



NATO

OTAN

**NATO
Multi-Domain
Operations
Conference**

United Kingdom
16-18 March 2022



Foreword

General Phillipe Lavigne, Supreme Allied Commander Transformation (SACT) and Admiral Sir Tony Radakin KCB ADC, Chief of Defence Staff of the United Kingdom co-hosted the NATO Multi-Domain Operations (MDO) Conference in Oxfordshire, United Kingdom on 16-18 March 2022. The event aimed to create a shared understanding of the concepts and principles of MDO, share national and organizational perspectives, and inform ACT's conceptual work moving forward in order to help align NATO MDO efforts as well as identify and prioritise the critical next steps to address this complex topic.

An audience of over 200 attended, including 56 Flag and General officers and subject matter experts drawn from 22 NATO nations, NATO HQ (International Staff, the International Military Staff), the NATO Command Structure, Agencies and Organizations, selected NATO Centres of Excellence and selected individuals from industry and academia.

The conference took place during the third week of President Putin's War in Ukraine which provided for conversations and discussions. It was recognized that tactical and operational level successes and failures in Ukraine, clearly underline the need for NATO to master MDO. Looking at NATO's current threats it was suggested that currently, Russia is a shaping threat, China is the pacing threat and Climate is a forming threat. Within this context, the Conference sought to discuss how these threats will look and transform into the future and how MDO may help shape, contest or fight them.



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**Allied Command Transformation
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Norfolk, Virginia | USA



General

Philippe Lavigne, FRA A&SF

MDO Conference Participants

25 April 2022

I am extremely pleased with all we achieved at the ACT and UK co-hosted MDO conference that brought over 200 people from 20 different nations!

The enclosed report shows the quality of the briefings, audience questions and discussions that are being used to increase momentum for this work, with the continued support of Allied Command Operations.

First, our priority is to develop MDO as part of a broader Military, Diplomatic, Information and Economic levers of power approach. The Alliance's approach will enable NATO's Military Instrument of Power to orchestrate military activities in synchronisation with the other levers of power, partners and stakeholders. This is where the true power of multi-domain action will be generated.

Second, Education of all stakeholders is key. Our military must think multi-domain, understanding what can be achieved in areas where they, and perhaps their Nation, are not experts. We must all understand our role in enabling NATO to deliver MDO, which requires a change in mindset!

Third, Digital Transformation of the Alliance is critical as the foundation for MDO. Transformation must start today through incrementally-delivered and cohered capability development programs that integrate on-going initiatives. This will need to be underpinned by a 'need to share' philosophy to connect all parts of the Alliance.

Fourth, the future started yesterday. President Putin's war in Ukraine created a sense of urgency to accelerate adaptation. We must leverage emerging insights to ensure MDO remains relevant, while also looking to the future. Our agreed roadmap for long-term warfare development as described in the NATO Warfighting Capstone Concept (NWCC), alongside SACEUR's Concept for the Deterrence and Defence of the Euro-Atlantic Area, are the vehicles to prepare us for the New Strategic Reality.

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Fifth, MDO requires a pathway to change. The Alliance Warfare Development Agenda (WDA), as the implementation plan for NWCC, will map out a phased delivery approach. We must evolve from 'Joint and Interoperable' forces and capabilities, while prioritising rapid development in Cyberspace and Space domains. Equally, NATO's Exercise and Educational programmes provide unique opportunities to experiment as 'we mean to fight' to enable multi-domain action.

I again thank all those who participated as this was an excellent and very successful event. The Conference was an important step to deliver MDO more fully into the hands of our warfighters and cross-government colleagues at pace.

Together we will win as a team!

A handwritten signature in black ink, appearing to read "Philippe Lavigne".

Philippe Lavigne
General, French Air and Space Force
Supreme Allied Commander Transformation

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“We recognize that conflict no longer resides only in the physical sense across the traditional domains of Land, Air and Maritime. Modern military operations rely heavily on Space, just like our everyday life. Cyberspace generates incalculable threats from adversaries, but has also become an area of people’s resistance. NATO must have the capability and the capacity to understand this changing operating environment, and develop strategies to maintain deterrence and to ensure warfighting advantage in all five operational domains.

To do so, NATO needs to go beyond joint, and towards Multi-Domain Operations.”





Day 1 Keble College -



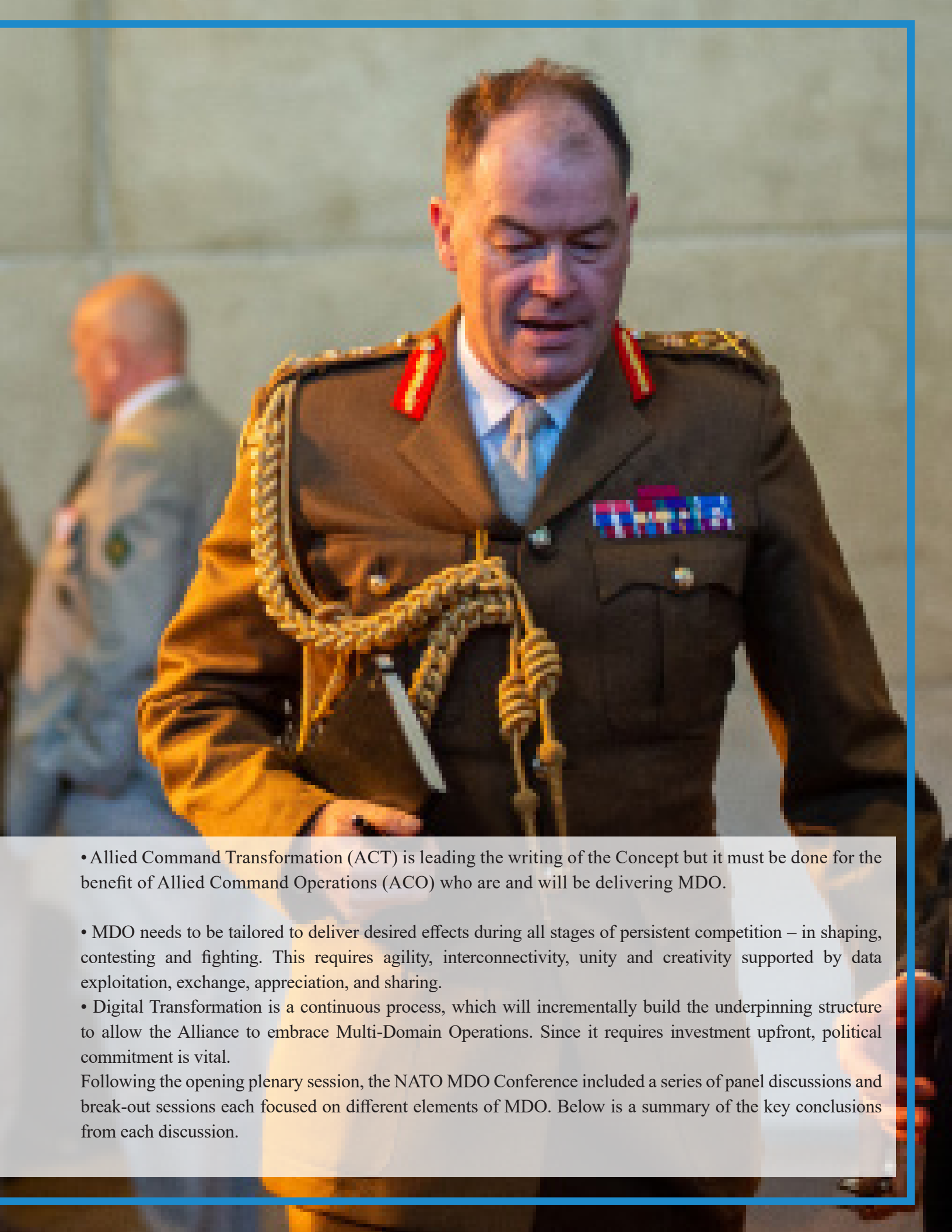
- Session Summaries

Opening Session



Opening remarks were provided by General Sir Patrick Sanders, Commander of the United Kingdom Strategic Command and General Phillipe Lavigne, Supreme Allied Commander Transformation. They noted:

- MDO can compensate for weakness in a single domain and increase the overall effectiveness. To do so, the forces must be multi-domain by design and integrated by instinct. Achieving this requires a fundamental cultural change.
- There are still weaknesses in understanding what MDO is, so the NATO Military Committee step-by-step approach (first - vision, definition, and principles; then - initial MDO Concept) was recognized as the most feasible one.
- MDO working definition was shared with the audience and was recognized as broad and encompassing enough.



- Allied Command Transformation (ACT) is leading the writing of the Concept but it must be done for the benefit of Allied Command Operations (ACO) who are and will be delivering MDO.

- MDO needs to be tailored to deliver desired effects during all stages of persistent competition – in shaping, contesting and fighting. This requires agility, interconnectivity, unity and creativity supported by data exploitation, exchange, appreciation, and sharing.

- Digital Transformation is a continuous process, which will incrementally build the underpinning structure to allow the Alliance to embrace Multi-Domain Operations. Since it requires investment upfront, political commitment is vital.

Following the opening plenary session, the NATO MDO Conference included a series of panel discussions and break-out sessions each focused on different elements of MDO. Below is a summary of the key conclusions from each discussion.

Moderator: *Dr Keith Scott, Senior Lecturer, De Montfort University*

Panellists:

• *Lieutenant General Rob Magowan, Deputy Commander, United Kingdom Strategic Command*

• *Vice Admiral Stuart Munsch, Director Joint Force Development, J7, United States Joint Staff*

• *Major General Yves Metayer, Emploi des forces – Protection Division Chief, French Joint Staff*

• *Mr James Black, Research Leader, RAND Europe*

The aim of the panel was to present national approaches to MDO and compare and contrast the main principles of implementation and the linkages of the military with non-military Instruments of Power (IoP). While there are many differences, the panel highlighted some of the main similarities relevant for NATO's work on MDO. The initial NATO Concept acknowledges that there are different national perspectives on MDO and does not aim to force nations to change their own approach, but rather provides a unifying construct and vision on which all nations can agree. Of note:

- MDO can be viewed as a tool for integrating deterrence at the strategic level and activities across applicable IoPs (diplomatic, information, military, economic) at the operational level.
- MDO expands the manoeuvre space from which operational art can be applied and to deliver options to decision makers for symmetric and asymmetric engagement. It is imperative to avoid a stove-piped battlefield.

- Developing and implementing MDO will be “a journey” that will be informed as we develop our thinking and practice. Domains in which we operate, and the dimensions in which we effect, may change, so we need to be able to embrace it, be agile and adapt accordingly.

- In applying MDO, traditional Command and Control (C2) will not suffice. It will require different supported/supporting relationships and the integration of generalists and specialists across all levels. It will also require transformation of the broader socio-technical system as well as organizational culture. In order to address this complexity, three key pillars needs to be addressed: ‘cognitive’, ‘regulative’, ‘normative’ that relate to mind-sets, rules, and behaviours respectively.





SESSION 2 –MDO EDUCATION AND TRA

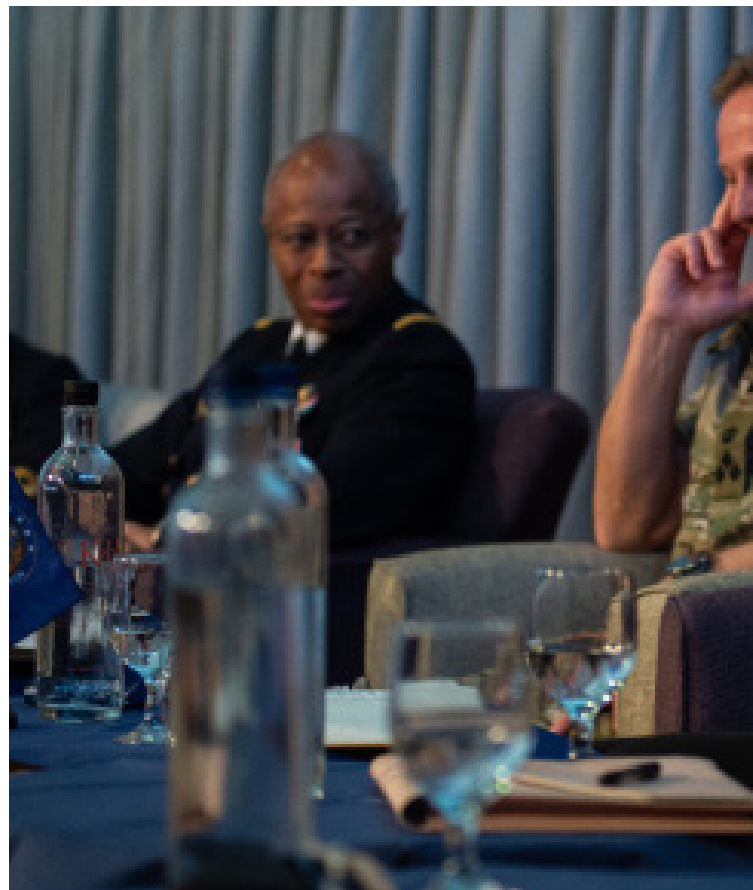
Moderator: *Professor Beatrice Heuser, Chair of Politics and Intl Relations, University of Glasgow*

Panellists:

- *Rear Admiral Henrik Ryberg, Commandant Danish Royal Defence Academy*
- *Major General Jean-Marc Vigilant, Director, French War College*
- *Brigadier Matt Jackson, Director, United Kingdom Joint Service Command & Staff College*
- *Brigadier General Ilmars Lejins, Assistant Chief of Staff, Joint Force Development, Allied Command Transformation*
- *Dr Michelle Black, University of Nebraska, Omaha*
- *Mrs Sarah Chapman Trim, Culture and Behaviours Lead, Multi-Domain Integration, United Kingdom Strategic Command*

The aim of this panel was to explore how civil and military education can facilitate the required changes of culture and mind-set to implement MDO. Different nations and institutions approach MDO education and training in different ways that provide a force-multiplying effect.

Many allies are already doing great work to bring multi-domain thinking into their basic training and college environments. Currently, this takes place predominantly at the command and staff college level. There is however, a unifying view that this will need to change and MDO must be introduced at all levels of military education and training.



INING - Changing Culture and Mindset



The panel also noted:

- There are challenges in how human capital is developed to implement MDO, but through the Warfare Development Agenda 'Cross-Domain Command' effort, specifically the focus on the Development of Cross-Domain Leaders' NATO ACT will start addressing this at the NATO level.

- Training for MDO is a moving target, and it needs supporting concepts and doctrine as there is currently a lack of common understanding and standardisation. There is an old adage that says 'when people don't know what to do, they do what they know,' which is often a backwards looking view. It is vital to determine what inhibits the promotion of the skills we need, and address them at the root.

- There is a need to balance training needs and training availability. Disruptions of training and education such as during COVID may have fundamental and long lasting negative impact on the force readiness. There has to be built-in flexibility.

- Implementing MDO requires deep and profound cultural change. If unsuccessful, no amount of strategies, concepts or doctrines will make MDO work. The key is to incentivise change and behaviour, and target rules that inhibit the change we need.





SESSION 3 – Digital Enablement of Multi Domain Operations

Moderator: *Major General Tom Copinger-Symes, Director Strategic & Military Digitisation, Defence Digital United Kingdom Ministry of Defence*

Panellists:

- *Mr. Mario Beccia, NATO Deputy Chief Information Officer for Cyber Security*
- *Dr. Matthias Hammer, Senior Vice President and Head of Engineering for Connected Intelligence and Multi Mission Systems, AIRBUS and NATO Interoperability Advisory Group*
- *Dr. David Lanc, founder and Chief Executive Officer of Ionburst and Cyborn*
- *Dr Oliver Lewis, co-founder of Rebellion Defence*
- *Colonel Richard Abelkis, NATO Communications and Information Agency Executive Management*

The aim of the panel was to explore how data driven processes and technology can enable MDO, what solutions already exist in the private sector that are applicable within NATO, and what are the most imminent impediments to the successful digital transformation of NATO. This panel noted:

- There is a need to define what must change. The NATO Enterprise is 41 organisations (the NATO Alliance plus the 30 nations). The NATO Coalition is the Enterprise plus all other organizations and partner nations that the Alliance works with. Change needs to start from within and spread out, but it has to be informed by the actions the Allies are already doing so that digital enablement is compatible. While thinking big, we need to start acting small and fast.

- A Digital backbone cannot be linear and centralized, but needs to be adaptable and always compatible. Therefore, we need to start by solving technical problems at the lowest level, and allow systems to grow.

- The banking and international monetary sectors provide readily available solutions and ideas for safe, secure, and flexible data sharing among the public, government and private sector.

- ‘Trust the data is mantra for NATO’s future.’ Data needs to be collected from all sources, verified, and protected across all domains. Current systems cannot handle data from an enterprise of connections and this needs to change. All systems should be set up ahead of time to share data across the organisation and amongst Allies to enable availability of right data, at the right time, in the right format when a decision is made to share it widely. Access and the ‘Need to Know’ principle must be reimaged to a ‘Need to Share’ to allowing pattern recognition.

- NATO needs new models of contracting. It should consider an inverted cycle of procurement, focussing on the effects operators need to achieve instead of on a predetermined capability. This focus can shift from a hardware-centric view that is harder to change, to more easily adaptable software solutions. We must be aware that this would require a change of mind-set where software development is in a state of constant flux (and no longer think in terms of initial and final operational capability) through continuous improvement and evolution.

be added to widen the aperture of the political level.

- At the strategic level, it is all about dialogue and bilateral discussions. Therefore, MDO C2 could be problematic in language, given that civilian authorities do not exercise C2. It was suggested that, within the definition of MDO, a spectrum of agreed terms that described C2 such as co-ordination and synchronisation may be more palatable.

- When a decision is made at the political level, SACEUR then determines how the military will accomplish the mission. NATO by its consensus nature lacks specificity its political guidance and the current level of political-military (POL-MIL) understanding is low.

- The coordination of the IoP cannot be combined with the military role of orchestrating the five domains (land, air, maritime, space, cyberspace); the military must master its own sphere to ensure that the war is not lost.

• Training, Exercising and Wargaming C2

- It is vital to integrate modelling, simulation, experimentation, and wargaming into MDO work.

- Projection of the MIOp was considered an important factor for MDO C2. The importance of conducting exercises and capability demonstration serves not only as a means to develop readiness and experiment with C2, but also to demonstrate capability for deterrence reasons.

- Rigidity in thinking only makes things worse and we must not get locked into a cycle of “conceptual agony.” NATO must use all the tools available and not be afraid to fail in training as these ‘failures’ can help identify weaknesses and opportunities of MDO implementation. NATO needs to be evidence-based and seek incremental progress instead of perfect solutions from the start.

• Digital Enablement of C2

- Getting C2 right from a technical standpoint is the ‘easy’ part. The bigger challenge is connecting the right people, at the right time, at the right level, with the right information to support the right decision making.

- Cyber is already (and constantly) under attack. NATO needs to accelerate the digitalization effort, and change how we classify information to enable better information sharing across domains and with partners.

- Information Technology (IT) does not tell the Alliance how to command and control; C2 should be defined first and then the IT infrastructure should be built to support.

• Practicalities of Implementation

- We should avoid getting bogged down in conceptual and theoretical debates, and should focus on practical implementation. There are many good examples of MDO implementation available. Integrate as needed to conduct a task, take an action or create an effect, it doesn’t always have to be ‘all domain’.

- NATO’s mission is defence and the initial focus for MDO should look to “in-conflict” C2 challenges.

- Nations will join MDO at a variety of levels depending on the maturity and capability of their military forces. Focus on the smaller nations of NATO; larger nations have better means to be interoperable with NATO in a MDO context.

- MDO was described as a “vehicle to an end, not the vehicle itself” in that MDO is not a strategy in and of itself but is rather a mechanism to accomplish a strategy.





Day 2- The Defence United Kingdom



ce Academy of the Kingdom

SESSION 4 – MULTI-DOMAIN COMMAND AND CONTROL



The aim of discussion was to tap into the collective knowledge and experience of the attendees and explore complexities of commanding and controlling multi-domain activities across the national military Instruments of Power (IoP) and then synchronizing them with those delivered by other

national IoP. This complexity further grows when considering C2 at the alliance level. Each Nation uses Strategic, Operational and Tactical (as per AJP-01), but is this adequate when we consider MDO C2? If NATO were to have a supra-strategic C2 function in the MDO context then the term Grand Strategic could be appropriate. The breakout discussions mostly focused on five different themes:

- Thresholds – C2 at Different Stages of Competition and Conflict
- In the modern age, ‘thresholds’ are very ambiguous as our adversaries attempt to operate below the threshold of open conflict – the so called the grey/hybrid zone. Cyber, Electro-magnetic and non-kinetics effects in particular are delivered on both sides of the threshold.
- Multi-domain C2+ is complex and must be normalised during shaping so that escalation can be managed and the transition to contesting & fighting can be rapidly achieved.
- Agile flow of direction, guidance and information up-down and across all levels, all domains and all IoPs is a key, but extremely difficult to achieve. There is a lack of understanding of the “supported-supporting commander” dynamic within the military domain. This needs to be addressed within the Military IoP (MIOp)

before it can be considered or addressed within the other instruments of power.

- Below the threshold of war, integration, cooperation and coordination between the MIOp and other IoPs has to be developed and practiced. Namely, the management of ‘supporting’ verse ‘supported’ functions within National and NATO authorities. Nations have differing perspectives on how responsibility is managed, transferred and relinquished. While it is challenging to issue the Transfer of Authority below the threshold of open conflict, it is likely too late to build relationships and processes once the ‘shooting starts’.
- Initial steps in implementing MDO C2 should start at the NATO HQ with organizational adaptation.
- Linkages Between Military and Non-military Instruments of Power
- All participants agreed broadly that military cannot exercise C2 on other instruments of power. However, through the MDO construct the MIOp can help the political-level frame and deliver synchronized activities through other IoPs. The MIOp should be considered as a facilitator of MDO though all IoPs, and not its commander.
- Command – Control – Influence. In the MDO integration of MIOp and other IoPs, military commanders should aim to promote and influence non-military counterparts.
- Additional complexity occurs when MDO operates in the new domains (space and cyberspace) that are shared between military and non-military actors. Joint C2 cannot be exercised as simply in these domains as with other more purely military domains.
- There is a political layer encompassing the DIME (diplomacy, information, military, economic) construct, to which information, social and cultural elements could

Scene Setter: Dr Michael Rouland, Director of Research, Russian Strategic Initiative, United States European Command



The aim of the discussion was to explore how NATO should consider escalation management in relation to an adversary.

de-escalation? The escalation ladder is not just up-down in a particular dimension / domain against a single entity, but goes laterally outside of the traditional geographical boundaries and beyond borders as multiple actors are affected and involved. The keynote speaker anchored his remarks in the current crisis in Ukraine, and asked questions to stimulate thinking, for example by noting that Putin has undertaken a global campaign to expand Russian influence and wondering if NATO activities / investments are aligned to counter this strategy? Participants in the breakout sessions noted:

- There is an inherently political nature of escalation management. The military role in escalation management at the Strategic level is to provide options to decision makers that would pose dilemmas and ‘off-ramps’ for adversaries. These options should span conventional, unconventional, irregular and nuclear warfare.
- The consequences of the actions taken by the other IoPs on our own population, in the framework of MDO escalation management, must be carefully considered.
- Nations within NATO have different perceptions of escalation, some prefer soft

actions and wish to avoid conflict at all cost, while others are more in favour of firmness.

- Adversaries exploit the grey zone (below the threshold of war), NATO has to develop MDO escalation management in this context (note: shaping and contesting is discussed in the NATO Warfighting Capstone Concept).

- Information campaigns as part of the escalation ladder can engage other nations to bring pressure on the adversary. We must better understand the information environment, and strategic communications are key.

- The severe effects of sanctions (with collateral impacts) might create escalation versus the desired outcome. Ensure there are “off ramps” for de-escalation purposes.

- We need to understand our adversaries’ escalation mind-set, and their strategic intent. Thinking they are like us and will interpret and react like us is a fundamental flaw of our approach. We must better understand the mind-set of the adversary and their decision making process and figure out how to track cognitive change in leaders and populations.

- Third party countries may have more leverage and be “better influencers”.

- Training for escalation management is difficult. Exercises and wargaming provide a good venue (e.g. CMX, EX STEADFAST JUPITER), but only if they are well red teamed.

Open Questions Remaining?

- Has NATO’s increased exercise programme been interpreted as aggression and is it provocative?
- How much influence do we really have (on the adversary mind-set)? Are we relevant?
- Partnerships and cooperative security – is this “in and of itself” an escalatory approach?

MULTI-DOMAIN OPERATIONS GAP ANALYSIS

Moderator: *Lieutenant General David Julazadeh, Deputy Chief of Staff for Capability Development, Allied Command Transformation*

Panellists:

- *Major General Karl Ford, Director Policy and Capabilities Division, NATO International Military Staff*
- *Lieutenant General Brice Houdet, Vice Chief of Staff, Supreme Headquarters Allied Powers Europe*
- *Vice Admiral Guy Robinson, Chief of Staff, Allied Command Transformation*

The aim of the discussion was to explore the gaps to achieve the MDO vision. While gap analysis is often focused toward required capabilities, this session also looked at gaps in strategy and policy, force structure and level of ambition. The panel was comprised of senior leaders from three NATO organisations with different perspectives. The panel noted:

- MDO development needs to determine NATO's integration function for accessing effects in the cyber and space domains.
- Capability mixes should be shaped through the NATO Defence Planning Process (NDPP) to help realise MDO. NDPP should be "de-mystified" and solutions should be identified that are platform agnostic.
- NATO requires a line of activity for MDO that is



calibrated to achieve agreement for all 30 NATO members. While MDO must account for all instruments of power, its development should remain military centric.

- War gaming, operational experimentation and exercising should be leveraged and become more sophisticated to help enable MDO.
- The current crisis in Ukraine should not be wasted as it provides a unique opportunity to enable MDO development. Lessons must be viewed through an MDO lens, so that both red and blue insights can inform MDO work.
- Digital transformation is a necessity; NATO needs a digital transformation strategy.

Conclusion

The NATO Multi-Domain Operations Conference

was an invaluable opportunity to generate shared understanding of MDO principles and the development of the MDO concept. The ability to share national and organizational perspectives was vital to inform NATO ACT's conceptual work for the future. The fact that over 200 people to include 56 Flag and General officers attended such an event during a challenging time for Europe attests to the importance of the topic.

The success of the MDO Conference is a direct reflection of the contributions of the moderators, panellists and audience. It would not have been possible without our hosts, the United Kingdom Ministry of Defence and the multitude of organizations that provided support.





Speeches



“
**THE NET RESULT IS THAT HE IS A WEAKER
AND MORE DIMINISHED FIGURE TODAY
THAN HE WAS THREE WEEKS AGO – AND
CONVERSELY, NATO IS STRONGER AND
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”

Opening Remarks *Icebreaker*

Admiral Sir Tony Radakin, Chief of Defence Staff of the United Kingdom

It's a pleasure to welcome you to the start of the MDO Conference – and a warm welcome to my co-host, General Philippe Lavigne.

It's great for the two of us to have the opportunity to demonstrate a moment of Anglo-French unity, before we resume our historical antagonisms on the rugby pitch this weekend.

We meet at an extraordinary time. Our thoughts and admiration are with the people of Ukraine as they fight for the future of their country. The coming weeks are going to be very difficult, but in many ways Putin has already lost.

Far from being the far-sighted manipulator of events that he would have us believe, Putin has made a series of catastrophic misjudgements:

- He has failed to recognise how deeply the notions of sovereignty, democracy and national identity have taken root in Ukraine.
- Like all authoritarians, he has allowed himself to be misled as to his own power and ability, including the effectiveness of the Russian Armed Forces.

- Lastly, he has failed to anticipate the unity and cohesion that exists among the free nations of the world, here in Europe and far beyond.

The net result is that he is a weaker and more diminished figure today than he was three weeks ago – and conversely, NATO is stronger and more untied today than at any time I can remember.

Whether this is the beginning of the end for Putin, or merely the end of the beginning, is difficult to tell. Either way, the world has changed and we should be cautious of drawing instant conclusions.

But, buoyed by NATO's renewed sense of unity and purpose, we have an opportunity over the next couple of days to add renewed focus and momentum to the ongoing conversation around integration.

Because what is clear for the situation in Ukraine is that too often the debate around the future of warfare is framed as a simplistic choice between traditional 20th century way of doing things versus the new world of digital and cyber. That's a false distinction – it is both together.

In the lead-up to Russia's invasion of Ukraine, we saw true-multi domain operations: the massing of troops in Ukraine's border; maritime & air exercises in the Atlantic/Med/Pacific; nuclear



drills; cyber-attacks, misinformation, false flag operations - all melded together, and obscured behind a veil of diplomacy and denial.

Since They crossed into Ukraine, Russia's record has been more mixed. if anything, we've seen a failure of integration:

- A failure to coordinate fires and manoeuvre.
- A failure to fully exploit cyber and Electronic Warfare.
- Poor intelligence and logistics.
- All of which has been compounded by Ukraine's strengths – national cohesion, smart planning (dispersal of forces), effective information operations.

Russia's woeful performance in Ukraine remind us that integration is not easy. It's hard for our adversaries, and it is hard for NATO. But in this era of constant competition, whichever nation can do it better will have an advantage.

The most obvious challenge for NATO countries is how we harness the deep expertise we have in the three traditional domains and fully incorporate cyber and space, both as enablers and as domains in their own right.

But the challenge is also how we integrate more broadly: across Government; with allies and international partners; working

closely with industry; and taking on challenge from academia.

The UK response was the Integrated Review:

- Russia as acute threat / anchored in NATO.
- Greater cross government integration to align military, economic, diplomatic, cultural tools.
- Persistent engagement with partners and allies.
- PJHQ / PSC(I) / Cyber / Space

We have seen glimpses of a more integrated approach in our response to Ukraine:

- Internationalised – through NATO, Joint Expeditionary Force (JEF) but incl. Japan / Australia etc
- Economic, diplomatic, cultural, sporting – from Nordstream to Netflix.
- Declassification of intelligence to expose Putin's plans.
- Cross Government Information Cell – to counter misinformation.

But we must do better. Ukraine is the spur to go further and faster – not just in countering the threat posed by Russia, but at the grand strategic level as we seek to buttress the rules-based system internationally.



Our task as military leaders is to maintain the cohesion and unity we've seen in the diplomatic space over the past month and apply it to the way NATO works, from capability design through to military operations, so that we can operate ever more seamlessly in the future.

For all these reasons, I absolutely stand behind what General Lavigne and his team at Allied Command Transformation are doing to further this agenda across the length and breadth of the Alliance, as an integral part of the Warfare Development Agenda and the NATO Warfighting Capstone Concept.

This Conference is an opportunity to work through some of the critical capabilities and enablers that will ensure we can meet General Lavigne's ambition to understand better, decide faster and act in a way that is stronger.

- Capability – experimentation, force development, integrated C2, digital enablement.
- People – education and training – but also how we design and develop equipment; and undertake operational planning.
- Culture – so that integrating becomes second nature; and language matters - working across 30 nations, it is vital that we speak clearly

and understand one another.

In sum:

- NATO will remain, central to the UK's national security, and to Euro-Atlantic security.
- We must maintain our cohesion and resolve through the current crisis, but also build for the future at the same time.
- Integration gives us the means to be a strong and cohesive force in an uncertain world; to offer greater political and military choice to decision makers; and to be the greater the sum of our parts, militarily, governmentally and as an Alliance.
- The UK is committed to work with you NATO to make this happen.

General Sir Patrick Sanders, Commander United Kingdom Strategic Command

"Ladies and gentlemen, welcome to the magnificent Keble College. We're gathering at a pivotal moment in NATO and Europe's history. These are truly dark times, and the Russia-Ukrainian War is the most severe geopolitical event since World War Two. It's going to result, I'm sure, in far greater global consequences than the 9/11 attacks that defined much of the trajectory of our careers.

Of course, we don't know what the outcome of Putin's monstrous war is going to be. But we can say for sure, at this point, that it's inflicting untold suffering on the Ukrainian people, and I'm sure that you, like me, are in awe of their incredible bravery and tenacity.

We can also say that Putin's actions have inspired much of the world to unite against his aggression. But they also increase the risks to European and global security to a level unprecedented since the lowest ebb of the Cold War, with the consequences of escalation profoundly grave.

Conferences like this that demonstrate NATO's resolve to deter and defend NATO territory, both now but importantly for this conference, on an enduring basis into the future, are hugely important.

As well as having broken any number of laws and violated peace in Europe, Russia's Armed Forces have also surprised many of us by demonstrating an array of shortcomings.

We should be profoundly cautious in drawing false conclusions. Russia has a long history of starting wars badly before improving. But it does seem clear that Putin has miscalculated and made some fundamentally flawed assumptions about the will and the tenacity of the Ukrainian people and their commitment to their own sovereign choices.

These failures also illuminate weaknesses in doctrine or the application of doctrine, and in their ability to prosecute multi-domain operations.

At the strategic level, Russia's ability to orchestrate the diplomatic, economic and information levers of power, with the military instrument of power, has been eroded. And in the information domain, the timely declassification and release of intelligence by the US and allies has prevented Russia from gaining the upper

hand in the information confrontation. In effect, we got the truth out before the lie. And first-mover advantage in information warfare is huge.

Since the invasion, the Ukrainians have dominated the information narrative with extraordinary skill, though it remains to be seen, of course, to what extent this penetrates into Russia.

At the operational level, it's true that the Russian build up days, weeks, months and years in advance of the invasion demonstrated a really sophisticated integrated use of levers across government, and indeed society, to build and foster a multi-domain advantage.

But we've all seen a failure to conduct the full orchestra of war between armour, artillery, air, engineers, and so on, to exploit their natural strengths in electronic warfare, and to integrate with the cyber and space domains in a way that compensates for respective weaknesses in each domain, and multiplies the overall effect.

It's not clear to any of us whether this is a failure of concept, of execution, or simply human capacity, or all of these. But we can be certain that Russia will be learning from this experience, and will emerge more capable and more dangerous as a result, and we have to offset that.

It serves as a salutary lesson. Even for an advanced military like Russia, the ability to conduct combined arms, joint and integrated operations at tempo and scale, is challenging.

Therefore for us, it underlines the importance of NATO's ability to master cross-domain and cross-instrument of power understanding, connectivity, and action, at speed and scale, as the NATO Warfighting Capstone Concept describes.

So we would be failing in our duty if we don't learn the right lessons from this war, and use them to strengthen NATO's deterrence and defence capability.

We have got some way to go. If I assess our own performance here in the UK Armed Forces, we remain configured for joint operations in the era of industrial warfare.

We haven't shifted at the pace required to become an integrated force to be able to both operate and fight in the Information Age, one that can out-think, out-excel, out-fight, out-pace, out-partner, and out-last or adversaries.





So what ACT is doing in the MDO space is critical to NATO's competitiveness and deterrence ability. The Warfighting Capstone Concept provides us with the North Star and the new force model, and prepares the structures to harness multi-domain operations for the Alliance. As such, the new reaction force will be multi-domain by design. We in the UK will play our part in this endeavour.

I am really pleased to see that this conference is going to address the most important aspects of developing an approach with the five key panel discussions that we're going to go through today and tomorrow. And I'm looking forward to hearing from all the speakers during these sessions.

I would like to speak very briefly about the UK's role, experience and ambitions in multi-domain operations. We tend to use the term Multi-Domain Integration, you will have seen that from some of the literature that we've shared.

So what does that mean? Well, it's really nothing more or less than ensuring that every part of defence can work seamlessly together, and with other government departments, and the UK as allies, to deliver a desired outcome.

But the most important aspect of this is that it is a mentality. It is a cultural challenge fundamentally.

We in the UK tend to think of ourselves as being reasonably competent at joint operations. But it has taken a generation longer for that to take effect. And the sort of surgery that we had to commit ourselves to creating a Joint Staff College and dissolving the single Service colleges, creating joint doctrine, creating joint headquarters.

I am really one of the first generation of Chiefs that has benefited from that joint culture, and that joint integration. I think we face a similar challenge when it comes to integration across the five domains.

We have an Integrated Operating Concept that provides us with a framework, and we have a Multi-Domain Integration Change Programme, led by my deputy, Lt Gen Rob Magowan, who you'll hear from later on. That's the means by which we're leading and catalysing integration within our Armed Forces, from the strategic to the tactical level, and promoting integration across government and with allies.

There are three core pillars to this programme: people, capability, and force development and operational experimentation.

First and foremost, people are the key to developing the adaptive edge to give us the advantage: training, education and inculcating operational lessons provide the ways of changing that culture so we begin to integrate by instinct at every level, and make the operational commanders of tomorrow demand more.

Second, capability, and we're pivoting towards the exploitation of Information Age capabilities. The Change Programme is stimulating innovation and integration across all lines of developments. It is resolving policy and process challenges. For example, directing the standards that will enable our Defence Digital Backbone programme, which gives us the ability to exploit data and share it with partners, enhancing our ability to operate and fight.

And thirdly, we're testing new theories and alternative force structures, as well as assessing the threats and the opportunities of new technology.

Our Exercise Integrated Warrior provides us the conceptual focus, provides us the bold experimentation objectives on operations and exercises, to shape and accelerate progress. And all of that charts towards Exercise Integrated Defender in 2024, which will provide a strategic headmark to demonstrate tangible progress against the Integrated Operating Concept and NATO's warfare development agenda. This capstone event is going to focus on delivering truly integrated operational advantage from operate through to warfighter.

I'll give you just a couple of examples of the sort of work that we're talking about.

First, our National Cyber Force, which is a truly integrated organisation. Perhaps uniquely, it brings together two intelligence agencies and the MOD to develop our abilities as a responsible cyber power, ranging across the full spectrum of cyber threats and providing options that can be integrated as a national lever of power, and also with military operations from the strategic to the tactical level. It's a truly blended effort.

Secondly, because this is a NATO conference, it would

be remiss not to mention HQ Allied Rapid Reaction Corps (ARRC). Certified in 2020 as NATO's first corps warfighting headquarters since the Cold War, HQ ARRC's pioneering attitude has led the application of multi-domain capabilities of the high tactical level. HQ ARRC, following NATO's example, has used air-land integration to form the foundations of its MDO approach.

ARRC has the sole NATO ground liaison element within the headquarters and the certified air operations component command. And this critical presence of joint expertise in the headquarters has allowed further development of capabilities in the other domains. A multi-domain team has been established in the core main command post, and new posts have been formed within the headquarters to integrate the space and the cyber domains.

So when they consider a course of action, all of the domains are considered with subject matter experts on hand to find the best solution. Accompanied by Special Operations Forces advisors, and routine deployment of above-secret communications, HQ ARRC, is truly able to harness the unique attributes that each domain has to offer, whilst also integrating through operational communications into our intelligence agencies, partners

across government and other organisations operating in theatre.

Alongside that innovative approach taken to MDO development, HQ ARRC maintains a near continuous presence of staff officers across Central and Eastern Europe. The delivery of short term training teams to build capacity in Estonia, Ukraine and Sweden, and extensive support to the newly formed Multinational Corps South-East and Romania, has seen ARRC sharing its MDO experiences and building those of others.

So that's a little bit about what we're doing internally and as part of NATO. During this conference, I hope to gain a deeper understanding of other nations implementation perspectives, and hope that we'll all be better informed across the next couple of days. Most importantly though, I look forward to working with you all on the Alliance concept for MDO."

Opening Remarks

General Philippe Lavigne, Supreme Allied Commander Transformation

I'm delighted to be here today in the Keble College. I couldn't help but notice that, among many sports that have made the reputation of the College for about 150 years, rugby was probably the most dominant. So popular that, between the wars, Keble could field two teams on the same day. In fact other sports, notably football and hockey, complained that rugby attracted all the best men... being myself a rugby fan and player, I can only feel comfortable in this environment!

Today, the Keble College hosts the Multi-Domain Operations Conference. The mere fact that so many people are gathered in this beautiful place shows that the future success of the Alliance will not be based on firepower alone.

As the consequences of the Russian invasion of Ukraine are unfolding, and while NATO and Allies are continuously shedding light on Russian activities and calling out Russia's actions, plans and disinformation, we recognize that conflict no longer resides only in the physical sense across the traditional domains of Land, Air and Maritime.

Modern military operations rely heavily on Space, just like our everyday life. Cyberspace generates incalculable threats from adversaries, but has also become an area of people's resistance; we can see it now in reaction of Russia's brutal invasion of Ukraine. There is also a lot to say in terms of Cognitive Warfare.

We should not hesitate to question some of our assumptions. For instance, we could wonder whether Russia was trying to conduct MDO, and what they could have done to do so. We should not wait to learn from this conflict and reflect. Therefore, NATO must have the capability and the capacity to understand this changing operating environment, and develop strategies to maintain deterrence and to ensure warfighting advantage in all 5 operational domains.

To do so, NATO needs to go beyond joint, and towards Multi-Domain Operations.

As you know, the Military Community tasked ACT to lead the bi-SC development of an initial Multi-Domain Operations concept. A lot of work has already been achieved by ACO and ACT teams through the consultation of Allies and Partners.

Today is another great opportunity to share knowledge and gain a better understanding of respective national views.



Our Bi-SC working definition and vision for MDO has a voluntary military bias. The Military activity is orchestrated across the 5 domains, and is synchronized through collaboration with other stakeholders – for example, Diplomatic, Academia, and Partners – to produce effects in the virtual, cognitive and physical dimensions.

However, this is not a revolution. Our previous guiding principles are still highly relevant but, to enable MDO, we must expand horizontally across the new domains, and vertically to better exploit capability cooperation across all levels of warfare.

In terms of C2, the future ‘Multi Domain’ Force Commander may not have command over all military assets engaged on the operation, especially in the Cyberspace and Space domains. These capabilities could be retained at Strategic level, as is often the case for Special Forces today.

MDO is proposed as an enclosure to the WDA, the Warfare Development Agenda, the implementation plan of the NATO Warfighting Concept. This means that MDO is encompassed within the WDA.

Through its Lines of Delivery, the WDA will execute a comprehensive transformation programme to achieve not only Multi-Domain Operations, but also, for instance, C2 superiority.

MDO is a priority outcome delivered via several interconnected WDA activities, to maximise strategic choice for shaping, influencing and fighting through the orchestration of the Military Instrument of Power.

Through all the discussions and panels proposed during this MDO Conference, we will brainstorm together; I need you all to share, contrast and compare, and get the best possible result.

My vision of ACT’s mission as NATO warfare development command is to improve the Alliance’s ability to better understand the environment and decide faster than our adversaries. This reinforces our cohesion and leads to an

Alliance that is stronger together. These 3 cohering principles are nicely underlined by the 4 guiding principles that came out of the bi-SC work on MDO.

These 4 guiding principles are Agility, Interconnectivity, Unity and Creativity. Applied to MDO, they guide us in how we should handle Data.

Agility speaks for the ability to leverage data faster than the competition.

Interconnectivity enables Data exchange, to better understand. Unity calls for Data sharing and reinforces common understanding while it strengthens the bond between Allies.

And creativity refers to the need for NATO to make a cultural shift in mind-set, to become more agile and make the most out of Data.

We are in an age of Data predominance. Therefore, there is an operational necessity for MDO. But there is also an organizational imperative to carry out NATO Digital Transformation. This digital transformation should be operationally-informed and data-driven, enabled by more agile processes and data-centric tools.

NATO Digital Transformation is a journey, and not an end-state. It will take time, but NATO does not start from scratch. The NATO Digital Transformation should be actioned in a parallel and interconnected set of modernization, optimization and transformation activities; it can be accelerated by incrementally delivering changes within a ‘Think big, Act Small and Fast’ approach. In particular, Digital Transformation must integrate on-going activities via evolutionary and – when needed – revolutionary decisions.

The digital backbone is a core asset of the Digital Transformation. Initial work is already under development via the modernization of NATO Core Services, Core Communication networks and Cyber Security. The establishment of the digital backbone is a continuous process, which will incrementally build the underpinning structure to allow the Alliance to embrace Multi-Domain Operations. It must eventually enable the connection of the Military Instrument of Power to other non-military Instruments of

Power, and all relevant actors that contribute to MDO.

C2 evolution is a major challenge on the road to MDO. NATO is currently running several C2 programmes and we must ensure that they are designed to eventually converge into a broad Multi-Domain Command and Control system of systems as we further develop, experiment, and wargame.

Let me stress the point... NATO Digital Transformation can NOT be just technological... it must be an interconnected set of Transformation, Optimization, and Modernization activities, across Data, People & Talents, Organization, and Capabilities, that will enable Multi Domain Operations.

We must also exercise an agile governance, inspirational and lean enough to drive the Digital Transformation all the way to the individuals, as the data warriors that will manage this strategic asset, aiming at the rapid delivery of the identified critical capabilities.

To achieve MDO through the Digital Transformation, we have to commit to major up-front investment in our human capital and financial resources. This will require a strong political commitment. However, we are convinced that a well-managed transformational approach will ultimately be more economical than a permanent emergency patching constraint.

Together, ACT and ACO must seize all the opportunities offered by the experimentations during the exercises, and by innovation, to test our new concepts on MDO.

We also have to figure out how to interact more intimately with external stakeholders, such as academia, industry, and partners. And we must keep the Lessons Learned process running, by proactively and conveniently drawing experience from every occasion.

NATO's Transformation is an urgent and collective effort, inherently carrying cohesion and interoperability, and benefiting from the collective intelligence that stems from our diversity. HQ SACT will continue to approach Multi Domain Operations as a whole-team effort to build the final plan, ensuring we connect all the Warfare Development Agenda Lines of Delivery, for the immediate benefit of the warfighter.

I repeat I see the MDO conference as a great opportunity... and there is no time to waste! Therefore, without further ado, like a rugby player, I pass the ball to you, because you are all part of the team.

I thank you for your attention.



Closing Remarks

General Philippe Lavigne, Supreme Allied Commander Transformation

Here we already are at the end of this conference. It has been less than 2 days since I welcomed you to Oxford, but I think we have covered quite a lot of ground, and we can say that this conference has been a huge success.

I would like to thank the UK and Sir Patrick Sanders, for hosting this event and making it so informative and enjoyable, from the beginning to the end! We have shared a lot, we have to continue.

Now I would like to share with you some of my thoughts on MDO.

I could have continued on an analogy between MDO and the Rugby Instrument of Power, but I will not do it before the Crunch and I will stay on the Military Instrument of Power.

As I mentioned yesterday, the delivery of Multi Domain Operations is one of the Alliance top priorities. In this regard, we can define five steps that can be managed in parallel, to lead us to the point where the Alliance as a whole becomes MDO-capable.

First, MDO will address the Military Instrument of Power with the capability to link with the other Instruments of Power. We have to focus and to deliver now MDO, in order to keep our advantage at the speed of relevance.

This means we have to think about MDO both nationally and within our alliance, and at the political, strategic, operational and tactical levels. This will not be easy!

We do know that we need to educate our leaders and expand the manoeuvre space to shape, contest and fight when necessary.

Second, we must complete the integration of Space and Cyberspace. These are still considered as 'New' domains compared to the traditional Air, Land and Maritime domains.

We have made unprecedented progress in a very short period of time, from concepts and doctrines to the practical use of new capabilities on and for the battlefield. We went very fast, and we can be proud of it. But it is now time to consolidate the gains, while obviously continuing to move forward. Through education, training and practice, we must now proceed to a normalization of operations in cyber and space, so that they are no longer seen as new capabilities.

Third, MDO requires a cultural shift, a new mind-set. As General Rob Magowan said "what can I do for MDO/MDI?" To achieve this cultural shift, we must leverage critical enablers: People, Data, Technology, Agility and Education.

On Education, we have many questions:

- How can we educate our young personnel?
 - How can we teach them the effects of all the domains and engender the new Multi-Domain mind-set?
 - How can we teach them to become more creative decision-makers?
- To change our mind-set, we also need:
- bottom up approaches,
 - MDO teams
 - Experimentation: on education, training, operations, concepts and doctrines. And most importantly, we need to share what Nations discover with these experimentations for the good of the whole Alliance!
 - Adopt and Adapt new technologies from the civilian sectors to meet operational problems and leverage

the findings from Academia...

Fourth, MDO demands a coherent and Alliance wide approach to Capability Development. As we have been doing for the last two days, we must continue to share our expertise, align our thinking and converge activities



against an agreed and common framework, to collectively set the future requirements and develop the relevant doctrine.

And fifth, we must commit to the digital transformation of NATO. By exploiting the latest technologies, we must address the urgency of leveraging all available data. Only a data-enabled Alliance can fully embrace Multi-Domain Operations and benefit for this strategic asset; and we have to consolidate the willingness of Nations to share the Data.

This conference is coming to an end, but this is

the start of the journey and we must continue with our exchanges, while constantly striving to deliver. We must start now, using parallel and connected activities to test our thinking and evolve our ideas.

Let me reiterate the method we must follow: "Think big, Act Small and Fast".

This is a collective commitment, so ACT needs your support to make it happen. We have now a better understanding of the gaps to take into account. Together we will succeed, as a Team.

Thank you for your participation and attention.





BIOGRAPHIES

Colonel Richard Abelkis
NATO NCIA Military Engagement Leader
NATO Communication and Information Agency



Colonel Abelkis in 1994 received a Direct Reserve Commission as a 2nd Lieutenant in the Army Signal Corp. He completed Signal Office Basic Course in 1995, assigned to the 324th Signal Battalion, Athens, Georgia as a Cable and Wire Platoon leader. Promoted to 1st Lieutenant in 1996 and assigned as Aide de Camp to Brigadier General Battelle, commander of the 359th Signal Brigade, Augusta Georgia. The next assignment as the 982nd Combat Camera Detachment Commander in Atlanta, Georgia from 1998-2001. Promoted to Captain in March 2001 and served in G3 Operations as the Wide Area Network Lead for the 335th Theater Signal Command East Point Georgia. Deployed during Operation Enduring Freedom in Oct 2001 – Oct 2002 to Kuwait/Afghanistan as part of the ARCENT G6, again in Jan 2003 to Aug 2003 as part of Operation Iraqi Freedom campaign. Promoted to Major in 2007 and deployed 15 months in 2008 – 2009 in Kuwait/Afghanistan as a lead Network Architect with the 335th Provisional Theater Signal Command.

Returned to active duty in 2009 and assigned to the Defense Information Systems Agency Washington DC, as the Global Video Service Program lead deploying the next generation IP based VTC services for DOD. Designed and implemented the Tri-Level (NATO - S, US- S, ISAF-C) Cross Domain VTC (2010) for USFOR-A J6. In 2013, assigned to I CORPS, Joint Base Lewis McCord, Washington State, as the CORPS Network Architect, deploying a tactical wide area presence in the Pacific to support operations and exercises for the CORPS and its Divisions. Promoted to Lieutenant Colonel in 2014 and assigned to the United States Army Pacific Command and as the Programs, Projects & Policy Director overseeing a \$40 million annual G6 budget for network support and improvement in the Pacific. In 2018 assigned to the Army CIO/G6, Pentagon, as the Army Infrastructure Program office, responsible for a \$350 million annual Army IT modernization program. Promoted to Colonel in 2020 and assigned as the Army CIO/G6 Strategy and Plans Director developing the Network Modernization Strategy in conjunction with Multi-Domain Operations.

He received two-Bronze Stars, one-Defense Meritorious Service Medal, five-Army Meritorious Service Medals, Army Commendation Medal, Army Achievement Medal, Armed Forces Expeditionary Medal, Global War on Terrorism, and NATO Medal-Afghanistan.

Colonel Abelkis also worked in industry with companies such as Accenture, Deloitte and Cisco while serving as a Reserve Officer between 1994- 2009. His experience includes Satellite Communications Systems, Fiber and Microwave Radio, Network Architecture, Data Center Design, Voice & Video, as well as Cloud Infrastructure and migrations. He holds a Bachelor Degree in Electrical Engineering from the University of Massachusetts Lowell, 1989, a Masters in Program Management from the University of Maryland Global Campus, 2012 and is in the process of completing a Masters in Cloud Architecture (May 2022).

Mario Beccia
Deputy Chief Information Officer
NATO HQ

Mr. Mario Beccia is NATO's Deputy CIO for Cybersecurity, working in the Office of the Chief Information Officer. He holds a university degree in Economics and Management, an MBA in management of innovation, and several certifications in cybersecurity and information technology (PMP, CISM, CISSP, CCSP, ITIL, TOGAF).

He started his career in 1997 by joining a start-up company focused on web technologies for businesses. He then worked as independent consultant on IT and Information Assurance projects in Italy and Belgium.

He joined NATO Allied Command Transformation in 2006, where he worked on business transformation and capability development programs. He supported the setup of the NATO Computer Incident Response Capability (NCIRC) and IT Modernization (ITM) programs by collecting and engineering requirements, championing the creation of an implementation roadmap for Cloud Computing and Cyber Defence in NATO, working with various entities in the organization (NCIA, NOS, Cyber Defence Committee, C3Board, Emerging Security Challenges Division, etc...).

He served as technical director for Cyber Coalition (one of the largest Cyber Defence exercises in NATO), and led the Cyber Defence track of CWIX.

He setup the Cyber Defence track of ACT's TIDE Sprint (a think-tank with participants from industry, NATO nations and other international organizations), and the Cyber Defence portion of the FFCI (NATO's Framework For Collaborative Interaction, aimed at enabling knowledge exchange between NATO and industry).

He moved on to the NATO C&I Agency in 2015, where he supported the creation of several Cyber Defence information exchange programs (including the NICP, NATO Industry Cyber Partnership). He led the NCIRC implementation program by setting up and running projects intended to expand and consolidate the capability, such as 10 Additional Sites, ANWI/New NATO HQ Cybersecurity architecture, BMD, IT Modernization security architecture.

He joined the European Defence Agency in 2018 as Chief Information Security Officer and Project Officer Cyber Defence, leading the creation of a Cybersecurity practice in the Agency, the creation of a stronger classified information management ecosystem and the Cyber Defence program of the Agency. He was in charge of several cross-domain and multinational projects under the PESCO framework and other multinational initiatives. In 2020, he started the milCERTs Interactive Conference, a yearly cybersecurity exercise and conference aimed at creating a stronger military CERT interaction between EU military entities.

In March 2021, he joined back NATO as the Head of the Strategic Support branch in the Office of the CIO at NATO HQ, working on improving coherence of ICT services across the Organization and improving the Enterprise cybersecurity posture. As of February 2022, he took on the role of Deputy CIO for Cybersecurity, leading a major Cyber Transformation program in NATO.

He is passionate about martial arts, computer programming, crypto currencies and electric vehicles.



James Black
Research Leader in the Defence & Security Research Group
RAND Corporation



James Black is a Research Leader in the Defence & Security Research Group at RAND Europe, part of the RAND Corporation, a not-for-profit research institute.

In this role, he serves as Lead for RAND's Defence Strategy, Policy and Capabilities portfolio in Europe, providing research, analysis and wargaming for national governments and NATO/EU institutions. Relevant examples of recent work on MDO include: leading a study for the UK Ministry of Defence's Development, Concepts and Doctrine Centre to inform development of Joint Concept Note 1/20 on Multi-Domain Integration; examining MDO/MDI in the NATO context in an edited volume by the NATO Cooperative Cyber Defence Centre of Excellence; and various projects on the future of command and control, human-machine teaming, and strategic advantage. James also previously managed a major study for the NATO Communications and Information Agency and NATO ACT on transforming cyber capability development within the

Alliance, and has worked on defence strategy and policy issues for a number of NATO Allies and Enhanced Opportunity Partners (most recently the Australian DoD and Finnish MOD).

In addition, James has a secondary role as European Lead of the RAND Space Enterprise Initiative, a hub for RAND's space-related research and wargaming. In this capacity, he has led projects for the UK MOD and the UK Space Agency informing development of the new national and defence space strategies, as well as examining the cross-domain implications of new space technologies for Dstl and others. In addition to his position at RAND, James was recently selected as a NATO 2030 Fellow, focusing on contemporary and future challenges to the Alliance. Prior to joining RAND, he worked in the UK Parliament and at Transparency International's Defence and Security Programme. He holds a dual MA-MSc in International Security and International Relations from Sciences Po Paris and the London School of Economics, and a BA (Hons) in History from the University of Cambridge. James holds NATO and UK clearances.

Dr. Michelle Black
Assistant Professor in the Department of Political Science
University of Nebraska Omaha.

The Director for Workforce Development and Education for the National Counterterrorism Innovation, Technology and Education (NCITE) which is a Department of Homeland Security Center of Excellence. A Research Fellow for the National Strategic Research Institute (NSRI) at the University of Nebraska, and Editor for the Space and Defense Journal. In addition to her academic career, Dr. Black has over seventeen years of professional experience with the Department of Defense.

Prior to joining UNO, Dr. Black was a government civilian for the Department of Defense from

2009-2016. She specialized in Deterrence Analysis and Adversary Decision-making for United States Strategic Command (USSTRATCOM) Plans and Policy Directorate at Offutt Air Force Base. During her time at USSTRATCOM, she provided analysis and recommendations to senior leaders on decision-making strategy, deterring state and non-state actors, and regional expertise. Additionally, she initiated and directed the Deterrence and Assurance Academic Alliance, recruiting over 35 academic institutions to the program. This program provides a platform for defense and academic organizations to communicate and collaborate on research issues regarding Deterrence and Assurance.

Prior to her government civilian work, Dr. Black worked in Psychological Operations from 2001-2009 as U.S. Army Special Operations NCO (Airborne) for the United States Army Special Operations Command (USASOC) and later as a Defense contractor. She deployed to Iraq, Kuwait, and Qatar during Operation Iraqi Freedom and Operation Enduring Freedom.

Dr. Black earned her Ph.D. in Political Science from the University of Nebraska at Lincoln in 2016. She also earned an M.S. in Negotiation and Dispute Resolution from Creighton University (2009), a Graduate Certificate in Intelligence Studies from Mercyhurst College (2007), an M.S. in International Relations from Troy University (2005), and B.A. in Cultural Anthropology from the University of Iowa (2001).

Dr. Black's research interests include: Insurgency Progression Theory, Violent Extremist Organization/Terrorism's use of online social media, Multi-Actor Deterrence, Deterring non- state actors, Deterrence and Assurance Theory and Application, and Adversary Decision-making.



*Sarah Chapman Trim
Culture and Behaviour Lead
Multi-Domain Integration Change Programme
UK Strategic Command*

Sarah Chapman Trim is Culture and Behaviour Lead for the Strategic Command Multidomain Integration Change Programme and a Senior Research Fellow at the Centre for Army Leadership. A Military Psychologist in the Royal Australian Navy from 1999-2009, Sarah authored the review of the integration of women into the RAN submarine service for the Chief of Navy and the Australian Parliament and served as Maritime Task Group Psychologist during the second Gulf War, with responsibility for 600 personnel in-theatre.

A Fellow of the British Psychological Society and international affiliate of the American Psychological Association, Sarah is a deep specialist, keynote speaker and published author in the science of human behaviour, leadership and culture change. She has worked alongside a diverse and challenging stakeholder network within the Australian and British Armed Forces, strategic partners and allies, successfully influencing senior leaders to deliver long-term strategic change in personnel policy, leadership, organisational culture and performance optimisation, including culture change initiatives for military personnel in Isolated, Confined and Extreme (ICE) environments.

Whilst submarines remain her first love, Sarah now proudly serves in the Royal Auxiliary Air Force. In her spare time, she enjoys learning French, German and Russian.



Major General Tom Copinger-Symes CBE
Director Strategy & Military Digitisation, Defence Digital,
UK Strategic Command

Tom spent his early career with The Rifles on operations in Northern Ireland, Bosnia, Kosovo, Iraq and Afghanistan – including with 4 RIFLES on Op TELIC 10 and 5 RIFLES on Op HERRICK 15 - as well as operational and strategy posts at PJHQ and MOD.

In 2014 he formed and commanded 1 Intelligence Surveillance and Reconnaissance Brigade, created to integrate the Army's intelligence collection and exploitation capabilities. In 2017, after a year as Assistant Chief of Staff Operations in Army HQ, he led a four-month project to develop the Information Manoeuvre concept to explore the benefits of integrating the Army's information centric and digital capabilities.

In his next post, as General Officer Commanding Force Troops Command, he led 30,000 of the British Army's specialist soldiers delivering Information Manoeuvre and Theatre Enablement as central contributions to the British Army's approach to a new era of great power competition, culminating in the formation's re-designation as 6th (UK) Division and the move of the Theatre Enablers to 1st (UK) Division.

In August 2019 he took up his current post, newly created to accelerate Defence's Digital Transformation and increase its adoption and exploitation of data and digital technology. Subsequently he has also taken on both the Strategy and Digital Transformation portfolios.

Tom has a range of extracurricular responsibilities, including Assistant Colonel Commandant (Field Army) of The Rifles; Honorary Colonel of the First Aid Nursing Yeomanry; and President of Infantry Football. He also is an Advisory Board member of Nimbus Ninety and a Trustee of Heropreneurs.



***Major General Karl Ford CBE
Director Policy and Capabilities Division/
Deputy Director General International Military Staff***

Following a cadetship to Bath University, Karl Ford commissioned into the Royal Artillery in 1989. Service in his first close support regiment (40 Regt RA) included the liberation of Kuwait (Op GRANBY/DESERT STORM - 1991), before joining the Allied Commander Europe's Mobile Force (Land) or AMF(L), which included a Balkans deployment (1993). In 1995, he took command of a close support headquarter battery (O Battery/1RHA), before commanding a company of peshmerga in northern Iraq (Op WARDEN - 1996). He then spent 6 months with the Australian Army before returning as an SO3 Plans at the UK's HQ Land Command, which was punctuated by a tour in HQ SFOR, Sarajevo (1997). He then spent 6 months on the British Military Advisory and Training Team (BMATT) South Africa, followed by penance in the UK's Ministry of Defence, prior to attending the Advanced Command and Staff Course 4 in 1999/2001.



As SO2 J5 in the UK's deployable Joint Force Headquarters (JFHQ), he served in Cote D'Ivoire, Indonesia, Afghanistan (CJTf-180 - 2002), and the Gulf (Op TELIC 1/IRAQI FREEDOM - 2003) as an operational level/campaign planner. In 2003, he assumed subunit command (137 Bty/40 Regt RA), returning to Iraq as the brigade operations company (Op TELIC 2 - 2003) and deploying to Cyprus with UNFICYP (2004). On promotion to OF4, he was appointed to HQ ARRC and deployed to Afghanistan through the period of NATO expansion (ISAF IX - 2006).

He commanded a close support artillery regiment (26 Regt RA), including a tour to Iraq (Op TELIC 13 - 2008), before moving to the Permanent Joint Headquarters (PJHQ) as Military Assistant to the Chief of Joint Operations (MA/CJO). As an OF5, he was the Chief of Staff of the Army 2020 Study, which delivered a root and branch re-design of the British Army. On promotion to OF6 in 2012, he took command of 3 (UK) Division's field artillery brigade, as the last Commander Royal Artillery (CRA). In September 2014, he took up post as ACOS J5 (Plans & Policy), SHAPE, which included the staff lead for NATO's Readiness Action Plan to adapt the Alliance in response to a resurgent Russia and dynamic threats from the Middle East and North Africa.

After a short return to the UK as Brigadier Army Staff in the Army Headquarters, he was promoted to Major General and, in September 2017, assumed the post of DCOS Plans at JFC-BS where he was responsible for establishing the operational-level management of Deterrence, Continuous Adaptation, Operations Planning, Training & Exercises, and Military Partnerships. He joined the International Military Staff as the Director of the Policy and Capabilities Division, and the Deputy DGIMS, in February 2020.

He was appointed MBE in 2003, QCVS in 2009 and CBE in 2017. He is married to Mary, and they have two sons (2000 & 2004) and a daughter (2008). His passion is paragliding (President Army Paragliding) but other interests include sailing (ex Commodore of the RAYC), skiing (ex-Chairman Army Alpine) and scuba-diving.

Colonel Mietta Groeneveld
Director NATO Command and Control Centre of Excellence



Colonel Mietta Groeneveld is the Director of the NATO Command & Control Centre of Excellence. The NATO C2COE supports NATO, nations and international institutions/organizations with subject matter expertise on Command and Control.

Col Groeneveld graduated from the Royal Military Academy in Breda as Maintenance Officer in 1991. After her first assignments in the Netherlands and Germany, she was selected in 1997 to attend the Technical University in Delft where she achieved a Master of Science degree in Applied Physics in 2001.

Since 2001 she has been posted at several positions at the Army Materiel Command, Army Staff, Ministry of Defense and Defense Material Organization. In 2008 she was given the command over a maintenance unit of roughly 500 employees.

Promoted to colonel in 2010 she became Head of the Program Office SPEER and as such responsible for the scope, quality assurance, budget and planning at program level off all SAP implementations projects aimed at building and migrating joint financial and materiel logistics in the Dutch Armed Forces.

In 2013 she attended the National Security Program at the Canadian Forces College, a high-level course aimed to prepare selected leaders for strategic responsibilities within a global security environment.

In august 2014 she became Branch Head Multilateral Military Affairs within the Department of Defense in the Netherlands, responsible for the coordination on military policy with NLD MOD representatives within NATO, EU, UN and OSCE. Additionally she served as the NLD MOD representative within the NATO Logistics Committee and the NATO Committee on Standardization. She was the NLD Chairman for the BENELUX Arms Control Agency as well as the NATO CC COE, and Member of the Board of the Strategic Airlift Capability C17 and the Movement Coordination Centre Europe.

And from 2018 until 2021 she has been Branch Head Management and Services within the Army Staff, responsible for services and policy on infrastructure, transport, security and export control within the RNLA.

During her career she was deployed to Kirgizstan in 2002 as Deputy Senior National Representative as part of the European Participating Air Forces (EPAF) in Operation Enduring Freedom and to Afghanistan in 2017-2018 as the CJ4 of Training and Advisory Command-North and the NLD-SNR in Resolute Support at Masare-Sharif.

Col Groeneveld is active as an editor for the military-science journal of the Dutch Armed Forces “Militaire Spectator”. In 2018 she became President of AFCEA Chapter The Hague and she is President of APA, the Technical Staff officers association. She has been a member of the Dutch Military Orienteering Team and competed in 15 Military World Championships and numerous international orienteering events. She is 11time military champion in orienteering.

Colonel Mietta Groeneveld lives in The Hague with her partner Olaf Binsch and their son Odin (2007).

Dr Matthias Hammer
Head of Multi Mission Systems Engineering
Airbus Defence and Space



Matthias Hammer studied Mechanical Engineering with a specialisation in aircraft engineering. He continued to work at the Technical University of Darmstadt as a scientist in the field of flight mechanics and control, especially on flight guidance and collision avoidance systems.

In 1997, he joined the predecessor organisation of Airbus and worked in the fields of simulation and virtual reality, safety critical systems engineering, control and monitoring as well as training systems.

In 2005 Matthias joined Eurofighter GmbH as the Project Director for the Eurofighter training simulator. He then moved to Atlas Elektronik in 2009 as their Director Submarine Systems Division.

In 2015, he became the head of the Avionics and Electrics Engineering department in Airbus Helicopters.

Since 2020 Matthias is the Head of Multi-Mission Systems Engineering and Chief Engineer Connected Intelligence in Airbus Defence and Space being responsible for the development of Mission, Intelligence and Communication systems for all product lines in Defence and Space.



*Beatrice Heuser
Chair in International Relations
Glasgow University*

Beatrice Heuser holds the Chair in International Relations at Glasgow University. Her degrees are from the Universities of London (BA, MA) and Oxford (DPhil), and the Philipps-University of Marburg (Habilitation).



From 1991-2003 she taught at the Department of War Studies, King's College London, ultimately as Chair of International and Strategic Studies. She has also taught at Sciences Po' and the Universities Paris I, IV (Sorbonne) and VIII (St Denis), and at two German universities.

From 1997-1998, she worked in the International Staff at NATO Headquarters in Brussels. Between 2003-2007 she was Director for Research at the Military History Research Office of the Bundeswehr in Potsdam. This year she is taking leave to return to the Bundeswehr to design and teach a Strategy module at the General Staff College in Hamburg.

Beatrice Heuser has worked primarily on aspects of strategy, publishing

- Reading Clausewitz (2002);
- Strategy before Clausewitz (2017);
- The Evolution of Strategy (2010) which covers the period from Antiquity to the present; specifically on nuclear strategy: Nuclear Strategies and Forces for Europe (1997); Nuclear Mentalities? (1998); and The Bomb (1999).

She has researched and edited volumes on insurgencies and counterinsurgency. Her next big book, due out on 17 March 2022 with OUP, is War: A genealogy of Western ideas and practices.

Lieutenant General (P) Brice Houdet
Vice Chief of Staff
Supreme Headquarters Allied Powers Europe



Lieutenant General (P) Brice HOUDET is experienced in combat operations, intelligence and political military international relations. He holds a master's degree in national security strategy from the National Defense University (Washington, D.C.).

He spent 12 years in the French Foreign Legion, including 9 years in the 2ème Régiment Etranger de Parachutistes, of which he was the commanding officer from 2006 to 2008. He deployed in Bosnia, Kosovo, North Macedonia, Chad, Ivory Coast, Gabon, Senegal and Djibouti.

He was the chief of staff of Direction du Renseignement Militaire and as such has extensive knowledge of this agency and experience in relationship with other foreign and national intelligence agencies.

He served for four years in Washington, D.C. as a student at National War College (class of 2009) and attaché at the French Embassy. He is an ancien of NATO Defense College, Senior Course in 2005 and served for more than five years in NATO, first as a deputy military representative in NATO Headquarters, Brussels, and in 2017 as the French National Military Representative in SHAPE. He was elected in 2019 as the Dean of national military representatives at SHAPE.

On 17 July 2020, he was promoted to Lieutenant General and assigned as Vice Chief of Staff Supreme Headquarters Allied Powers Europe. He also took command of operation ALTHEA, Bosnia and Herzegovina.

He is bilingual in English and can speak some German, Italian and Russian. He is married to Delphine and has six children and eight grandchildren.



" We are in an age of Data predominance. Therefore, there is an operational necessity for MDO. But there is also an organizational imperative to carry out NATO Digital Transformation. This digital transformation should be operationally-informed and data-driven, enabled by more agile processes and data-centric tools. "

***Brigadier Matt Jackson DSO
Director of the Joint Services Command and
Staff College***



He returned to 40 Commando Royal Marines in Oct 02 to command Bravo Company on operations in Iraq twice (Op TELIC 1&4) and on exercise in Norway and the USA. After Advanced Command and Staff College he spent 2½ years as the Military Assistant to the Deputy Chief of Joint Operations at PJHQ in Northwood. On promotion to Lieutenant Colonel in Sep 07, he was the SO1 Training

at CTCRM for 6 months before moving to AMPHIBFOR to become the SO1 Operations. During this appointment, he deployed on Op TELIC 12/13 as the Divisional SO1 Plans. He was in charge of Royal Marines' recruiting as Corps Colonel from Sep 09 to Dec 10 prior to commanding 40 Commando from Jan to Aug 13, which included RFTG/Op Cougar 11 and Op Herrick 17.

On promotion to Colonel in Nov 13 he was appointed to the MoD as the Secretary to the Chiefs of Staff, a job he left in Dec 15 to attend HCSC 16. He was subsequently appointed as the Deputy Brigade Commander of 3 Commando Brigade from May 16 until May 18, when he moved to the Defence Academy to be a member of the HCSC Directing Staff.

From Dec 2018 until Sep 2020 he commanded 3 Commando Brigade Royal Marines, a job he left to attend the Royal College of Defence Studies. He became the Director of the Joint Services Command and Staff College in August 2021.

He has two Masters Degrees and a Post-graduate Certificate. He is Chairman of the UK Armed Forces Equestrian Association and President of the RNRM Amateur Rowing Association.

Matt Jackson is 49 years old, married to Suzy, and has three daughters (Sophie (15), Eleanor (11), and Lydia (9)) who, with the 5 horses/ponies owned between them, all enjoy One Day Eventing. With what little time (and money) he has left, he enjoys competing at indoor rowing competitions, watching rugby, and dreaming about once more being able to go telemark skiing.





Lieutenant General Julazadeh Deputy Chief of Staff, Capability Development Allied Command Transformation

Lt Gen Dave Julazadeh is the Deputy Chief of Staff, Capability Development, Headquarters Supreme Allied Command Transformation, Norfolk, Virginia. He is responsible for developing operational and strategic capability requirements on behalf of 30 North Atlantic Treaty Organisation nations. Additionally, he serves as SACT's Innovation Representative, Air Domain cross-functional Champion, and Champion for NATO's Command and Control, Cooperative Cyber Defense and Joint Air Power Competence Centers of Excellence.



Lt Gen. Julazadeh entered the US Air Force in 1990 following graduation from Kansas University and commissioning through ROTC. He has served as a F-16 instructor pilot, functional check flight pilot and flight examiner, logging more than 2500 flight hours, including 600 combat hours during Operation Provide Comfort, Deny Flight, Northern Watch, Allied Force, Freedom's Sentinel, and Resolute Support. He also participated in Operation Uphold Democracy while serving as an Air Liaison Officer with the 1st Ranger Battalion, 75 Ranger Regiment.

Lt Gen. Julazadeh has served in Numbered Air Force, Major Command, Headquarters Air Force, Headquarters NATO, Headquarters US Central Command, Headquarters US European Command, and Office of the Secretary of Defence staff positions. He has commanded at the flight, squadron, and twice at the wing level. Prior to his current assignment, Lt. Gen. Julazadeh served as Chief of Staff, Headquarters USEUCOM, Patch Barracks, Stuttgart, Germany.

Dr David Lanc *Founder, Cyborn & Ionburst*

Dr Lanc has over 30 years of world leading experience of converting business challenge, technology feasibility and viability, and realisable innovation into usable solutions to complex problems where legacy infrastructure needs to be integrated.

Dr Lanc has a first joint degree in Accountancy & Computer Science in 1984. He became a Scottish Chartered Accountant in 1988, then immediately left accountancy to focus on information systems innovation and its strategic place in commerce.

As Strategy Director of Europe's largest cards payments business, he developed its global strategy, introducing "big data" analytics and "intelligence" innovations when "multi-terabyte" data lakes were scary. He led acquisitions of WorldPay (UK) and Link (US), delivering a multi-channel, international payments business accelerated by technology interoperability, legacy-integration, and analytics.

As a member of Visa's European Innovation board, Dr Lanc was the first to introduce online e-commerce security for Bank card payments in 2003, immediately reducing card fraud. He led the 2003 global rollout of Chip & PIN/EMV security for bricks and mortar card payments. Over 2bn people use this security daily. This global initiative, managed by national efforts, is now 19 years old, so you will recognise the parallels and challenges of trying to advance complex alliances, cultures, and national priorities at pace for the benefit of all.

Dr Lanc completed a self-funded PhD in 2006 and was awarded an Honorary Doctor of Enterprise by Edinburgh Napier University in 2016 for services to enterprise, reflecting his life work in bringing digital commerce and security to global ecommerce.

Dr Lanc's work in data security morphed in 2018 into patented innovations in Cloud native "data-out" protection now in production. This approach recognizes perimeter security is no longer enough to protect sensitive and classified data in a world exposed without cyber perimeters.

5G and Edge computing, and the world of IoT force us to think differently about how we use and share classified and sensitive data across the MDI/MDO spectrum. While we talk of information advantage, AI and big data, the reality is without Data Advantage, none of this can be assured.

We must consider data as a sovereign asset, available to legitimate services and applications that will change over time. This provides a great opportunity to rethink how we can deliver MDI/MDO at pace, faster but without breaking the bank or changing end user behaviours:

- "Legacy" technology can no longer be regarded as a limitation to advancing at pace. Abstracting the sovereign data layer enables this, allowing API and metadata integrations to deliver fast;
- The need for Edge agility means we must overcome the limitations of monolithic structural concepts such as "digital backbones" and "data lakes". Backbones must become virtual, dynamic, and available anywhere. Data and its access control needs to move where it's needed; always secure, resilient and recoverable;
- Multi-failover recovery must include public Cloud storage and networks for classified data whether or not secure channels can be guaranteed. We need to operate hidden in plain sight. If network bandwidth is degraded, data resilience and recovery must be assured without sacrificing security; and
- Data must always be secure from compromise if technology hosting it falls into the wrong hands.

Delivering at pace challenges established thinking...always. We can deliver significant data advantage today if we're prepared to think differently beyond what scared us yesterday.



General Philippe Lavigne *Supreme Allied Commander Transformation*



The nomination of General Philippe Lavigne to the post of Supreme Allied Commander Transformation was approved by the North Atlantic Council on 28 May 2021.

General Lavigne has accumulated a particularly diverse and robust operational experience. Having joined the French Air Force Academy in 1985, he qualified as a pilot in 1989, flew the Mirage 2000 during operations in the former Yugoslavia and in Iraq before assuming command of the 1/5 Fighter Squadron “Vendée” in 2001. He subsequently served within the Paris-based Joint Strategic Planning and Command Operations Centre (CPCO) where he contributed to the planning of several peacekeeping and humanitarian operations from 2003 to 2005.

After serving in the Planning Office of the French Air Force Staff, where he was tasked with issues related to space and European cooperation in the field of simulation, he was selected to attend the Centre for Higher Military Studies (CHEM) in 2008 and the “Defence Policy” course at the Institute of Advanced Studies in National Defence (IHEDN). He was appointed Deputy Director at the General Secretariat for Defence and National Security in Paris in 2009, where he served for three years dealing with a number of sensitive and complex issues in an interagency setting with multinational entities.

He served twice in high-level joint positions, first as the Information Director within the Joint Staff of the Armed Forces between 2012 and 2014 and then as Director of the French Chief of Defence’s front office from 2016 to 2018. Between those two postings, he commanded the Kabul International Airport with its 5000 staff and 57 nationalities and supervised the transfer of military responsibility for the airport to the Afghan civilian authorities.

On 31 August 2018, he was appointed Chief of Staff of the French Air Force, renamed as the French Air and Space Force in 2020, whilst under his command

General Lavigne was made a Commandeur in both the Légion d’honneur and the ordre national du Mérite, and awarded the Croix de la Valeur Militaire. He has accumulated over 2800 flight hours and flown 46 combat missions on the Mirage 2000. He is married to Isabella and they have three children. He continues to play rugby, a long-held passion, whose cherished values have inspired his motto: “Win as a Team”.

Brigadier General Ilmars Lejins
Assistant Chief of Staff Joint Force Development
Allied Command Transformation



Born in a Latvian émigré family 1971 in California, USA, BG Ilmars A. Lejins grew up in Sweden, was schooled in West-Germany and, after the end of the Soviet occupation, he returned to his fatherland where he joined the Latvian Armed forces 1993. Admitted to the Swedish Infantry Military academy, he graduated in 1996 as an infantry officer.

His career with troops has been on every level up to brigade command. Initially with the Baltic Battalion from 1996 to 1999, where he served as a platoon leader and, later, as the second-in-command of the Latvian Infantry company. During this time, he deployed to IFOR/SFOR. After completing the Swedish Junior Staff and Company Commanders' course (MSS TAP) in 2000, he assumed the rewarding task of setting up an Armed forces level (joint) professional NCO training system as well as taking up command of the newly founded NCO Academy. He later took command of the 2nd Infantry Battalion, where he was tasked to finalise the last conscription training and professionalise the unit. He has served as an Infantry Kandak Operational Mentoring and Liaison Team (OMLT) leader for a demanding 9 months ISAF tour in northern KUNAR, Afghanistan during 2009-2010. 2016 he was appointed as the Commander of the Land forces Mechanized Infantry Brigade. A post twinned with being the head of the Land forces as well. During his tenure as brigade commander, he had the pleasure to be instrumental to the NATO eFP (Enhanced forward presence) battle group deployment to Latvia and to the successful integration of more than 8 nations in to an effective deterrence force.

His staff assignments have been on the LVA JHQ level and at NATO. In 2007-09, he served as the section head for International commitments at the LVA JHQ overseeing the redeployment of LVA troops from OIF to ISAF. Returning from ISAF, he took a post at the operational level as the JHQ J3/5/7 PLANS Branch Head with the responsibilities being National (operational) Defence and Contingency planning, Force/Capability development and bilateral/multilateral plans. During his time at the JHQ, he also oversaw and supported the development of the nascent Latvian Joint Terminal Attack Controller (JTAC) program. 2013 to 2016, he served as the Branch Head for Military Cooperation, J9 as well as being the LVA SNR at NATO JFC Brunssum, the Netherlands.

BG Ilmars A Lejins is a graduate of the Baltic Defence College, Higher Command Studies Course, the United Kingdom's Joint Services Command and Staff College (Advanced Command and Staff Course 8) and holds a MA in Defence studies from the King's College in London. Notable military courses taken are the UN Junior Officers Course at SWEDINT and the UK Combined Arms and Tactics Course at Warminster. He has various LVA service, MOD and Armed forces awards, NATO IFOR and ISAF medals, the Estonian Land Forces Cross, the US Army Commendation medal with oak cluster and is a Cavalier of the LVA state Order of Viesturs. BG Lejins has been invited to join the Royal Swedish Academy of War Sciences.

He is married to Daiga Lejina and father to two sons and a daughter. He enjoys playing and watching football, a good run now and then and has a fondness for military history and single malt.

Oliver Lewis
Co-founder of Rebellion Defence

Oliver Lewis is the Co-founder of Rebellion Defence, a British-American defence software ‘unicorn’ startup, and Director of the National Security and Technology Programme at the University of Oxford’s Changing Character of War Centre. He is a senior visiting fellow at the University of Southern California and founding co-editor of the Routledge book series, *Advances in Defence Studies*. Prior to founding Rebellion Defence, Oliver was a senior civil servant in the UK Government Digital Service and was posted to Afghanistan multiple times during 2010-2012. On a previous career break from the Civil Service he founded the defence business of another UK ‘unicorn’ startup, *Improbable*. Oliver is a trustee of the Common Mission Project (Hacking for Defence) and neuro-rehabilitation charity *SameYou*.



Lieutenant General Rob Magowan CB CBE
Deputy Commander UK Strategic Command



Lieutenant General Rob Magowan joined the Royal Marines in 1989, prior to which he studied chemistry at Southampton University. After successfully completing his training he assumed several Troop Command roles, including a tour of Northern Ireland.

He went on to become Assistant to Commander in Chief Fleet and completed the US Marine Corps Command and Staff course, also gaining a Masters' degree.

On returning from the US, Lieutenant General Magowan was posted to HQ 3 UK Division as a plans officer, during which time he was deployed to Afghanistan on Operation FINGAL, the first International Security Assistance Force (ISAF) deployment to Kabul. Following promotion to Lt Col in 2002, he returned to 42 Commando as Second in Command, deploying to both Kuwait and Iraq for Operation TELIC 1.

2003 saw him begin a 3-year stint in London, working in the Cabinet Office before assuming the Deputy Head position in the Afghan Drugs Inter Departmental Unit whilst acting Colonel in 2005. In 2006, he assumed command of the Royal Marine's 30 Commando Information Exploitation Group, deploying immediately on Operation HERRICK 5 to Helmand province. He was promoted to full Colonel upon taking up the Deputy Head post in Defence Intelligence in 2009.

After successfully completing the Higher Command and Staff Course in 2011, he was promoted to Brigadier and became the Chief of Staff to the National Contingent Commander in Kabul. In 2013, he assumed the Commodore Naval Personnel Strategy role before becoming Commander Joint Forces Intelligence Group in 2015.

On promotion to Major General in 2016 he became Commandant General Royal Marines and Commander United Kingdom Amphibious Forces. He also took over as the Operation Commander of the European Union Naval Force Somalia. In late 2017, he was the Assistant Chief of the Naval Staff (Capability) and Chief of Staff Navy Command HQ, before assuming the post of Assistant Chief of the Defence Staff (Capability and Force Design).

He was appointed MBE in 2005 (42 Commando), CBE in 2013 (Afghanistan) and CB in 2018 (Commandant General Royal Marines). He was also awarded the US Legion of Merit for his time as CGRM.

Lieutenant General Rob Magowan assumed his current post, Deputy Commander Strategic Command (UKStratCom) in January 2020.

Major General Yves Métayer
Head of Force Employment – Protection Division
French Defence Staff

Born in Vannes in 1969, Brigadier General Yves Métayer is married and father of five children. After schooling at the Prytanée National Militaire de La Flèche, he joined the military academy of Saint-Cyr Coëtquidan in 1989. He began his military career in 1993 with the 3rd Marine Artillery Battalion (3rd RAMa) in Verdun then Canjuers.

He is posted overseas in 1996, as a platoon leader in the Pacific Marine Infantry Battalion of New Caledonia (RIMaP-NC). Two years later, he joined Brittany and the 11th Marine Artillery Battalion (11th RAMa), where he commanded a firing battery with which he was deployed twice to Martinique (33rd RIMA infantry company) then in Djibouti (5th RIAOM battery).

Returning to the military academy of Saint-Cyr Coëtquidan in 2001, he commanded a company of cadets before being sent in operation in Kosovo within the staff of KFOR (Kosovo Force).

Between 2003 and 2005, he studied at the Joint Defense College in Paris. He was subsequently assigned to the Land operational staff, as an “Africa” staff officer, and was sent to Chad in 2007, as commander of the EPERVIER detachment in Abéché.

Again at the 11th RAMa appointed head of the training & operations office until 2010, he was projected in Afghanistan as head of a liaison team with the Afghan army (Operational Mentoring Liaison Team - OMLT), before being assigned to the defence staff as assistant to the Africa bureau, from 2010 to 2012.

In 2012, he took command of the 11th RAMa. During these two years spent at the head of the “bigors” of La Lande d’Ouée, he assumed the head of operational military assistance for the SERVAL operation in northern Mali.

From 2014 to 2016, he commanded the operations division of the Western defense zone staff in Rennes, before being an auditor at the center for advanced studies of the Ministry of Interior.

After two years spent at the Defence Staff in charge of anticipation and synthesis at the Planning and Conduct of Operation Center (CPCO), and promoted to brigadier general on June 1, 2019, he took command of the Armed Forces in the southern Indian Ocean area on August 16, 2019.

At the end of this command, he joined the Defence Staff in Paris as head of the employment of forces - protection division on August 1, 2021.

Officer of the Legion of Honor and Officer of the National Order of Merit, General Yves Métayer is decorated with the Cross of Military Valor.



Vice Adm. Stuart B. Munsch
Director for Joint Force Development, J7

Vice Adm. Stuart Munsch, a native of North Dakota, graduated from the Naval Academy in 1985 with a Bachelor of Science in Electrical Engineering. At Annapolis, he was brigade commander of his class and an All-American and national champion pistol shooter. Selected for a Rhodes Scholarship, he attended Oxford University and earned a Bachelor of Arts and a Master of Arts in Philosophy, Politics and Economics.

He then was assigned to four consecutive sea duty assignments, serving on USS Will Rogers (SSBN 659), USS Jefferson City (SSN 759), USS Kitty Hawk (CV 63) on the staff of Commander, Cruiser Destroyer Group 5, and USS Tucson (SSN 770). In 1999, Munsch reported ashore to U.S. Pacific Command, where he served in the Plans and Policy Directorate (J5) prior to becoming deputy executive assistant to the commander. He then was selected for a White House Fellowship and served as special assistant to the Secretary of Agriculture.

Munsch commanded USS Albuquerque (SSN 706) from 2002 to 2005, followed by duty in the Pentagon as the military assistant to the Deputy Secretary of Defense and then as executive assistant to the Director, Submarine Warfare, Office of the Chief of Naval Operations (OPNAV N87).

Munsch commanded Submarine Development Squadron (DEVRON) 5 from 2008 to 2010 and then returned to the Pentagon to head the Navy Strategy branch (OPNAV N513). Selected for flag rank, he was reassigned as Deputy Director, Undersea Warfare (OPNAV N97).

Sent overseas to Japan and Bahrain, Munsch commanded Submarine Group 7 and Task Forces 74 and 54 from 2013 to 2015, followed by duty in the Pentagon as the senior military assistant to the Deputy Secretary of Defense. In 2017 Munsch reported to OPNAV N3/N5 as the Assistant and in 2018 became the Deputy Chief of Naval Operations for Operations, Plans and Strategy. In 2019 he established and served as the initial Deputy Chief of Naval Operations for Warfighting Development, N7. He assumed his role as Director for Joint Force Development (J7) in 2020.

Munsch is a member of the Council on Foreign Relations, a Massachusetts Institute of Technology Seminar XXI fellow and recipient of the U.S. Navy League's Decatur Award for operational excellence. His awards include the Defense Distinguished Service Medal, Navy Distinguished Service Medal, Defense Superior Service Medal, Legion of Merit (five awards), and several unit awards shared with shipmates.



*Admiral Sir Tony Radakin KCB ADC
Chief of Defence Staff
United Kingdom*



Admiral Sir Tony Radakin is the professional head of the United Kingdom's Armed Forces and principal military adviser to the Prime Minister and Secretary of State for Defence.

He previously served as First Sea Lord and Chief of Naval Staff from June 2019 until early November 2021, during which time he oversaw a full-scale transformation of the Royal Navy, instigated a renewed naval presence around the globe and secured an expanded shipbuilding programme.

Commissioned in 1990, he has served in numerous command and staff appointments, both ashore and afloat, and in command of UK and international forces. Operational tours have included the Iran/Iraq Tanker War, security duties in the Falklands, NATO operations in the Adriatic, countering smuggling in Hong Kong and the Caribbean, and three tours in Iraq – each in command.

A qualified barrister with an MA in International Relations and Defence Studies, he is a graduate of the Higher Command and Staff Course and the London Business School's Senior Executive Programme, and various international courses, principally in America.

He lives in Hampshire with his wife and four sons, born between 1998 and 2005. He is president of the UK Armed Forces Tennis and Royal Navy Squash Associations, and Vice Admiral of the Royal Navy Sailing Association.

Responsibilities

The Chief of the Defence Staff's responsibilities include:

- Leading defence (with the Permanent Secretary (Perm Sec))
- Setting strategy for defence, including the future development of the Armed Forces (subject to ministers' direction, and together with Perm Sec)
- The conduct of current operations (as strategic commander)
- Leading relationships with other countries' Armed Forces

*Vice Admiral Guy Robinson OBE
Chief of Staff
Allied Command Transformation*

Guy Robinson joined the Royal Navy in 1986 as a warfare officer. His seagoing career has been primarily spent in frigates and destroyers, serving as a bridge watchkeeping officer, navigator and then Principal Warfare Officer. He has been fortunate to command three warships: the patrol vessel HMS GUERNSEY, the Type 42 Destroyer HMS EDINBURGH and the Type 45 Destroyer HMS DARING. In 2003, he commanded EDINBURGH during the combat phase of the 2nd Gulf War and was subsequently awarded a Mention-in-Despatches.



In 2008 he operated from the Iraqi Khawr al Amaya offshore oil terminal as Commander Task Group 158.1, running operations in the Northern Arabian Gulf. In 2012, he took DARING on the first operational deployment of a Type 45 to the Middle East. From 2015 through 2016 he was the Deputy Commander of United Kingdom Maritime Forces, the Royal Navy's high readiness battle staff. During that assignment he assumed duties as Commander of Combined Task Force 150, the counter-terrorism task force operating in the Indian Ocean. In his most recent command assignment (2017-21) he was Deputy Commander at Naval Striking and Support Forces NATO (STRIKFORNATO) based at Oeiras, Portugal; a deployable Joint battle staff whose primary role is the integration of high-end U.S. maritime capabilities into NATO operations.

During assignments ashore, Vice Admiral Robinson has served in the UK's Ministry of Defence (MoD), working as the financial programmer in the above water equipment capability area. He also served on the staff of Flag Officer Sea Training staff as Commander Sea Training where he was responsible for the training of all Royal Naval major warships, from frigates to aircraft carriers, as well as a multitude of ships from both NATO and non-NATO navies. As a captain he served in the MoD's Development, Concepts & Doctrine Centre (DCDC) where he was responsible for generating maritime concepts and high-level doctrine. His most recent shore assignment (2013) has been in Navy Command Headquarters as the Assistant Chief of Staff (Warfare), where he was responsible for the assessment of the Fleet's warfighting capability. He became Chief of Staff at Headquarters Allied Command Transformation in July 2021.

When in the UK, Vice Admiral Robinson lives in Hampshire with his wife Mel, a Commodore in the Royal Navy, and their two adult children Max and Maisie. He is a graduate of the UK Higher Command and Staff Course (2013), the US Coalition Force Maritime Component Commanders' Course (2015), the Royal College of Defence Studies (2017) and is an alumnus of the Windsor Leadership Trust. He holds a master's degree in defence studies from King's College London. Her Majesty The Queen appointed him as an Officer in the Military Division of the Most Excellent Order of the British Empire in 2013.

***Dr Michael R Rouland
Director of Research & Senior Strategic Advisor at the
Russia Strategic Initiative
U.S. European Command***



Dr. Michael Rouland is Director of Research and Senior Strategic Advisor at the Russia Strategic Initiative, U.S. European Command where he oversees a comprehensive and diverse program that supports the entire Department of Defense and a global network of over 350 scholars. He previously served as Senior Historian and Special Advisor for the Office of the Chairman of the Joint Chiefs of Staff, specializing in research on Russia, China, Central Asia, and the global integration of the joint force. He served as Senior Historian and Special Advisor for the Chief of Staff of the Army. In that role, he provided direct historical and analytical support to the Army's senior leaders and participated in multiple service-wide working groups, including the U.S. Army's European Strategy Assessment Team, the Mosul Study Group, and the Raqqa Study Group, to tackle the Army's most important strategic challenges.

Dr. Rouland previously served as an historian for the headquarters of the U.S. Navy and the U.S. Air Force, completing a combat tour at Kandahar Air Field, Afghanistan. He has written multiple official histories and studies for service leadership, including the publicly-released studies *Great Game to 9/11: A Concise History of Afghanistan's International Relations* (2014), *What the Battle for Mosul Teaches the Force* (2017), and *What the Battle for Raqqa Teaches the Force* (2018). He currently writes a series of analytical essays on Russian geostrategic challenges for the Department of Defense. In addition to his work in government, Dr. Rouland leads courses on Russian studies at Georgetown University's School of Foreign Service.

He previously taught modern Russian and Central Asian history at Miami and Stanford Universities. Dr. Rouland has published extensively on Russian, Soviet, and Central Asian history and culture. He is author and editor-in-chief of *Cinema in Central Asia: Rewriting Cultural Histories* (2013), the first comprehensive account of Central Asian film, and has served on multiple juries at film festivals across Central Asia. Dr. Rouland holds degrees in History and Russian from Duke University and a Ph.D. in Russian history from Georgetown University.

Rear Admiral Henrik Ryberg Commandant Danish Royal Defence Academy

Rear Admiral Ryberg started his career in the Royal Danish Navy in 1981. Upon completion of his training as a naval officer, Rear Admiral Ryberg served as both Commanding Officer and Chief of Operations on various types and classes of vessels in the Navy. Most recently, Rear Admiral Ryberg served as Commanding Officer on the command ship HDMS THETIS with which he deployed as the first Force Commander to the Horn of Africa in 2008.

In between serving operational duties at sea, Rear Admiral Ryberg has held various management positions in the Defence Command Denmark, the Royal Danish Defence College, the Danish Defence Personnel Organisation and the Personnel Branch of the Danish Ministry of Defence. His vocational focus has thereby evolved around the fields of strategic management, HR and education. Besides his military education, Rear Admiral Ryberg holds an MBA in organisation from University College Copenhagen and an MPA from Copenhagen Business School.

Rear Admiral Ryberg is married to Margit Ryberg with whom he has three adult sons; Alexander, Kristoffer og Oliver.



General Sir Patrick Sanders KCB CBE DSO ADC Gen Commander UK Strategic Command

General Sir Patrick Sanders was commissioned into The Royal Green Jackets in 1986 and spent his early career at Regimental Duty in Germany, Norway and the UK. He has commanded at company, battalion, brigade, and divisional level, including on operations in Northern Ireland (multiple tours), Kosovo (1999 and 2002), Bosnia (2001), Iraq (2007), and Afghanistan (2011-12). His staff appointments have all been in operational and strategic roles. These have included Brigade Chief of Staff, Directing Staff at the Joint Staff College, Policy/Military adviser for the Commander of Coalition Forces in Iraq in 2003 to 2004, Colonel Army Strategy, a brief tenure as Chief of Defence Staff's Liaison Officer to the US Chairman of the Joint Chiefs of Staff, and more recently Head Operations (Military) and Assistant Chief of Defence Staff (Operations) in the Ministry of Defence. His previous two appointments were GOC 3rd (UK) Division and Commander Field Army. He was promoted to General in May 2019 and assumed the post of Commander Joint Forces Command where he managed the organisation's move to Strategic Command.



Commander of Strategic Command

The Commander is the head of Strategic Command (UKStratCom) which leads in the cyber domain for defence and manages allocated joint capabilities from the 3 armed services. The commander reports to the Chief of Defence Staff and, as a Top-Level Budget holder, is accountable to the Permanent Under Secretary of the Ministry of Defence.

Dr Keith Scott
Senior Lecturer for English Language
De Montfort University in Leicester

Dr Keith Scott is a Senior Lecturer for English Language at De Montfort University in Leicester, where he chairs the Faculty Research Ethics Committee for the Faculty of Arts, Design, and Humanities. His research operates at the intersection of communication, culture and cyber, with particular interests in influence, information warfare, cybernetics, and simulations and serious gaming as a training, teaching, and research tool.



Major General Jean-Marc Vigilant
Director of French War College

Major General Jean-Marc Vigilant is the Director of War College in Paris. He is a graduate of French Air Force Academy and holds a Master's degree in Aeronautical Science. He attended Spanish Staff College in Madrid and the NATO Defence College in Rome.

He held several joint positions, some at the political military level, both in France and abroad. In particular, he was assigned as an exchange officer to the Spanish General Directorate for Defence Policy, and later he was the Executive Assistant to the Supreme Allied Commander for Transformation (GEN (FRA-F) Denis Mercier), in Norfolk, Virginia, USA.

He is a fighter pilot and commanded at all levels in the French Air Force until air base commander. He gained an extensive operational experience in Africa, Former Yugoslavia and recently in the Middle East where he was the French Senior National Representative and Director of Civil Military Operations with the Combined Joint Task Force - Operation INHERENT RESOLVE in Iraq and Syria.







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Modern military operations rely heavily on Space, just like our everyday life. Cyberspace generates incalculable threats from adversaries, but has also become an area of people's resistance; we can see it now in reaction of Russia's brutal invasion of Ukraine.

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**United Kingdom
16-18 March 2022**
