amphibious operating capability of the USMC becomes more significant as flexible basing and the enhanced capabilities which a family of amphibious ships could bring to the force.

This is how Lt. Gen. Rudder put it: "We can reconfigure our amphibious ships to take on many different assault functions. I think when people talk about amphibious assault, they have singular visions of near-beach operations. Instead, we need to think of our amphibious capability from the standpoint of our ability to maneuver from range.

"Rather than focusing on the 3,000 or 5,000-meter closure from ship to shore, I think about the 600, 700, 1,000-mile closure, with amphibs able to distribute and put people in place or to conduct resupply once you're there. Amphibious lift, with its ability to bring its own connectors for logistics support, is increasingly significant for the operational force.

"In addition, we have to make sure that we're able to close the force when lethal and non-lethal shaping has done its course. At some point, you're going to need to seize and defend land. We have two ways to tactically accomplish this mission, either by air or by surface assault. There's no other way to get forces ashore unless you secure a port that has the space to offload and a road network to move ashore. Open port options are highly unlikely during crisis, thus amphibious lift is increasingly becoming more valuable for maneuvering forces in the maritime domain."

The Marines are launching a new capability in the next couple of years, the Marine Littoral Regiment (MLR). According to the MARFORPAC commander: "We are working towards initial operating capability (IOC) of the

MLR in 2023. We want to demonstrate the maneuverability of the MLR as well as the capabilities it can bring to naval operations.

"Near term, we will work to exercise new capabilities in the region, such as loading the NMESIS (Navy/Marine Corps Expeditionary Ship Interdiction System) system on the KC-130s or LCAC for integrated operations with F-35s, MQ-9s, and other maritime targeting capabilities."

In short, the USMC is in transition in the Pacific, and working towards greater interoperability with the joint force, notably, the U.S. Navy and the USAF.

A ROYAL AIR FORCE PERSPECTIVE

Air Chief Marshal Sir Mike Wigston provided the perspective of the RAF on shaping a way ahead for the integrated networked force. The last time an RAF Chief of Staff spoke at a Williams Foundation Seminar was in March 2018. Air Chief Marshal Sir Stephen Hillier, then Chief of Staff of the RAF, addressed the Williams Foundation Seminar on the shift from the land wars to high intensity conflict. At that seminar, this is how Hillier highlighted the challenge:

"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 C^2 structures, processes, and approach to information sharing will be a decisive factor."

What Hillier discussed throughout his 2018 presentation in Australia was the presaging of what would be introduced in 2020 as the new integrated operating concept for the UK forces.

That operating concept which is rooted in the kill web approach was officially launched in the Fall of 2020. Chief of Defence Staff, General Sir Nick Carter, at the 2020 version of the annual Royal United Services Institute address by Chief of Defence Staff, highlighted the launch of the new strategy. "What should be our response to this ever more complex and dynamic strategic context? My view is that more of the same will not be enough. We must fundamentally change our thinking if we are not to be overwhelmed. Hence, we are launching this Integrated Operating Concept.

"We cannot afford any longer to operate in silos—we have to be integrated: with allies as I have described, across Government, as a national enterprise, but particularly across the military instrument. Effective integration of maritime, land, air, space and cyber achieves a multi-domain effect that adds up to far more than simply the sum of the parts, recognizing—to paraphrase Omar Bradley—that the overall effect is only as powerful as the strength of the weakest domain."

Since Hillier last spoke, the UK has faced the challenges of Brexit, Covid-19, has introduced the new carriers as operational realities, and has operated the new carrier outside of the European area of operations. The RAF and Royal Navy have also begun the F-35 era, and the UK government has launched the Tempest next generation airpower program as well.

And as the current Chief of Staff of the RAF spoke at the Williams Foundation, Europe was experiencing its first major war in a very long time. And Air Chief Marshal Sir Mike Wigston was speaking after the UK government had committed itself to increased defense spending and the launching of the new Integrated Operating Concept.

In other words, the UK faces a number of challenges which certainly require better force integration within the UK forces and with allies, simply to get the scale, and depth necessary for UK direct defense, let alone contributing to wider allied considerations.

FIGURE 10 AIR CHIEF MARSHAL SIR MIKE WIGSTON

How does Wigston see this getting accomplished?

This is how he framed the challenges: "One year ago, the UK government published the Integrated Review of Security, Defense Development and Foreign Policy. It was a significant statement of Britain's place in the world and the role of the UK Armed Forces in that. Last April, before the ink was even dry, Russia first threatened military action against Kyiv. It was a chilling foretaste of what we are now seeing unfolding there. The outrageous, unprovoked, and unjustified invasion of a sovereign country in Europe, thousands of deaths, Second Line of Defense

and the displacement of over 10 million Ukrainian citizens, something we thought we had consigned to history."

He then argued that the Integrated Review had highlighted three key themes which current events simply reinforced as key challenges.

"Firstly, the recognition that it's an uncertain and increasingly dangerous world. We face fast evolving threats to our nation's and our allies.

"Secondly, in this era of strategic competition, the UK must be prepared and able to act globally as a problem solving, burden sharing nation, amplifying our effect through deeper relationships and partnerships.

"And thirdly, with the equivalent of a 42 billion Australian uplift in defense funding over the four years from 2021, that the UK government could not be clearer in its view of the integral role of the UK Arm Forces in protecting and projecting the United Kingdom around the world."

"The Integrated Review confirmed the need for the UK to be able to deter and defend against state-based opponents, to strengthen our technological and scientific base and to continue the modernization of every aspect of our armed forces. And it also looked at broader aspects of security too, including climate change, population pressures, and resource competition."

But with the Covid-19 impact, it will be challenging for the UK or any major liberal democracy to establish sustained defense spending, so what then are the priorities to be focused upon with investments, and force design going forward?

"My chief of defense staff has made his priorities, and of course they're now my priorities, very clear. Firstly, that everyone must be absolutely focused on playing their part in turning the ambition of the Integrated Review into reality.

"Second, it's around transforming, reforming, and integrating effectively.

"Third, it's about having formations, units, platforms, systems, and people that are more deployable and deployed more, at home and abroad.

"Fourth is the need to be more lethal. And to be more lethal, it's absolutely essential that we are more innovative.

"And fifth, and probably the most important, is our people, our culture, and the diversity of our workforce in every sense of the word. And threading through all of those is that critical need for multi domain integration across the maritime land air space and cyberspace domains. To achieve that nirvana of multi domain integration, we must integrate across defense by design, and we must integrate by instinct."

Wigston then highlighted how such an approach affected the RAF.

"To continue to protect the UK and our allies in this threat laced world, the Royal Air Force must be ready to understand, decide, and then act faster, with even greater precision, lethality and in more places around the world simultaneously than we do today. And we've got to do it sustainably too, both in terms of resource and the environment Above all, it will require the Royal Air Force to integrate ever more closely with our Royal Navy, Army and Strategic Command, the Ministry of Defense, other government departments and our international partners.

"Success demands, swift, joint, fully integrated action across all war fighting domains, land, sea, air, space and cyber. Our aircraft, spacecraft and systems must integrate seamlessly to allow the transfer and exploitation of information, rapid decision making and timely delivery of effects."

In his presentation, he highlighted the way ahead as envisaged by the UK with regard to the airpower piece of shaping the evolving networked and integrated force. This is the team tempest or future combat air system approach.

And this is Wigston described it: "The Future Combat Air System is such a critical development program for the nation, because we need to start work now on what will replace Typhoon from the late 2030s and why we are investing three and a half billion Australian over the next four years alongside our international partners like Italy. We're taking a revolutionary approach, looking at a game changing mix of swarming drones and mixed formations of un-crewed combat aircraft, as well as next generation piloted aircraft like Tempest. Our uncured combat aircraft, Mosquito, is already taking shape in Belfast and our experimental swarming drone, Arvena, has already exceeded expectations on operational trials. This isn't the stuff of a distant sci-fi future. We're aiming for Mosquito and Arvena derivatives to be fielded operationally this decade, transforming the combat battle space in a way not seen since the advent of the Jet Age."

The integration piece for the RAF evolves on two levels, the UK national force and its ability to work more effectively with allies in coalition operations.

And he describes the latter in the following terms:

"We must place a premium on being allied by design, through building alliances and improving interoperability. And it means that we have to be integrated with allies across government as a national enterprise, and particularly across all the instruments of our military power. Our multi-domain effects have to add up to more than the sum of the parts.

'In that regard, I can't think of a better example of multi-domain integration than the UK carrier strike group that deployed last year through the Indo-Pacific region, as far as Japan. It brought to life, the deeper UK focus on the Indo-Pacific, a region the Integrated Review identified as critical to our economy, our security, and our global ambition to support an open and resilient international order.

"At the heart of that carrier strike group, of course, is our ability to operate fifth generation combat aircraft from the sea. Lightning is a phenomenal war fighting machine, from land or sea. And last year 617 Squadron Royal Air Force and VMFA-211 from the US Marine Corps demonstrated that enormous utility from the Royal Navy's HMS Queen Elizabeth."

"We must train our personnel to work together through integrated exercises with government partners and allies. As we develop our military plans and processes, we must ensure that they're integrated by design rather than working with partners ad hoc at the point of need. Our modernization from an Industrial Age of platforms to an Information Age of systems has to be enabled at every level by a digital backbone, into which all sensors, effectors and deciders are connected."

Frankly speaking, this is very hard to do.

I have spent a great deal of time over the past decade on ships, land bases in the UK and in the United States watching how the UK and the USMC and U.S. Navy have worked the integration which the RAF chief underscored with regard to the ability of the UK carriers to work with the United States. This was a deliberate effort which has been very challenging to do and, frankly, not widely noticed in the broader political or strategic world.
Second Line of Defense

If such efforts are to be prioritized, ensuring that they get the kind of strategic and funding support will be crucial. And the significant investment in the land wars is a significant investment cost which is not easily carried forward in such an effort.

And getting governments on the same page with regard to rapid decision making is its own challenge, but equally important as shaping the joint operational approach so well laid out by the RAF Chief of Staff.

Indeed, Wigston highlighted the hinge between the military and the civil authorities which is crisis management.

"Air and space power gives our government the ability to act or signal strategically worldwide, at range, at speed, precisely with minimal physical and political risk and maximum political choice. We play a decisive role protecting and defending the United Kingdom and our allies 24/7 today. But as chief of the air staff, it also falls to me to design and start to build the force my successors will have to fight with and win within 10-, 20- or 30-years' time.

"The Royal air force must be ready to operate in that complex operating environment of the future. Above all, we must be able to defend the UK and our allies in the face of those sophisticated new air and missile threats."

It really is decision superiority that force integration is about.

How to operate with maximum effect throughout the extended battlespace but with not just military but civil decision making capable of resolving crises.

And that is a major challenge facing our democracies.

DEFENSE INDUSTRIAL PERSPECTIVES

Three representatives of the defense industry provided their perspectives on the way ahead for the networked integrated force at the Williams Foundation seminar.

Those three representatives were: Tom Rowden, Vice President International Strategy and Business Development for Rotary and Mission Systems (RMS) at Lockheed Martin; Rod Equid, Chief of Enterprise Focus Areas, Raytheon Australia, who was previously the Chief Executive Officer of the AWD Alliance, the organization charged with delivering Australia's next generation warships and AVM Chris Deeble AO, CSC (Retd.), Executive Director Strategy, Northrop Grumman Australia

Tom Rowden

Rowden underscored the importance of what the Australian's have focused on in terms of joint by design. How to get better at baking in interoperability rather than doing after-market patch ups to connect platforms and create more integrated systems and combat effects?

FIGURE 11 TOM ROWDEN

Here is how Rowden put it: "Is there a better way to do business? Is there a different model that could be used? Or perhaps is there an effort currently in process that might pave the way for a more joint, and more importantly, combined interoperability that will allow the generation of common understanding in the battle space, and creating a more robust offense and defense across the entirety of the forces involved in deterring conflict and fighting and winning the war if deterrents should fail? I believe the short answer is yes."

He went on to answer his question by referring to the efforts in Australia to in fact enhance capabilities for joint by design. "Where does this leave us for interoperability in the 21st century in Australia? Gone are the days where we could rely on a single, mid-grade enlisted person, no matter how good they are, to run the data and information exchange amongst our services.

"Now and in the future, it's going to take smart people ensuring interoperability requirements are being met to the satisfaction of our tactical and operational commanders. While there are still hills to climb and miles to go in this 21st century interoperability journey, I believe the teams here in Australia are getting after and addressing the entropy conundrum that has plagued the forces on the other side of the Pacific.

"What I see in Australia is focused energy and working cooperatively to maximize the value of interoperability solutions to the war fighter regardless of service. This approach represents a fundamental change from the way I have experienced the acquisition of capability in the United States."

Rod Equid

Rod Equid underscored that the build out of the fifth-generation force enhances the challenge of working the networks to get the right kinds of decisions at the right time and the right place.

This is how he put it: "The technology revolution has seen the invention of a digital information layer between human and machine, obviously a characteristic of our fifth gen platforms. This arrangement both presents opportunities for solutions, but at the same time enormously increases the complexity of the problem to be solved.

"Put simply, effective command and control coordination and the attendant decision making supported by appropriate aids is necessary to enable optimization of the use of platforms and other assets to achieve joint force multi-domain outcomes.

Second Line of Defense

"Any solutions for an effective networked and integrated force involves a number of factors, including ownership and control of the appropriate assets hosted by the three services, exploitation of the proliferation of data in the information layer, coordination of multi domain operation in the five domains, including sensing and delivery of both kinetic and non-kinetic effects and improved effectiveness, survivability, and lethality to deal with contemporary and emerging threats."

He argued that there has been clear progress in Australia in shaping a fifth-generation force capable of network integration. But he argued that going forward it was crucial to evolve the government-industrial acquisition paradigm to deliver the kinds of changes needed more rapidly, as platforms evolve and the networks into which those platforms are embedded.

He underscored how he saw the way ahead in the following terms:

"The combined efforts of defense and industry over the past decade have been impressive in delivering the building blocks of fifth generation capability. In particular, delivering the platforms and associated support systems.

"However, from an industry perspective, current policy and processes need to involve further and faster in order to succeed in the problem space of implementing an integrated and network fighting force.

"This is because current acquisition processes are optimized to deliver projects against component future force capability needs, for example, strike or long-range fires capabilities, but potentially with insufficient focus on the bigger picture of creating an integrated and network force. Focus is also required to catch up the force in being and all of this while maintaining a capability to fight tonight."

FIGURE 12 ROD EQUID PRESENTING AT THE SEMINAR.

With regard to the government side of the acquisition progress, moving beyond a legacy platform buy process remains challenging but crucial to accelerating the evolution of integrated force combat effects and their capabilities.

He underscored the importance of "Policy demanding that new acquisitions comply with an appropriate architectural concept, enabling joint force integration beyond the immediate project scope. If there is no

change to our approach, a consequential risk is that industry will continue to evolve around individual projects focused on single domains bought by different organizations without contributing effectively to the achievement of an integrated and networked force as an outcome.

"Despite the obvious good intentions, this also raises the question as to why we continue to conduct stovepipe acquisitions sometimes with Capability Acquisition and Sustainment Group (CASG) and Chief Information Officer Group (CIOG) buying separate, but often complementary systems surely continuing along the same pathway as a luxury that we can no longer afford."

This requires as well that the C^2 tissue is increasingly significant to shaping an effective way a force that is integratable. For Equid: "Defense needs to ensure there's a policy overlay that will ensure future capability acquisitions are compatible with defined and agreed architectures, and there's a concerted effort to catch up the force in being.

"We must deal with and narrow the addressable gap with regard to how well extent new capabilities share data and information and interact through various layers of C^2, including delivering integrated fire control from the plethora of information sources available to support the command and decision-making process.

"The risk is that stove piped force elements will fail to interact and will preclude data sharing for effective C^2 and decision making. There needs to be a key focus on bridging C^2 capability gap among platforms."

AVM (Retd.) Chris Deeble

Finally, AVM (Retd.) Chris Deeble underscored how the need for speed in decision making and in ensuring effective combat effects required a major shift in thinking about how to build out the networked integrated force.

He argued that" we need to think it beyond the joint force, and focus on multi domain operations. Multi-domain operations from my perspective are beyond joint and they require changes to our operational and traditional operational approaches."

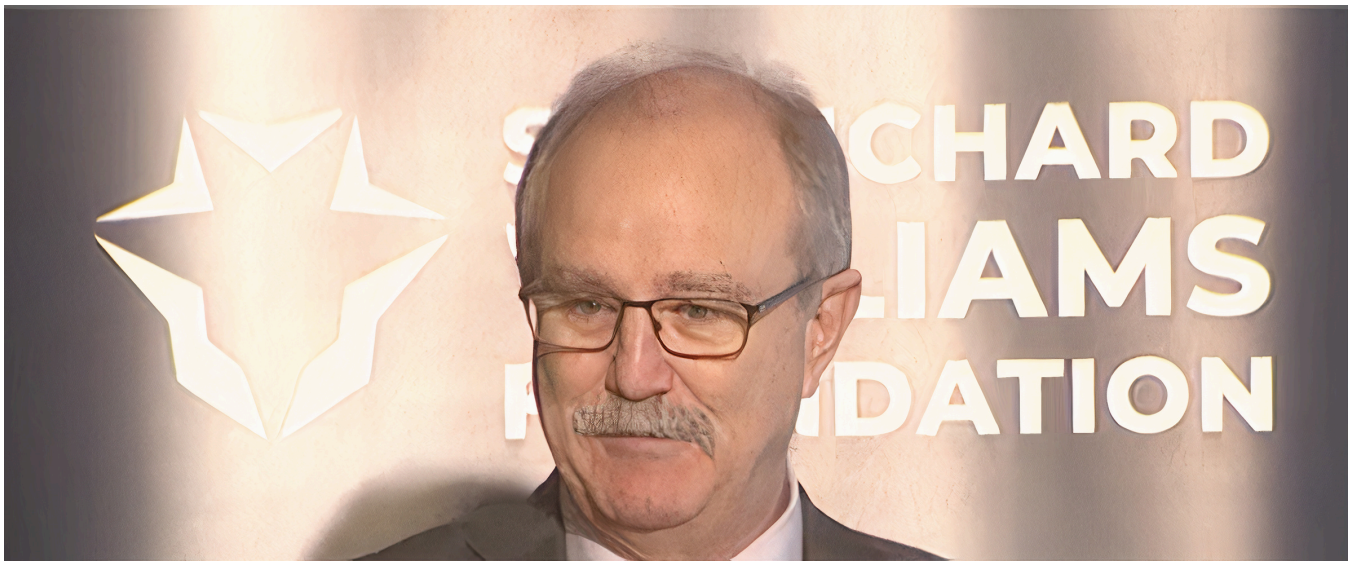

FIGURE 13 CHRIS DEEBLE

According to Deeble, the operating force needs to be able "to respond at the speed of the threat." To do so, requires rethinking the relationship between sensing and decision making as well as the role which machine-aided decision-making tools can provide.

According to Deeble: "We've got to start thinking about what multi domain sensing actually means for us in operations. And we need to add to that understanding the importance of the role of prediction. As we look to artificial intelligence, as we look to machine learning, as we look to quantum computing, then we have to start thinking about shifting our paradigm and accepting prediction as a key part of operations.

"How do we validate predictive data?

"How do we build into our equation, something that is trusted and that we agree with?

"And then to reshape our ability to make decisions around what we think that future might look like, because we can't afford to be making decisions too late in the decision-making loop."

"AUSTRALIA IS FACING ITS GERMAN MOMENT"

Peter Jennings, Executive Director of the Australian Strategic Policy Institute, put it bluntly and directly to the audience: We are facing a significant defense threat, and we need to take it seriously and get prepared.

A recent article by Greg Sheridan in The Australian raised a similar waring when he looked back to the 1930s and saw analogies to the current situation. "If the 2020s are really the 1930s all over again, how is it the government is not going to produce any significant new defence capabilities for the rest of this decade?

"This decade does resemble the 1930s, not because we face a new Hitler or even a new imperial Japan but because of the utter fecklessness of defence policy and the miserable failure in defence of both sides of politics. Australian leaders spent the 1930s "admiring the problem" of defence. They understood Nazi Germany and imperial Japan and made sententious statements all through the decade. But they did almost nothing to provide significant Australian capabilities."

Jennings noted that when Prime Minister Morrison introduced in July 2020, the new defense strategy, as an aside he was concerned that indeed the current decade had a resemblance to the global threats of the 1930s.

Jennings highlighted what he sees as the key driver of this challenge, namely, what I refer to as the global threat from the 21st century authoritarian powers.

Here is how he put it: "The publicly stated goals in terms of the world's two most powerful authoritarian regimes are to break the international order and to remake it under their control. Beijing and Moscow's, having both separate and shared interests, but their intent has been publicly articulated for at least a decade. One thing you can say about these authoritarian systems is that they do not disguise their plans. No one today could credibly claim that China is an enigma wrapped in a mystery. You just need to read Xi Jinping's speeches…."

He then underscored the question of how the authoritarian leaders have envisaged the way ahead.

"We know Xi Jinping believes that the West, and the United States in particular, is in terminal decline. We know that Xi thinks of himself as a world's historical figure, uniquely placed to hold China together and uniquely placed to force Taiwan into the People's Republic.

"I also think it's fair to say that Xi Jinping's view of Taiwan is somewhat like Putin's in Ukraine shaped by emotion and by invented historical memory. In other words, this is not a bloodless game theory calculation. A war over Taiwan would ultimately be Xi Jinping's war rather than China's war, just as the war in Ukraine is Putin's war, not necessarily Russia's war.

"But the tragedy of Russia and China is that their political systems have been purpose built to give one leader the capacity to take their country to war. And this is how unthinkable was happened."

But then what do Australia and the West need to do?

Jennings warns: "As far as Australia is concerned, I think we find ourselves in a type of strategic twilight zone. We know we're in such a crisis, or at least on the glide path to one. We also know that this is a crisis with the potential to grow into a global configuration. And yet, we are not behaving as though this is the reality we face. If we really thought that war was coming, wouldn't we be doing things differently around the defense capability development today?"

FIGURE 14 PETER JENNINGS

He underscored that Australia needs (and one could certainly add the United States to his warning) to focus on force building and strategic depth as an urgent matter for defense acquisition not only a process of long-term force building.

Jennings articulated his concern as follows: "I do wonder if the defense obsession about building the perfect networks and integrated force has contributed to our current inability to change gear. Through all of my defense career, we were designing and equipping the defense force in a world where the pace of strategic change was an interesting artifact, rather than a clock ticking on Australia's security.

Second Line of Defense

"We could take 20 years to design and deliver defense capability, and it didn't really matter.

"And what that meant was that we could polish those capabilities as though we were building the ultimate Hornby railway set, all designed to run around a beautifully networked and integrated track."

He then went back to his 2018 presentation at a Williams Foundation seminar to reinforce his concern and his point: "Four years ago, almost to the day at the 2018, Sir Richard Williams conference, I spoke on the topic of deterrence. And on that occasion, one thing I did was to advocate for the acquisition of the B-21 aircraft. My reasoning for this was that it would add substantial deterrent capability to an ADF, that looked to me, to be under gunned. Now, more credentialed people than me have also made this case. Had we gone down that track at the time of the 2016 defense white paper, we would have been well placed to see the arrival of B-21 currently in production sometime caught quite soon. Now, of course, that didn't happen. And I would have to say that defense's interest in that I idea was not so much zero as about minus 100."

As a result of the clash between geopolitical strategic reality and Australian perceptions, he forecast a "German moment" for Australia.

"I think Australia is very soon going to have its own German moment. I'm sure you know that just weeks ago, Germany reversed some of its most entrenched defense and security policies, which had been embedded for decades. In response to the Ukraine crisis, Berlin under an SPD-Green government is doubling its defense expenditure and seeking to reverse a disastrously ill-considered set of energy policies that build dependence on Russia.

"No one saw this coming. It happened because of a dire strategic need. Australia will have its Germany moment. No one is seeing it coming. It will happen because of a dire strategic need.

"Now, if that floodgate unlocks, we will see, I think, a fundamental recasting of defense capability development plans. I don't know where that leaves the networked an integrated force. Other than to say to you, get ready for big, fundamental changes, and the need for speed in acquisition."

THE WAY AHEAD FOR THE ADF: MASTERING THE ART OF WARFARE

John Conway was the moderator for the recent Williams Foundation seminar on the integrated networked force. Recently, I was able to discuss his thoughts on the seminar as well as his perspective on the upcoming September 2022 seminar as well.

In my own work on the strategic transition, indeed in many ways a strategic shock, from the Middle Eastern land wars to engage in warfare with 21st century authoritarian powers, I have emphasized to two integrated elements in shaping a way ahead. On the one hand, with regard to the warfighting piece, the need to distribute the force for survivability is combined with the requirement to integrate the force to get the kind of combat and crisis management effect necessary to prevail in a crisis. On the other hand, there is no point in having such a capability if the civil side of government has limited crisis management skills. It is about the use of military power in the context of successful mastery of the art of crisis management.

In my discussion with Conway, he made a similar argument, but in his terms, it is the requirement to be able to master the art of warfare, not just simply having governments fund advanced warfighting skill sets.

This is how he put it: "We have demonstrated in Afghanistan and Iraq that we are good at warfighting, but we are not so good at warfare. And I think we have a generation of generals and politicians who only know war fighting. They don't understand that there is a significant difference between warfighting and warfare."

If we indeed focus on the art of warfare, the key focus is upon how to get the crisis management effect we need; not simply engaging in ongoing warfighting and positioning for warfighting. And this means in turn, that the focus for the ADF or its allies is not simply providing balanced funding for the joint force, but prioritizing investments and training to shape a force with the most lethal effect and with most useful impact on advancing the art of warfare for the liberal democracies.

In this sense, the role of airpower is notably important for the ADF or its allies. And the reason for this is the capability of airpower to operate flexibly, rapidly, and decisively. This is how Conway put it: "Force packaging is a key element in the way ahead in the art of warfare. We've got to start thinking about sophisticated force packaging options, which are going to exploit the kill webs that you talk about. And then the land, or let's call it the surface because it's not just land, it's land and sea. The surface is important because it's about basing. Whether it's a ship, whether it's a carrier, on on land it's an airfield. We need basing and logistics for this next war. And that's not a narrative that lots of people want to hear."

Conway felt that the March seminar provided an opportunity for both the ADF and international speakers to do a stock taking with regard to where the ADF and its allies are with regard to force development and evolution. He underscored the following: "When we introduced the fifth-generation narrative it was in a world different from now. We were operating in the Middle East from sanctuary bases. We are now in a situation where we need to focus on the survivability of our bases and platforms, and to find ways to generate lethality despite such challenges. And this perspective clearly came through during the seminar."

He argued that integration for the sake of integration, in terms of the joint force, was not the correct focus. "We need integration, but we need to be thinking about the hard power options for the defense force. Long-range strike is a key element of where we need to go, and that capability may or may not be fully integrated; but delivering the effect is critical to the art of warfare in the current and evolving context. And that is a key focus for the next seminar which will be upon enhanced lethality for the ADF. We understand that we're going to have to integrate because we're a relatively small force. Integration is not an end in itself; it's the means to an end. What we're actually talking about now is outcomes, which are linked to clear political objectives."

As the ADF moves forward, Conway discussed the "triangle of tradeoffs" for development of the force, namely, lethality, survivability, and affordability. It is not about investing in balanced force development for its own sake; rather investments need to be directed to those elements of the ADF which can deliver lethality and survivability at the most affordable cost.

In such a context, advanced training is critical and as such will provide a key focus for discussion in the September seminar. As he put it: "Within a limited budget, you've now got to think really, really hard about survivability. And you've got to think really hard about preparedness and that links to the training piece that we'll get to in the next seminar.

"And we've now got an adversary, who is making us spend more and more money on survivability. We'd rather spend money on lethality, but they're making us spend money on survivability because they're becoming increasingly sophisticated, because it's coming harder and harder to survive. And this is driving up the cost of survivability. But one way of mitigating that risk is getting your training systems right. And being able to fight the best fight with what you've got and invest in warfare rather than just war fighting."

LOOKING BACK AND LOOKING FORWARD: THE SEPTEMBER 2022 WILLIAMS FOUNDATION SEMINAR

Second Line of Defense

The September 15, 2022, seminar to be held by the Williams Foundation will focus on the key question of how to enhance the lethality of the Australian Defense Force. In particular, the seminar will focus on the gaps and opportunities for the ADF driven by fifth generation airpower.

Recently, I discussed the seminar with the Foundations' Chairman, Air Marshal (Retired) Geoff Brown and he provided a look back at the March 2022 seminar as well as highlighting the focus of the September 15, 2022, seminar as well.

Geoff Brown: "We started down the path of working a more effective joint or integrated force effort several years ago. The seminar was designed to provide an assessment of the current state of the effort as well as discussing some ways to further enhance the integrated networked force effort. With the end of the COVID-19 perspectives, we were very pleased to have significant international participation in the seminar to provide a wider perspective on that way ahead as well.

"I think we are clearly on the right path, but we have major challenges remaining, notably on the acquisition side. Tom Rowden did make the point that he thought we were in a better place than the U.S., but we still have a slow-moving bureaucracy around how to get the kind of integrated capabilities which we want, especially when compared to how quickly the commercial sector can operate."

And there is the challenge of working integration forward with the legacy force as has been noted that the force which we will have in 20 years' time will contain 80% of what we have now.

Brown underscored that "we clearly need to integrate the legacy systems with new platforms, systems, or capabilities. The Aegis system is a good example of how one can do this. The Aegis system evolving now is much different from the initial Aegis system as it can now work with a wide variety of weapon systems compared to where it started. The Aegis example demonstrates that the kind of force integration path we are on is achievable, but we need to expand how we in fact can do so. By putting a core system in place and then working with an open architecture enabled by that system, significant integration can take place by incorporating adjacent systems and capabilities."

This approach has clear implications for acquisition. Brown underscored that "rather than having endless competitions to drive down what seems as the lowest price provided by various primes, Defense needs to pick a core prime to manage a weapons area and allow that prime to work with a diversity of suppliers and systems providers to drive the best capabilities to the force. We actually don't have time now for a lot of the competitive tension that the acquisition system feels it needs to do to get the best value for money.

"The key is to get the operators working with industry to drive the kind of rapid change needed."

This is especially true when considering that new platforms are built around a software upgradeability core and getting to where operators can drive change in concert with the systems providers can allow for the kind of rapid change which operators need to deal with 21st century peer adversaries.

The next seminar will focus on shaping a way ahead for the ADF to become more lethal and obviously a core answer to that is the pathway identified by Air Marshal (Retired) Brown. And he added that in the forthcoming seminar one of the key capabilities to be highlighted which can drive the kind of change which the ADF is seeking is around the training domain. "We need to increase the training throughput of the force to accelerate operational changes. The technology's out there to actually increase training outcomes quite significantly. We're not even close to utilizing the technology that's already available, in my mind, to get the best training outcomes. That will be one of the vectors that we'll certainly look at in the seminar."

In addition, Brown underscored that the whole challenge of resilience of the force is another key dimension which needs to be enhanced as well in shaping a way forward for the ADF. This means looking at efforts to enhance fuel supplies, weapons, supply depth and logistics support. He argued that without the kind of industrial depth which the United States delivered in World War II, it will be difficult to build out the kind of capabilities which are needed for the United States and the core allies.

"We need to understand what our real industrial production capability and suspend the idea of needless competition in areas where such competition actually reduces production capability. And on the defense side, we need to be focused on the art of realistic force development and design and avoid paths like the USMC Force Design 2030 which really goes down a unique path not really adding to the overall lethality of the joint or coalition force.

"We need to ask the question of how new platforms or new force design approaches really add to the lethality of the integrated and networked force or they don't and avoid the latter. The focus has to be upon deterrence and whether you are moving the needle forward on deterrence or not, if you are not then don't go down that platform or force design path. The Pacific in particular drives the need for long-range systems, and we are working towards enhancing our capability to acquire and operate such systems."

SPEAKERS BIOS

Air Vice-Marshal Robert Chipman AM, CSC, Head Military Strategic Commitments

Air Vice-Marshal Chipman is the Head of Military Strategic Commitments, responsible for the strategic level management and situational awareness of current and potential Australian Defence Force Commitments.

Air Vice-Marshal Chipman joined the Royal Australian Air Force in 1989, graduating from Sydney University with an Honours degree in Aeronautical Engineering in 1992.

He completed Pilot's Course in 1994, F/A-18 Operational Conversion in 1995 and Fighter Combat Instructor Course in 1999. Following various operational and instructor assignments, he commanded of No 75 Squadron from 2006-2009 and No 81 Wing from 2013-2014. In 2008, No 75 Squadron was awarded the Duke of Gloucester Cup for the most proficient flying squadron and the Kittyhawk Trophy in 2009 for the most proficient fighter squadron.

Air Vice-Marshal Chipman has staff experience in capability development roles within Capability Development Group and Air Force Headquarters. He has completed a tour as Director of the Australian Air and Space Operations Centre within Headquarters Joint Operations Command. He was an inaugural Director of Plan JERICHO in 2015, an Air Force transformation program intended to deliver joint, integrated air and space capability for the Australian Defence Force.

Air Vice-Marshal Chipman deployed on Operation SLIPPER in 2012 as a Battlelab Director in the United States Air Force 609th Air and Space Operations Centre. He deployed on Operation OKRA in 2014 as Commander Air Task Unit 630.1, for which he was awarded a Conspicuous Service Cross in 2015. He served as Australia's Military Representative to NATO and the EU from 2019-2020.

Air Vice-Marshal Chipman was appointed a Member of the Order of Australia in 2019.

Air Vice-Marshal Chipman has completed a Masters in Business Administration and graduated as a fellow of the Defence and Strategic Studies Course in 2016. He is a Graduate of the Australian Institute of Company

Directors and Oxford Advanced Management and Leadership Programme. He is also an alumnus of the Cranlana Institute and has completed the United Nations Senior Mission Leaders Course.

Lieutenant General Aurelio Colagrande, Italian Air Force Deputy Chief of Staff

Lieutenant General Aurelio Colagrande was born in L'Aquila on 8 October 1962. He attended the Air Force Academy from 1981 to 1985 and graduated as military pilot in 1986 at the European NATO Joint Jet Pilot Training (ENJJPT) in Sheppard AFB – TX, USA.

In 1987, Lt Gen COLAGRANDE was assigned to the 2nd Wing in Treviso and in 1989 was moved to the 51st Wing in Istrana where he was appointed as OPS Chief and later on as 103rd Squadron Commander. Between 1995 and 1999, he flew several flying sorties over the Balkan Airspace collecting more than 70 flight hours.

In July 2000, he was appointed to the Logistic Department of the Italian Air Staff in Rome and later, in 2002, moved to the Joint Strike Fighter Program Office in Washington DC (USA), as Italian National Representative.

From July 2006 until September 2007, he was back to the Logistic Department of the Italian Air Staff as Head of C4 ISTAR Branch and Chairman of the Italian JSF WG. From 2007 to 2009, he was appointed as 6th Wing Commander in Ghedi, after this assignment he returned to Rome, at the Secretariat General of Defence and National Armaments Directorate as Chief of the Aeronautical Programs Office.

From 2011 to 2013 he was appointed as the 46th Air Brigade Commander in Pisa, following this period he was assigned to the Air Operational Command in Rome as Deputy Chief of Staff, assuming later on the Chief position until March 2019.

From 20 March 2019 to 11 January 2022, he was the Commander of the Air Education and Training Command.

As of 12 January 2022, Lt.Gen. Colagrande is the Italian Air Force Deputy Chief of Staff. Lt.Gen. Colagrande has a University Degree in Aeronautical Sciences and a Master in International Studies

Major General Susan Coyle AM, CSC, DSM Head of Information Warfare

Susan Coyle completed a Bachelor of Science degree at the Australian Defence Force Academy before graduating from the Royal Military College in 1992 into the Royal Australian Corps of Signals. She assumed her current appointment as Head Information Warfare in January 2021.

Major General Coyle has worked at the tactical, operational and strategic level in a variety of command and staff appointments. She has commanded at every rank, including Commander Joint Task Force 633 (2020), Commander 6th Brigade (June 2017 – 2019), inaugural Commander Task Group Afghanistan (2015), and Commanding Officer 17th Signal Regiment (2009–10).

She has seen operational service as the J6 Communications on Operation CITADEL in East Timor (2002), Officer Commanding 104th Signal Squadron on Operation ANODE in Solomon Islands (2004), Deputy Commander – Afghanistan, transitioning into Deputy Commander JTF 636 on Operation SLIPPER before raising Task Group Afghanistan on Operation HIGHROAD (2014-2015), and Commander Joint Task Force 633 on Operation ACCORDION (2020). Key staff appointments include Chief of Staff / Director Workforce and Behaviours within the First Principles Review, Director Soldier Career Management – Army, Directing Staff / Director of Studies

Land at the Australian Command and Staff College, Military Assistant to the Deputy Chief of Army and Aide-de-camp to Commander Australian Theatre.

Major General Coyle holds post-graduate qualifications in a Master of Strategic Studies from the United States Army War College, a Master in Organisational Development and Strategic Human Resource Management from the University of New England, and a Master of Management in Defence Studies from the University of Canberra. She is a graduate of the Australian Institute of Company Directors, the Australian Command and Staff College, the United States Army War College as a Distinguished Graduate, the United States Combined Joint Force Land Component Commander Course, the Senior Executives in National and International Security at Harvard Business School and Australian Joint Task Force Commanders Course.

Major General Coyle has been appointed a Member of the Order of Australia for Commander Joint Task Force 633, a Distinguished Service Medal as the Deputy Commander JTF 636 / Commander Task Group Afghanistan on Operation SLIPPER / HIGHROAD, and a Conspicuous Service Cross as the Commanding Officer 17th Signal Regiment. She has also received a Chief of Joint Operations Command Commendation as Officer Commanding 104th Signal Squadron on Operation ANODE, and a Commander Australian Theatre Commendation as Staff Officer to the Commander Australian Theatre Joint Intelligence Centre. Whilst posted to the United States she received the U.S. Army Commendation Medal as the 11th Signal Brigade Satellite Engineer.

Tony Dalton AM, Deputy Secretary National Naval Shipbuilding

Tony Dalton is responsible for National Naval Shipbuilding within the Capability Acquisition and Sustainment Group in the Department of Defence. He comes to this job after a long career in the Navy where he was most recently responsible for the delivery of shipbuilding programs including the Hunter class frigate and Arafura class offshore patrol vessel.

Previously, Tony served as the Project Director for Navy Aviation Projects within the Defence Materiel Organisation, the Director General Navy Aviation Systems and the Head Helicopter Systems Division. Tony set up and led the Group's new Joint Systems Division in 2015 before taking over as General Manager Ships in 2017.

Tony's operational career in the Navy was forged as a helicopter pilot, where he amassed over 5500 military flying hours as a Sea King and Seahawk flight pilot, a display pilot and as a qualified flying instructor. Tony was the Commanding Officer of 805 Squadron in 2001 and commanded the Fleet Air Arm in 2008.

Air Vice-Marshal Chris Deeble AO, CSC (Retd), Executive Director, Strategy, Northrop Grumman Australia

Chris Deeble is Executive Director, Strategy Northrop Grumman Australia. Deeble is responsible for supporting the company's longstanding programs in Australia, as well as exploring new business pursuits.

Prior to joining Northrop Grumman, Deeble worked for Airservices Australia as the program executive for OneSKY, responsible for delivering the Civil Military Air Traffic Management System for Australia. As the program executive, he led a joint Airservices and Defence team in managing the acquisition and delivering the infrastructure of the most complex, world-leading air traffic management system.

Previously, Deeble served for 37 years in the Australian Defence Force, most notably as an Air Vice-Marshal. As a senior program manager in the Capability Acquisition and Sustainment Group, he managed over $25 billions of complex acquisition and sustainment programs. These programs included the Joint Strike Fighter, Wedgetail Airborne Early Warning and Control, Multi Role Tanker Transport and Collins Class Submarine. His performance

in leading these significant programs was recognised in 2016 when he was awarded the Officer of the Order of Australia (AO).

Prior to serving as Air Vice-Marshal, Deeble undertook senior roles in Air Force capability management and aerospace development. As the Director General Aerospace Development, Deeble was responsible for leading the development of submissions to the Australian government for all joint aerospace capability. As a result of his efforts, he was awarded the Conspicuous Service Cross (CSC) in 2007.

Deeble earned a bachelor's degree in mathematics from the University of Sydney, New South Wales.

Rod Equid, Chief of Enterprise Focus Areas, Raytheon Australia

Rod Equid is the Chief of Enterprise Focus Areas for Raytheon Australia, accountable for the company's strategic enterprise pursuits and other special projects. In this role, Rod provides advice to the Raytheon Australia Executive Leadership Team on selected pursuits, shaping the future for the company.

Rod was previously the Chief Executive Officer of the AWD Alliance, the organisation charged with delivering Australia's next generation warships.

Rod has been active in the defence industry for 25 years following a career of 20 years with the Department of Defence both as a serving member and a Defence civilian.

During his earlier career, Rod became a highly regarded test and evaluation specialist focused on flight test as well as both weapons and software certification. He was instrumental in establishing new test and certification techniques to support the introduction of software intensive aerospace systems into service. Rod also managed international test programs conducted at the Woomera range and was awarded the D. J. Knights trophy in recognition of his achievements in flight test.

Rod joined the defence industry with an SME organisation that was subsequently acquired by Raytheon. Since joining Raytheon Australia, he has fulfilled roles in Strategy and Business Development, Business Leadership and Complex Project Management.

Rod holds a Masters of Science in Aerosystems Engineering from Loughborough University of Technology, UK and was awarded the Royal United Institute prize for academic achievement during his associated studies. This complemented a Bachelor of Electrical Engineering (Honours) from Monash University and his broad range of technical and leadership learning undertaken throughout a career of 45 years in the defence domain. Rod is a Fellow of the International College of Complex Project Management.

Air Marshal Mel Hupfeld AO, DSC Chief of Air Force

Air Marshal Mel Hupfeld was born in Sydney in 1962. He joined the Royal Australian Air Force (RAAF) as an RAAF Academy Cadet in January 1980, winning the Flying Prize for his year and graduating with a Bachelor of Science degree in 1983.

Air Marshal Hupfeld's early career was spent in a variety of flying positions on Mirage and F/A-18 aircraft, primarily with No 3 Squadron (3SQN) and No 2 Operational Conversion Unit (2OCU), before qualifying as a Fighter Combat Instructor in 1989. Following a period of service as B Flight Commander, 3SQN, Air Marshal Hupfeld was appointed as the Executive Officer of 2OCU in 1995.

In 1997 Air Marshal Hupfeld was selected to attend the Royal Air Force Advanced Staff Course, graduating with a Master of Arts in Defence Studies from King's College in London, before taking up post as a Deputy Director in the Aerospace Development Branch.

In 2001 Air Marshal Hupfeld took command of No 75 Squadron (75SQN) and led the Squadron in operations in Middle East on Operations BASTILLE and FALCONER. In 2003 Air Marshal Hupfeld was awarded a Distinguished Service Cross in recognition of his performance as Commanding Officer 75SQN on Operation FALCONER, and his Squadron was awarded a Meritorious Unit Citation. On promotion to Group Captain in January 2004 he was appointed Director Aerospace Combat Development in the Australian Defence Headquarters, before accepting appointment as Officer Commanding No 81 Wing in January 2006. Promoted to Air Commodore on November 2007, he became the Director of the Combined Air Operations Centre in the Middle East Area of Operations, before returning to Australia as the Director-General Air / Director General Air Command Operations in March 2008. In December 2009, he took command of Air Combat Group where he oversaw all of the RAAF's fast-jet combat aircraft to deliver Australia's capability to control the air and conduct precision strike.

Air Marshal Hupfeld was promoted and appointed as the Air Commander Australia on 3 February 2012. In this position he provided specialist air advice on raise, train and sustain issues to the joint environment.

In September 2014 he was appointed Head Capability Systems Division in the Capability Development Group. In 2015 Air Marshal Hupfeld received an appointment as Officer of the Order of Australia (AO) for distinguished service to the Australian Defence Force in senior command and staff appointments. In August 2015 he was appointed to the role of Acting Chief Capability Development Group. On the disbandment of Capability Development Group, Air Marshal Hupfeld took up the newly created position of Head Force Design in Vice Chief of Defence Force Group on 1 April 2016.

On promotion, Air Marshal Hupfeld was appointed as Chief Joint Operations in May 2018 and subsequently Chief of Air Force in July 2019.

Commodore Darron Kavanagh AM CSC, RAN Director General Warfare Innovation, Royal Australian Navy.

Darron joined the RAN in 1984 as an Apprentice Electrician. He has served at sea in the guided missile destroyer HMAS Brisbane (2), and the guided missile frigates HMAS Darwin, Melbourne Adelaide and Sydney as a Weapons Electrical Engineering Officer which has included operational service in the Middle East.

Darron's staff appointments have involved the development and realisation of innovative capability by leveraging technology including:

Director General Maritime Integrated Warfare Systems which included delivery of surface ship combat systems, autonomous and robotic mine warfare systems.

Future Force Lifecycle Engineer where he was responsible for the development of material requirements and associated assurance for the future fleet for which he was awarded a Member in the Order of Australia in the 2019 Queens Birthday Honours List.

Lifecycle Engineer for the Surface Combatant Force.

Project Director of the Lightweight Torpedo Replacement Program for which he was awarded the Conspicuous Service Cross in the 2012 Queens Birthday Honours List.

Category Sponsor of Navy's Weapons Electrical Officers and Electronic Technical Sailors

Second Line of Defense

Liaison Officer in Washington D.C. for the joint US/Australian Nulka Project.

CDRE Kavanagh's academic qualifications include an Engineering Degree in Electronics and Communications, Masters of Business Administration (Project Management), Executive Masters Business (Complex Project Management) and a Graduate Diploma of Strategy in Defence Studies. Darron is a Chartered Engineer, Certified Professional Project Director and Graduate of the Australian Institute of Company Directors.

Peter Jennings PSM, Executive Director, Australian Strategic Policy Institute

Peter Jennings is the executive director of the Australian Strategic Policy Institute (ASPI), a position he has held since May 2012. ASPI is Australia's leading think-tank on national security.

He has worked in senior roles in the Australian Public Service on defence and national security. He was Deputy Secretary for Strategy in the Defence Department (2009-12); Chief of Staff to the Minister for Defence (1996-98) and Senior Adviser for Strategic Policy to the Prime Minister (2002-03).

Peter led the 'External Expert Panel' appointed in 2014 to advise on the Defence White Paper, released in February 2016. Peter was a member of the Australia-Germany Advisory Group, appointed by the Prime Minister and German Chancellor in 2015 to develop closer bilateral relations. He has been a member of the Advisory Group on Australia-Africa Relations advising the Department of Foreign Affairs and Trade.

Peter has previously held several Senior Executive Service positions in Defence including First Assistant Secretary International Policy and First Assistant Secretary Coordination and Public Affairs, Deputy Director of the Defence Imagery and Geospatial Organisation and head of the Strategic Policy Branch. In 1999 Peter ran Defence's East Timor Policy Unit, developing policy for the stabilization operation in East Timor.

Peter studied at the London Business School in 2000–2001 as a Sloan Fellow and was awarded a Masters of Science (Management) with Distinction. He has a Master of Arts Degree in International Relations from the Australian National University (1987) and a BA (Honours) in History from the University of Tasmania (1980–1984). He has been a Fulbright Fellow at the Massachusetts Institute of Technology (1985).

Peter was awarded the Public Service Medal in the Australia Day 2013 Honours list. In February 2016 Peter was awarded the French decoration of Knight in the Order of Legion of Honour. In 2021 he was awarded a Commendation by the Foreign Minister of Japan for services to the bilateral relationship.

Peter will step down as ASPI Executive Director after a decade in the position in April 2022.

Brigadier Ian Langford, DSC and Bars (PhD), Acting Head Land Capability

Brigadier Langford joined the Australian Army in 1992 and has held a range of command and staff appointments in the Army and Special Forces throughout his career. He has served in Australia's Joint Operations Command, Army Headquarters, Special Operations Headquarters, and Forces Command.

Brigadier Langford's operational service includes deployments to Timor Leste, Afghanistan, Bougainville, Solomon Islands, Iraq, Israel, Lebanon, Syria, and the South-West Pacific. For his service, Brigadier Langford has been awarded the Distinguished Service Cross on three occasions. He is also an Honourary Aide-de-Camp to the Governor General of the Commonwealth of Australia.

Brigadier Langford is a Distinguished Graduate of the United States Marine Corps Command and Staff College and the School of Advanced Warfighting. He holds a Bachelor's degree in Management, a Master of Arts, a Master of Defence Studies, a Master of Strategic Studies and a Doctorate of Philosophy from Deakin University.

Tom Rowden Vice President International Strategy and Business Development, Lockheed Martin Rotary and Mission Systems

Tom Rowden serves as Vice President, International Strategy and Business Development for Rotary and Mission Systems (RMS) at Lockheed Martin.

In this role, Tom is responsible for international business growth for RMS, including new business identification and pursuit, as well as managing relationships with international customers and partners.

Previously, he served as Director of India and Strategic Campaigns for RMS where he led a team of professionals identifying and qualifying international business opportunities.

Prior to joining Lockheed Martin, Tom served 36 years in the U.S. Navy, retiring from his final position as Commander, Naval Surface Forces/Commander, Naval Surface Force U.S. Pacific Fleet. His sea assignments include Commanding Officer, USS Milius (DDG 69), Reactor Officer, USS George Washington (CVN 73); Commander, Destroyer Squadron 60; Commander/Carrier Strike Group 7/USS Ronald Reagan (CVN 76) Strike Group; Commander Carrier Strike Group 11/USS Nimitz (CVN 68) Strike Group.

Significant shore assignments include Director, Surface Warfare Division on the staff of the Chief of Naval Operations and on the Joint Staff where he worked Integrated Air and Missile Defense for the Director of Operations and Commanding Officer, Surface Warfare Officers School.

Tom has deployed to the Arabian Gulf, Western Pacific, Sea of Japan, South China Sea, East China Sea, Philippine Sea, Mediterranean Sea, Indian Ocean, Black Sea and Gulf of Guinea/West Africa areas of operation.

Tom graduated from the U.S. Naval Academy with a Bachelor of Science in oceanography. He also holds a Master of Arts in national security and strategic studies from the U.S. Naval War College.

Lieutenant General Steven R. Rudder Commander, U.S. Marine Corps Forces, Pacific and Commanding General Fleet Marine Force

Lieutenant General Steven R. Rudder assumed his current position as the Commander, U.S. Marine Corps Forces, Pacific and Commanding General Fleet Marine Force, Pacific on 16 July 2020.

LtGen Rudder is a native of Canton, CT, and was commissioned as a Second Lieutenant in June 1984. LtGen Rudder previously served as the Deputy Commandant for Aviation, Headquarters Marine Corps.

LtGen Rudder's previous assignments include: Serving in Co B, 3rd Amphibious Assault Battalion; Student, NAS Pensacola, FL, designated a Naval Aviator; HMT-303, AH-1J helicopter training; HMLA-367, Maintenance Quality Assurance Officer and Weapons and Tactics Instructor; unit deployments to Futenma, Okinawa, and Operations DESERT SHIELD/STORM; HMM-161 (REIN), Weapons and Tactics Officer deploying with the 11th MEU(SOC) back to North Arabian Gulf; AH-1 Division Head, Marine Aviation Weapons and Tactics Squadron One; Operations Officer, HML/A-167; Future Operations Officer, deploying with the 22nd MEU(SOC) to

EUCOM and CENTOCM AOR, HMM-261(REIN); Office of Net Assessment, the Office of the Secretary of Defense serving as Mr. Andrew Marshall's Military Assistant; Squadron Commander, HML/A-167 deploying to EUCOM AOR in support of Dynamic Mix; Senior Watch Officer, OIF, 3rd Marine Air Wing Tactical Command Center; J5 Lead planner for Afghanistan and Pakistan, CENTCOM, Tampa, FL; deployed to Afghanistan, Pakistan and Qatar in support of Operation ENDURING FREEDOM; Commander, Marine Air Group 26, deploying to Al Asad, Iraq, in support of Operation IRAQI FREEDOM 9.1; Branch Head of Aviation Expeditionary Enablers (APX), Headquarters Marine Corps Aviation; Legislative Assistant to the Commandant, Headquarters Marine Corps, Office of Legislative Affairs; Commanding General, 1st Marine Air Wing, Okinawa, Japan; deployed Wing to

Thailand and South Korea; Director of Strategic Planning and Policy (J5), U.S. Indo-Pacific Command.

LtGen Rudder holds a Bachelor of Science Degree in Business Administration from Boston University, a Masters of Military Studies Degree from the Marine Corps Command and Staff College, and a Masters of Strategic Studies from the United States Army War College.

Personal decorations include the Defense Superior Service Medal, Legion of Merit with Gold Star, Distinguished Flying Cross with Combat 'V', Defense Meritorious Service Medal with Gold Star, Meritorious Service Medal with Gold Star, Air Medal Strike Flight 4, Navy Commendation Medal with Gold Star and Combat 'V', Joint Achievement Medal and Navy Achievement Medal.

Air Chief Marshal Sir Mike Wigston KCB, CBE, ADC, Chief of the Air Staff

Air Chief Marshal Mike Wigston CBE ADC is the Chief of the Air Staff, in command of the Royal Air Force, leading a Whole Force of some 35,000 Regular and Reserve personnel, and 5,000 Civil Servants, supported by thousands of contractors.

Commissioned on a University Cadetship in 1986, he completed his pilot training on the Tornado GR1 in 1992 followed by a succession of frontline tours, including operational deployments enforcing the no-fly zones in Iraq. He commanded 12(Bomber) Squadron, flying the Tornado GR4 and leading the Squadron on two operational tours in Iraq and large force exercises in Canada, Malaysia and the USA. Appointments in operational headquarters have included Al Udeid Airbase, Qatar, as the Chief of Combat Operations in the Combined Air and Space Operations Centre; Basrah International Airport, Iraq as Commander 903 Expeditionary Air Wing; and one year in Afghanistan as the Director Air Operations in Headquarters ISAF Joint Command. He was appointed CBE in 2013 for his contribution to that mission.

Staff appointments in the Ministry of Defence have included the Operations Directorate and the predecessor to what is now Military Strategic Effects. In 2013, after a short spell as the Tornado Force Commander, he became the Principal Staff Officer to the Chief of Defence Staff.

In January 2015, he was appointed Administrator of the Sovereign Base Areas of Akrotiri and Dhekelia and Commander British Forces Cyprus, responsible for the civil governance of the Sovereign Base Areas and command of British forces based permanently in Cyprus.

Senior Royal Air Force appointments have included Assistant Chief of the Air Staff, responsible for the strategic coherence and coordination of the Royal Air Force, and oversight of the RAF100 centenary programme.

Prior to becoming Chief of the Air Staff, he was Deputy Commander Capability, responsible for the strategic planning and delivery of all aspects of Royal Air Force capability including people, equipment, infrastructure and training.

Education and training include reading Engineering Science at Oriel College, Oxford; the

Advanced Command and Staff Course; an MA in Defence Studies from King's College London; the Higher Command and Staff Course; and the UK Pinnacle Course.

He is a Vice Patron of the Royal Air Force Charitable Trust and President of the Royal Air Force Rowing Association.

General Kenneth Wilsbach, Commander, Pacific Air Forces

Gen. Kenneth S. Wilsbach is the Commander, Pacific Air Forces; Air Component Commander, U.S. Indo-Pacific Command; and Executive Director, Pacific Air Combat Operations Staff, Joint Base Pearl Harbor-Hickam, Hawaii. PACAF is responsible for Air Force activities spread over half the globe in a command that supports more than 46,000 Airmen serving principally in Japan, Korea, Hawaii, Alaska and Guam.

Gen. Wilsbach was commissioned in 1985 as a distinguished graduate of the University of Florida's ROTC program and earned his pilot wings in 1986 as a distinguished graduate from Laughlin Air Force Base, Texas.

He has commanded a fighter squadron, operations group, two wings, two Numbered Air Forces, and held various staff assignments including Director of Operations, Combined Air Operations Center and Director of Operations, U.S. Central Command.

Prior to his current assignment, General Wilsbach was the Deputy Commander, U.S. Forces Korea; Commander, Air Component Command, United Nations Command; Commander, Air Component Command, Combined Forces Command; and Commander, Seventh Air Force, Pacific Air Forces, Osan Air Base, Republic of Korea.

Gen. Wilsbach is a command pilot with more than 5,000 hours in multiple aircraft, primarily in the F-15C, F-16C, MC-12, and F-22A, and has flown 71 combat missions in operations Northern Watch, Southern Watch and Enduring Freedom.

Air Marshal Geoff Brown AO (Retd), Chair, Sir Richard Williams Foundation

Geoff Brown, AO retired from the Royal Australian Air Force in July 2015 as Air Marshal in the position of Chief of Air Force. In a 35-year career, he commanded at all levels in the Air Force and flew Chinook helicopters, F-111s and F/A-18 as well as being a flying instructor and a member of the Roulette Aerobatic team. His operational service included Operation Iraqi Freedom where he was the operational commander for all RAAF assets.

Among his qualifications, he holds a BEng (Mech), a Master of Arts (Strategic Studies), Fellow of the Institute of Engineering Australia and is a Fellow of the Royal Aeronautical Society.

Since leaving the Air Force he has been appointed as a Director of Lockheed Martin (Australia), a Director of Electro Optic Systems, Chairman of the ACT Defence and industry Board, Chairman of the Sir Richard Williams Foundation, Chairman of the Advisory Board of CAE Asia Pacific and Middle East, Director on the

Governing Council for the Temora Air Museum and a Director of GCB Stratos Consulting. He also mentors in Leadership and Strategic Studies at the Australian Defence College.

His honours and awards include his appointment as an Officer in the Order of Australia, the United States Legion of Merit and the Meritorious Service Medal from Singapore.

John Conway, Sir Richard Williams Foundation

John is the owner and Managing Director of Felix, an independent company providing specialist capability development, operational analysis, and creative services to Defence since 2017.

He was previously a business development and strategy executive with Raytheon Australia specialising in air combat integration, electronic warfare, advanced weapons systems, test and training ranges, and integrated air and missile defence.

John retired from the Royal Air Force as a Group Captain in 2010 having served 24 years in a number flying, staff and senior command roles. His operational experience on F4 Phantom and Tornado F3 aircraft included Cold War Europe, the South Atlantic, the Balkans, and the Middle East.

He commanded the United Kingdom's largest Permanent Joint Operating Base at RAF Akrotiri in Cyprus between 2005 and 2008 enabling the airbridge into Iraq and Afghanistan, and supporting strategic ISR operations in the eastern Mediterranean. He attended the United States Marine Corps Weapons and Tactics Instructor Course and the Australian Advanced Command and Staff Course.

THE PROGRAM

Conference: Accelerating the Transition to a Networked, Integrated Force

24 March 2022, National Gallery of Australia

Program (updated 18 March 22)

Time	Topic	Speakers
0800-0830	Registration and light breakfast	
0830-0835	Welcoming Remarks	AIRMSHL Geoff Brown AO (Retd), Sir Richard Williams Foundation
0835-0845	Introduction and MC	John Conway, Sir Richard Williams Foundation
0845-0905	Keynote Address	General Kenneth Wilsbach, Commander Pacific Air Forces
0905-0925	Accelerating the Transition	AVM Robert Chipman AM, CSC, Head Military Strategic Commitments
0925-0945	Indo Pacific Context	LtGen Steven Rudder, Commander, U.S. Marine Corps Forces, Pacific and Commanding General Fleet Marine Force
0945-1005	5th Gen Information Environment	MAJGEN Susan Coyle AM, CSC, DSM, Head of Information Warfare
1005-1045	Break – Morning Tea	
1045-1105	Multi Domain operations Threats and Opportunities	AVM Chris Deeble AO, CSC (Retd), Executive Director Strategy, Northrop Grumman Australia
1105-1125	Not Just Platforms' – Architectural & Policy Considerations Enabling Truly Effective 5th Gen Joint C2	Rod Equid, Chief of Enterprise Focus Areas, Raytheon Australia
1125-1145	The Italian Air Force, a 5th gen. Air Force and beyond"	Lt. Gen. Aurelio Colagrande, Italian Deputy Chief of Air Force
1145-1205	Acquiring and Sustaining Next Gen Capabilities	Tony Dalton AM, Deputy Secretary National Naval Shipbuilding
1205-1225	UK Perspective	Air Chief Marshal Sir Michael Wigston, KCB, CBE, ADC, Chief of the Air Staff, Royal Air Force
1225-1240	Army Perspective	BRIG Ian Langford, DSC and Bars (PhD), Director General Future Land Warfare (rep Chief of Army)
1240-1355	Lunch	
1355-1415	Getting the bigger picture - Networking the Force	Tom Rowden, Vice President International Strategy and Business Development
1415-1435	Future Trends	Peter Jennings PSM, Australian Strategic Policy Institute
1435-1450	Navy Perspective	CDRE Darron Kavanagh, Director General Warfare Innovation Navy, representing Chief of Navy r
1450-1505	Air Force Perspective	AIRMSHL Mel Hupfeld AO, DSC, Chief of Air Force
1505-1515	Formal Close	AIRMSHL Geoff Brown AO (Retd), Sir Richard Williams Foundation