Joint Air & Space Power Conference 2021

Delivering **NATO Air & Space Power** at the **Speed of Relevance**

CONFERENCE

PROCEEDINGS

Joint Air Power Competence Centre

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The JAPCC wishes to thank all sponsors for their contribution to this year's Conference and for helping to make it a great success.

This book contains the proceedings of The Joint Air Power Competence Centre's annual conference held at the Messe Essen, Germany from 7–9 September 2021. The theme for this year's conference was:

'Delivering NATO Air and Space Power at the Speed of Relevance'

In this edition of the conference proceedings, we have captured and themed the results, rather than publishing a chronological recounting of the panel discussions. We hope this makes it easier for our readers to identify the key takeaways.

We thank those of you who joined us for your contributions to the discussion, and hope that those of you who were unable to be there will find this wrap-up informative and thought-provoking.

If you wish to provide feedback on these proceedings, or the conference on the whole in order to help us increase the value of the event, please send us your feedback at conference@japcc.org.

Thank you and good reading!

The Joint Air Power Competence Centre (JAPCC)

Delivering NATO Air and Space Power at the Speed of Relevance

Keynote Speech by General Tod D. Wolters, US AF,
NATO Supreme Allied Command Europe, US European Command

Introduction

We are delighted to provide you with the 2021 Joint Air and Space Power Conference Proceedings for the conference, which was held 7-9 September 2021 in Essen, Germany. The JAPCC conference brings together innovative academics and military experts in the field of Joint Air and Space Power. The conference's primary goal was to address the significant challenges of bringing policy and concepts into action 'at the speed of relevance.'

About 300 Joint Air and Space practitioners from across NATO, the European Union, and other international partners came together in this unique forum to exchange views with senior Air and Space Power community members on current and future topics under the Chatham House rule.

In five panels, participants discussed how Policy and Strategy enable rapid decisions at the appropriate level, how Emerging Technologies can be exploited for Dynamic Command and Control Synchronized Across all Domains, and how this task can be accomplished within the Electromagnetic Spectrum under the demanding conditions of Electronic Warfare and through securing NATO's access to Space.

Readers are encouraged to consider this conference summary in conjunction with the previously published Conference Read Ahead material for a fuller understanding. Conference committee members and editorial reviewers subjected all papers to peer-review, and the final papers were selected based on their quality and relevance to the conference.

We want to express gratitude to all the JAPCC Air and Space Power conference members and the conference organizers. Finally, a special thanks to the organizing committee members, the moderator, panellists, presenters, Read Ahead authors, sponsors, and all conference participants for their magnificent support of the Joint Air and Space Conference 2021.

'It's About Peace!'

This headline is a quote from one of the prominent keynote speakers at the Joint Air and Space Power Conference 2021. Whatever we do to strengthen defence has this clear and undebatable objective. However, the ways to win the peace need to be understood. That is equally true when peace has 'just' to be maintained, as it is in times of conflict when a broken peace will have to be re-established. Ike Eisenhower realized this when he was dealing with the challenges of the post WWII era – and we have to be aware of it again today.

Securing and maintaining peace has always been and will continue to be NATO's raison d'être. NATO nations cannot allow themselves to become complacent in this aim – our Alliance will always be prepared to strengthen and adjust its policies and posture in the face of ever-evolving threats to guard a peace that allows us to live in liberal societies where the agreed rule of law inhibits any autocratic rule.

The conference's theme made deliberate use of a term, 'Speed of Relevance', which considers the broader perspective of defence planning and the strategic management of defence. NATO distinctly used the term in its Political Guidance 2019, the main policy document that guides NATO nations' coordinated development of capabilities. In the context of this strategic-level document, it is meant to ensure readiness, provide options to the Alliance and facilitate agile, flexible, and effective Command and Control (C2) in support of NATO's core tasks.

From a broader perspective, the 'Speed of Relevance', which has its origins in the United States (US) National Defense Strategy, addresses the most basic questions for organizing defence capabilities – how to ensure a process that delivers the capabilities needed to prevail in future conflicts and to do it at speed, taking reasonable risks and looking for the best and most readily available solution rather than the gold standard. As such, the term provides a valuable lens through which to examine

how NATO currently does business and how it should continue to do so going forward.

The 2021 Joint Air and Space Power Conference took place at a time when NATO was taking its first steps towards consultation with the nations to develop the new Political Guidance, expected to be approved in early 2023. Discussions at the Conference hopefully helped to inform and sharpen the perspectives of all those involved in defining the needs of NATO and its nations to ensure defence in the years to come. Some of the ideas and thoughts introduced and discussed are at a very early stage of development. But it is the role of NATO, its nations, and the organizations linked to NATO to set in motion the work strands and projects that will examine these ideas further.

Rather than strictly following the chronological sequence of the keynote speeches and panel subjects, these proceedings will try to connect the thoughts and ideas raised at the conference under the following four headings:

- **Competition –** *What shapes our world today?*
- **Capabilities –** *What needs to be developed, and how can that be done?*
- **Consequences –** *What are the consequences for C2 and for operations?*
- **Getting it done –** *How to do what needs to be done?*

Encapsulating all of this is one vital resource – our people. As numerous speakers pointed out, NATO is an alliance of people. NATO military structures need to be configured to withstand 'the first punch' but respond rapidly with the appropriate response afterwards. However, it is people – young and not so young – that wear the uniforms, put 'boots on the ground', operate the weapons systems and put themselves in harm's way daily to defend freedom and democracy. NATO has to ensure that they are appropriately resourced to deter, defend, and respond.

Competition – What Shapes Our World Today?

In 'NATO 2030: United for a New Era', published in November 2020, the Reflection Group appointed by the NATO Secretary General discussed the dynamic security environment faced by NATO and highlighted the return of systemic rivalry and the rise of global threats.

'NATO's external security environment has changed dramatically since 2010, when the most recent NATO Strategic Concept was published. That Strategic Concept recommended cultivating a strategic partnership with Russia, made limited mention of terrorism, and no mention of China. Since then, fundamental shifts have occurred in NATO's security environment that are likely to intensify over the coming decade and require greater efforts at both political cohesion and adaptations to NATO strategy.'[1]

Much of what the document discusses was mirrored in the JAPCC conference's keynote speeches and panel discussions. It succinctly summarises the theme of this section when it says that 'the main characteristic of the current security environment is the re-emergence of geopolitical competition.'[2]

This competition is not an intellectual construct; it is occurring today. Some state actors are very obviously making use of their comprehensive capabilities across domains to send signals, influence the perception of our societies, and undermine trust in the political decision-making process of our liberal democracies. The comprehensive efforts of our nations to find suitable ways to battle a global pandemic also presented a unique opportunity for other state actors to manoeuvre and attempt to gain an advantage through some carefully orchestrated information campaigns. These efforts were designed to promote themselves and their regimes as powerful actors in times of crisis and to sow mistrust across our societies in the functioning of democratic systems in times of particular challenges.

The real challenge with what we call competition is hidden behind the political facade. Parts of this competition may, from certain perspectives, already appear as 'warfare', and others seem to be preparatory steps for a potential entry into violent conflict. This is particularly true if we consider the increased armament efforts and some of the particularly challenging capabilities being fielded or under development (e.g. advanced missile systems and hypervelocity weapons). There are well-founded claims that we are already, at least in one domain – cyberspace –, in a state of conflict with others who wish us harm.

Cyberwarfare (whether via large-scale cyber-attacks or simple disinformation campaigns conducted on social media platforms) can be quite effectively carried out by keyboard warriors 'working from home'. As experienced recently, these activities took place and at times increased during critical phases of the global pandemic. A loss of trust in a body as vital as the World Health Organization can leave nations floundering for answers. Mistrust, scepticism and, more importantly, fear and panic are powerful tools in destabilizing nations and their alliances.

NATO's dilemma is how to defend against and respond to these sorts of activities, their consequences, and potential subsequent conflict. Things happen fast, and NATO and its nations will have to get faster as well. In the context of the Speed of Relevance, this will mean making use of emerging technologies to enhance existing as well as to develop new capabilities. This is a significant challenge, but as was stated at the conference, NATO's success rests in its ability to continuously adapt to a changing world and a shifting security landscape. The conference referenced the USAF Chief of Staff's paper from 2020 – Accelerate Change or Lose [3] – which quotes Giulio Douhet:

'Victory smiles upon those who anticipate the change in the character of war, not upon those who wait to adapt themselves after the changes occur.'[4]

Conference attendees also heard the view that the need for speed implies that we cannot wait to see what happens and then respond. We need to anticipate what might happen and have responses resourced and ready to go. The great value of exercises and simulations in building and analysing scenarios was discussed at some length. Advances in computing power and in virtual and augmented reality give NATO the opportunity to 'play out' multiple scenarios and run through multiple options or 'what ifs.'

The 'forcing function' (as described at the conference) of war on the European mainland would be a powerful motivator for governments to take robust action in deterrence and defence. Therefore, the dilemma is to convince the NATO nations' governments to maintain and, in many cases, increase their investment in deterrence and defence using an evidence-based argument. This will need enhanced efforts to understand the grey zone between competition and the quality of conflict.

Capabilities – What Needs To Be Developed, And How Can That Be Done?

NATO and its military forces have always been skilled in making the best of what they have. For many years, it has been almost a point of pride that capability weaknesses can be overcome by working harder, training harder, and having better-educated personnel. However, it seems that technological advances have now subtly altered this paradigm, and it is quite possible that it no longer holds true.

If an adversary gains the edge through the use of emerging technologies, NATO runs the risk of being presented with a number of simultaneous dilemmas. Dealing with these will strain our scarce resources – whether these resources are time, patience, thinking capacity, or losses due to violence and combat. NATO has bitter recent experience of

this happening in the counter-terrorism fight. The situation could conceivably be much worse in the face of determined aggression from a near-peer adversary.

For many years, NATO has had a capability advantage. We had carrier air groups able to project military power, our submarines were quieter and able to cover large distances and stage without being detected, our tanks had better armour and better guns, our aircraft were more agile, better armed, and more serviceable. Through the so-called 'technology transfer', complacency, or gullibility, or potentially through a combination of all of these such advantage has slowly, but surely eroded.

The conference attendees heard how NATO must match emerging technologies to the gaps and seams identified in our current capabilities. Artificial Intelligence will play a considerable role in supporting the planning and execution of our missions. There are reasons and sufficient indications that this can be done in an ethical well-considered way. Software linking the systems and entities for planning and C2 will be of the utmost importance. It will support getting the right information to the right people at the right time to enable the right decisions at the right level.

A detailed analysis of what has become known as the 'kill chain' demonstrates the challenges we are facing in this respect – looking at the systems and sensors that provide the indications and warnings data and then identifying where that data goes, how many different systems it crosses, and how many times it requires humans to move that data manually from one machine to another. Doing this automatically from machine to machine, without human intervention, will speed up the process, but figuring out how exactly to do it will require considerable effort.

Moreover, the provision and transfer of data and services will be supported to an increasing degree by Space capabilities. However, these

crucial capabilities can be expected to be increasingly contested – and we will have to consider how to establish redundancies and provide for replacements (e.g. through 'responsive Space operations' including 'launch on demand').

A robust and reliable architecture is fundamental to making the appropriate and best use of what Artificial Intelligence (AI) and Machine Learning (ML) can offer. It helps to properly define the necessary capabilities and the appropriate ways to link them. It is not first and foremost about technologies, but it starts with a common and detailed understanding of the challenges we will face. The good news is that these architectures are not emerging technologies; they are tried and tested and in use every day by banks, power companies, and supermarkets. Indeed, using these approaches, which are available for security and defence requires funding them.

In this context, there is also an obvious need for what has been described in a recent JAPCC Journal article as 'a resilient innovation pipeline'. NATO has to strive to gain 'first-mover advantage' in the acquisition and fielding of disruptive emerging technologies. This implies a need to identify and address the fragmentation of researchers, academia, start-ups, governments, and established industries at the beginning of this pipeline (managing uncertainty). In addition, being able to fund, adopt, and scale these new technologies as, and when, they are ready and, perhaps more importantly before they are ready (Speed of Relevance implies taking well-calculated and responsible risks to gain first-mover advantage) adds an even higher level of complexity.

Discussions between technology experts from NATO's Science and Technology Organization (STO), members of academia, industry, and certainly the military will further help to understand the challenges and find ways to overcome upcoming problems and leverage innovation. We will have to be ambitious, and we will need an aspirational design and roadmap to 'out think, out excel and outpace' potential opponents.

At the same time, following a pragmatic approach, we might also have to look for incremental changes.

To realize what we wish to achieve in support of operations across all domains will most probably also require changes in the way we organize our acquisition processes and provide incentives for innovation. NATO's Defence Innovation Accelerator for the North Atlantic (DIANA) will hopefully offer a network for NATO nations to connect with industry and academia to make the best use of innovation in the civilian sector that supports developing the right applications of emerging and disruptive technologies to be used by our militaries.

Consequences – What Are The Consequences For C2 And For Operations?

It is always tempting to suggest that new and emerging threats require completely new responses from entirely new capabilities and C2 constructs. However, an enduring theme of the conference was that, despite some frustrations, there are a lot of things that NATO does well. A firm foundation of strategy and policy already exists to build ways (C2) and means (capability and force structures) to achieve success. To embark on a radical 'root and branch' restructuring of NATO processes and structures, from political and HQ level decision-making to tactical level TTPs, perhaps risks 'throwing the baby out with the bath water'.

NATO has already achieved high standards to jointly plan, command and coordinate the Air, Land, and Maritime domains organized in its component commands, but it certainly needs additional efforts to fully integrate them and include the space and cyberspace domains. It will also have to consider that comprehensive operations involve more than the military instrument of power – it may need to take into account and coordinate or even synchronize with capabilities vested in other non-military instruments and entities available to our nations.

As NATO moves closer to truly integrated Multi-Domain Operations (MDO) or Joint All-Domain Operations (JADO), a comprehensive situational awareness will be fundamental. The task to achieve this level of understanding has become increasingly complex, not due to a lack of information but due to the vast amount of data that will increasingly be available. The management of data will play a central role in future C2, making it necessary to create new functions in future C2 nodes to collect, verify, store, retrieve, analyse, fuse, give sense (i.e. build knowledge out of data), disseminate, and share data in a multinational and joint environment.

To support the required management of the considerable amount of data, data scientists may have to sit alongside warfighters. NATO will have to invest more resources in modelling and simulation, immersive technologies, and advanced wargaming to facilitate understanding the situation and development of multiple courses of action. AI and (when ready) the power of quantum computing will support dealing with the complex and rapidly changing scenarios we expect in the future operational environment.

NATO's C2 structures and processes may be a good starting point for what future operations will require, but they were not designed from the ground up to support and enable MDO. Nevertheless, there is good reason to start by looking at what NATO has today and build incrementally towards what NATO needs in the future. NATO is slowly determining what it can do now – with the capabilities it already has – to execute MDO. The Alliance may then continue to develop this through exercises whilst balancing existing with emerging technologies. Considerations to enable decentralized C2 and a reduction of the number of C2 layers may be a way to support achieving the necessary speed of response, which is an important key to reaching a superior operational tempo.

With a fully integrated operational structure and processes that provide situational awareness and all the necessary cross-domain information to the level of execution, decentralized C2 seems achievable and would enhance NATO effectiveness. It could avoid single points of failure and considerably enhance 'Mission Command plus', based on superior informational knowledge. Decentralized C2 would change the way we plan and execute today – and would be a paradigm change for military command and may require a new culture of command.

Effective C2 in a complex battlespace cannot happen without reliable communication and data transfer. Therefore, there is an obvious need to achieve and maintain superiority in the use of the Electromagnetic Spectrum (EMS). Advanced technologies and better interoperability can improve NATO's efficiency throughout Cyberspace and the EMS. Indeed, Cyberspace and the EMS can be perceived as two sides of the same coin. From an operational perspective, it seems paramount to incorporate cyber warfare and EW into NATO exercises such as Locked Shields, Cyber Coalition, Trident Juncture, Unified Vision, and Naval Electro Magnetic Operations. The impact and the effect of these exercises on NATO should not be underestimated. NATO's achievements in such exercises do not go unnoticed, and they have a real impact on deterring aggression and maintaining peace.

Space has rapidly become a critical requirement for everyday life and defence purposes. Protecting this critical capability (which, in practice, presents an array of vulnerabilities) is vital. It requires us to think deeply about what attempts there might be to deny the use of space-related Data, Products, and Services (DPS) for civilian and military purposes and what to consider when dealing with the challenges of potential denial. NATO nations acknowledge that the further exploitation of Space to ensure sufficient availability of space-related DPS is crucial and demands a high level of resilience. For safeguarding access to these DPS, international cooperation in the Space domain is indispensable. Space is a global domain, and it requires global partnerships.

Getting It Done – How To Do What Needs To Be Done?

NATO needs to compete in all domains and have capabilities in place that will enable competitive advantage. Competition always implies the will of competitors to win. However, to maintain security and peace, it is of utmost importance to drive down the potential for miscalculation. This is one of the key tenets of a deterrent posture – minimizing the risk of miscalculation for every possible scenario, either about our intentions or about our capability and preparedness to act.

Some of what needs to be done is already being done. NATO nations are developing their cyber capabilities to defend against attacks. Most nations are taking decisive steps to monitor operations in Space and can react to attempts to disrupt the use of Space assets and the DPS they provide or use. We are already making efforts to speed up the process. Indeed, as emphasized by a panel member, what we call MDO is not entirely new. However, achieving the required level of integration that advanced technologies can enable will require adjustments and maybe more substantial changes. The anticipated speed of action and reaction will be much faster than today in an increasingly complex environment, which presents particular challenges.

Many of our industries can move and innovate at speeds that NATO needs to recognize and match. Structures and processes are necessary for NATO to turn those thoughts and concepts into implementation. We must work out a way to identify operational requirements and communicate them appropriately (and non-generically) to industry so that they can give us what we need rather than what they might have thought we needed five or even ten years ago. This also implies that existing capabilities – often those currently stove-piped in different domains – somehow must be pulled together. We need to optimize our ability to leverage what is out there and rapidly deliver it into the hands of the warfighter.

To facilitate speed means accepting a calculated risk. Building collective shared awareness is the foundation of this decision model. We need to get the right information to the right people at the right time, and we need to get our senior leaders comfortable with the decisions that are being made at every level. Only by doing this can we create the essential advantages in awareness, information, and rapid decision-making.

Without a sense of urgency for change, we leave the initiative to others. An incremental and iterative approach will prevent us from trying to solve everything at once. Iteration needs to happen on a priority basis, which means fixing the most urgent problems first. We will have to maintain reliable and resilient C2. Based on this, we need a clear idea of a comprehensive architecture that links strategic and operational requirements and tasks to capabilities and the required technological standards.

Once again, the Joint Air and Space Power conference provided a valuable opportunity for senior leaders and Air and Space Power advocates to meet to discuss the critical issues facing the Alliance and present their ideas on possible solutions and lines of effort to advance NATO thought. We hope this brief summary captures the key ideas and issues discussed during the event and provides a perspective on the path forward for the transformation of Air and Space Power across the Alliance.

References

1 NATO 2030: United for a New Era. Analysis and Recommendations of the Reflection Group Appointed by the NATO Secretary General. 25 November 2020. p. 16.
2 Ibid.
3 Gen Charles Brown, 2020. Accelerate Change or Lose. US Air Force Chief of Staff.
4 Giulio Douhet, 1921. The Command of the Air. p. 27.

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