annual REPORT

Joint Air Power Competence Centre

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Joint Air Power Competence Centre

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Foreword

As the JAPCC Assistant Director, appointed in August 2024, I am honoured to carry forward the exceptional work of Paul Herber. It is with great pleasure that I present to you the 2024 Annual Report.

The last year has been intense, with the ongoing war in Ukraine, the conflict in the Middle East and various crisis worldwide. These developments have a direct influence on our work. Requests for JAPCC support from NATO entities and member nations have again remarkably risen, underlining the value of JAPCC's significant contribution to the development of NATO Air and Space Power, and the acknowledgement of our work and competence.

2025 marks the 20th anniversary of JAPCC, the most senior among NATO accredited Centres of Excellence. This edition of the JAPCC Annual Report provides an overview of key developments, projects, and research done in 2024, while also highlighting plans for 2025 and beyond. Despite severe staffing challenges (with only 52 % of the Subject Matter Expert positions filled) the JAPCC successfully supported many initiatives important to the Sponsoring Nations and the NATO Joint Airpower Community, including the Ramstein and Steadfast exercises series, significant studies and articles, custodianship of many important NATO publications, while actively participating in NATO Working Groups and Boards. Our JAPCC professionals maintain long-term focus on important projects, often with little fanfare or recognition. Much of JAPCC's work and products are found under the metaphoric waterline of an iceberg.

As you will see on the following pages, your investment in the JAPCC delivers dividends for airpower and interoperability now and for years to come. JAPCC will continue to assess the present and study possible future scenarios, keeping NATO's transformation through the Warfare Development Agenda and AIRCOM's five priorities and operational needs as a guideline.

While the focus of this report is on our many accomplishments in 2024, allow me to take the opportunity to remind you of our manning challenges. I can only urge you – as our Sponsoring Nations – to consider filling the vacant positions of this important Centre of Excellence to sustain and uphold the quality of the JAPCC work, its utility, and value in a more and more challenging environment for our Alliance. I would like to particularly call your attention to our UAS and Counter-UAS efforts and 5th and future generation fighters and Autonomous Collaborative Platforms, with particular focus on the Collaborative Combat Aircraft programs as the expected most challenging field in the upcoming years.

Furthermore, long-vacant positions such as Knowledge Management and Public Affairs could have a significant impact on our mission without requiring another professional from the combat arms. As always, we are responsive to you, the Sponsoring Nations; what else can JAPCC do to help you make the difficult but essential decisions shaping the future of Joint Air and Space Power?

As former AIRCOM, USAFE, and AFAFRICA Commander and Director of JAPCC General Gorenc used to say: 'Airpower is like Oxygen. When you have enough, you don't have to think about it. When you don't have enough, that's all you can think about.' It is also our job to keep us all breathing!

Sincerely,

Vito Cracas
Colonel Pilot, Italian Air Force,
Assistant Director, JAPCC

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JAPCC Background

Vision

To be NATO's catalyst for the improvement and transformation of Joint Air and Space Power, delivering effective solutions through independent thought and analysis.

Mission

The JAPCC, as a team of multinational experts, is to provide key decision-makers effective solutions on Air and Space Power challenges, in order to safeguard NATO and the Nations' interests.

Contributions to Joint Air & Space Power

To accomplish our mission, the JAPCC undertakes independent research and advocacy while also addressing the requirements of NATO and its member nations. Our Programme of Work (PoW) consists of a range of dynamic projects, activities, and tasks that are adjusted monthly in response to approved Requests for Support (RfS). If you are interested in submitting a RfS to inquire about the possibility of JAPCC facilitating a study on your chosen topic, please reach out to us using the form provided on our website, www.japcc.org.

In addition to this, the JAPCC independently hosts a number of significant events throughout the year. These include the annual Joint Air & Space Power Conference, the Joint Air & Space Power Network Meeting (JASPN), the Think Tank Forum (TTF), the Maritime Air Coordination Conference (MACC), as well as the JAPCC Steering Committee (SC) meeting and the Senior Resource Committee (SRC) meeting.

Leadership and Structure

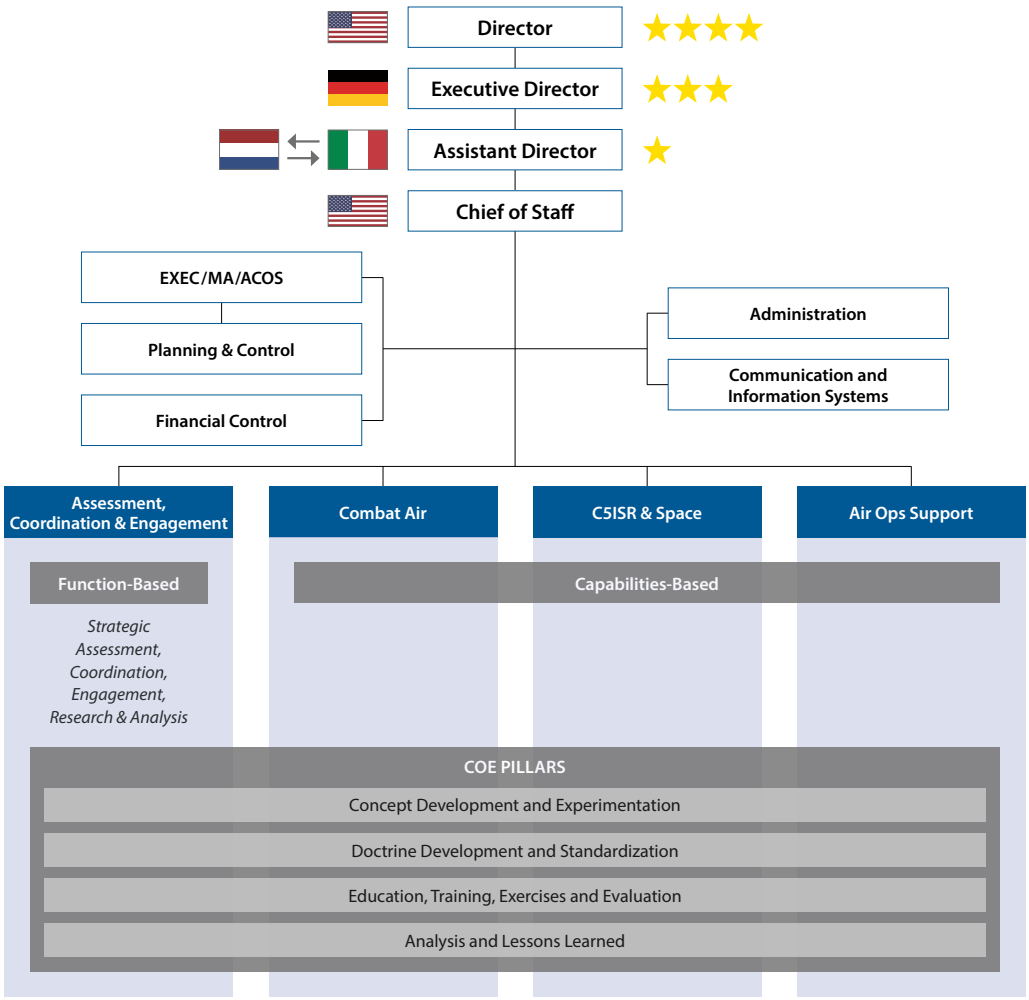
The JAPCC is headed by the Director, General James B. Hecker (USA AF), who has led the Centre since June 2022. General Hecker also serves as the Commander Allied Air Command (AIRCOM) and the Commander United States Air Forces in Europe and Air Forces in Africa (USAFE-AFAFRICA) at Ramstein Air Base.

The JAPCC's Executive Director, Lieutenant General Thorsten Poschwatta (DEU AF), also commands the German Air Component Command (DEU ACC) and the NATO Combined Air Operations Centre (CAOC) Uedem.

On-site, Colonel Vito Cracas (ITA AF) serves as the Assistant Director (AD), and together with the Chief of Staff (COS), Colonel Matthew Hanson (USA AF), provides day-to-day leadership for the JAPCC team.

The JAPCC consists of four branches that form its core. One of these branches is the Assessment, Coordination, and Engagement (ACE) headed by Colonel Alexander Lorch (DEU AF), who followed Colonel Markus Müller (DEU AF) in October 2024. ACE branch plays a central role in managing engagement planning, media outreach, and publishing. In essence, it acts as the guiding force behind our organization. The remaining three branches are categorized based on capabilities. Combat Air (CA) branch, headed by Colonel Kevin Anderson (USA AF), who followed Colonel Tyler Niebuhr (USA AF) in June 2024, focuses on combat-related operations. Colonel Marco Kathmann (NLD AF) leads the Air Operations Support (AOS) branch, which focusses on the provision of combat (service) support for air operations. Lastly, the Command, Control, Computer, Communication, Cyber, Intelligence, Surveillance and Reconnaissance & Space (C5ISR&S) branch, is led by Colonel Gianluca Chiriatti (ITA AF), who followed Colonel Maurizio De Angelis (ITA AF) in October 2024.

These four branches collectively form the backbone of the JAPCC, each contributing their unique expertise and skills to fulfil our mission.



The JAPCC Organizational Structure consists of four core branches that cover a broad spectrum of subject matter areas pertaining to Joint Air and Space Power.

Personnel

In 2024, just like in previous years, the JAPCC faced the challenge of efficiently utilizing its available resources. Unfortunately, we were unable to support all the Requests for Support (RfS) we had anticipated due to the fact that only about half of the Subject Matter Expert (SME) positions have been filled.

The JAPCC continues mitigating these shortfalls through cross-utilization, internal education and training, and creative technological solutions. However, to effectively address the wide range of subject matter areas in the field of Joint Air and Space Power that are relevant to NATO, and to provide enhanced support to the Joint Warfare Centre (JWC) and major NATO exercise programs, it is imperative for the JAPCC to receive increased participation from Sponsoring Nations. Furthermore, it is crucial to encourage other nations to actively engage with the JAPCC, either as a Sponsoring or a Contributing Nation. Use of the Voluntary National Contribution (VNC) construct allows JAPCC Sponsoring Nations to share their portfolio and focus on fields that require specific expertise. Any VNC, whether temporary, or for a specific project, will greatly enhance and support JAPCC's valuable efforts.

JAPCC Areas of Interest and Focus Areas

Areas of Interest	Focus Areas
Areas of Interest (AoI) are intended to encompass the majority of all JAPCC work, provide vision and clarity in those efforts, and provide a means to articulate the whole of our efforts and accomplishments across JAPCC Branches and COE Pillars.	Focus Areas (FA) indicate areas of particular interest, typically within an AoI, for a period of time. Activities supporting the FA may receive prioritization of time and resources. FAs may apply across multiple AoIs or topics.

Integration: Incorporates a broad range of activities with the common theme of integration – be it between nations, joint services/domains, whole-of-government, or industry/academia.

Examples: MDO including C2, Industry/Academic, Air-Land, CIMIC, etc.

Enablers: Many enablers are necessary to project airpower and accomplish the mission. This includes physical, informational, and electronic activities as well as supporting domains.

Examples: Resilience & Sustainability, Space/Cyber Support to Air Operations, JISR, EMS, etc.

Defensive Air Ops: The traditional means of planning, C2ing, and conducting the air defence mission to protect civil/military targets and ensure the ability to survive and operate.

Examples: IAMD, Hypersonic Defence, BMD, etc.

Offensive Air Ops: The traditional means of planning, command & controlling, and projecting airpower to accomplish the joint mission.

Examples: C-A2/AD Operations, Aircraft/Munitions, UAS, PGM, etc.

Support to NATO: Includes all activities and services that JAPCC delivers to directly support NATO training, planning, or operations.

Examples: Exercise Support, SME Support, Education & Training, Doctrine Development, Outreach, Publications, Annual Conference, etc.

The JAPCC Areas of Interest and Focus Areas approved by the Sending Nations.

With the help of the Sponsoring Nations, partnerships with universities, knowledge institutes and Warfare Centres, as well as interactions with industry and academia, can bolster JAPCC and significantly push NATO forward in the realm of Air and Space Power.

Currently, this is especially true in the rapidly evolving field of UAS and C-UAS, where JAPCC is not able to sufficiently meet the increasing demand for subject matter expert support.

Stakeholders

The JAPCC's primary customers include NATO HQ, Allied Command Operations (ACO), Allied Command Transformation (ACT), NATO Joint Force Commands (JFC), Joint Support and Enabling Command (JSEC), Component Commands (CC) and Sponsoring Nations (SN). However, when possible JAPCC also accepts support requests from other sources as workload and staff availability permit. With a track record of successful products

and ever-increasing connections to industry and academia, JAPCC continues to build upon its reputation as NATO's preeminent advocate for transforming Joint A&S Power.

Support to the 'Pillars of CoE Work' for NATO

Given the extensive scope of air and space subject matter expertise addressed by the JAPCC, the four pillars, a COE typically is built on and its branches structured accordingly, run cross-functional through all the JAPCC branches. JAPCC has three branches that offer specialized expertise and resources, contributing to each of the basic CoE pillars.* The Assessment, Coordination and Engagement Branch structure assigns a minimum of two positions to support each pillar, ensuring seamless alignment between the JAPCC's Programme of Work (PoW) and NATO's requirements. Due to the low fill-rate of the positions some cross-functional task can only be executed at the very minimum.

JAPCC Area of Interest and Focus Areas

JAPCC regularly reviews and transforms its 12 Focus Areas (FAs), Programme of Work (PoW), and organizational structure to ensure that it can continue to address current and future challenges and to provide key decision-makers with effective solutions to A&S Power challenges.

As the FAs have not always reflected JAPCC's true focus and weight of effort in the past, the introduction of so-called JAPCC Areas of Interest (AoI) was approved at last year's SC/SRC meeting. They are intended to capture most of JAPCC's work, provide vision and clarity, and provide means to articulate our efforts and accomplishments. Whilst the FAs indicate a limited number of priorities, typically aligned with an AoI, for a particular period. Activities supporting the FAs may receive prioritizations of time and resources and may apply across multiple AoI or topics.

The AoI are:

- *Integration:* incorporates a broad range of activities with the common theme of integration.
- *Enablers:* those enablers necessary to project Air Power and accomplish the mission.
- *Defensive Air Operations:* the traditional means of planning, commanding, controlling, and conducting the air defence mission.
- *Offensive Air Operations:* the traditional means of planning, commanding, controlling, and projecting Air Power to accomplish the joint mission.
- *Support to NATO:* all activities and services that JAPCC delivers to support NATO training, planning, or operations directly.

AoI's are designed to support AIRCOM's five priorities while maintaining independence for the JAPCC.

*Pillars of COE work for NATO are: 1. Education, Training, Exercise and Evaluation (ETEE), 2. Analysis and Lessons Learned (A&LL), 3. Doctrine Development and Standardization (DD&S) and 4. Concept Development and Experimentation (CD&E).

Key Developments

The JAPCC is actively engaged in areas where it can reach back to SMEs' expertise. This section provides a concise overview of the organization's endeavors over the past year in support of NATO's Joint Air & Space Power. However, due to space limitations, this report presents high-level summaries of our activities. For more comprehensive information on any specific area, we encourage you to visit our website or reach out to us directly.

Publications

In the 2024 editions of the JAPCC Journal, a significant publication that promotes the development of Joint Air and Space Power, we proudly maintain our role as a strategic platform for dialogue. Our aim is to advance both theoretical and practical discourse across all command levels. Recent issues have been enriched with a plethora of valuable insights and innovative strategies, thanks to the integration of expertise from senior NATO leaders, JAPCC personnel, and esteemed external contributors. These forward-thinking articles play a vital role in shaping NATO's Joint Air and Space Power, equipping leaders with the necessary knowledge to navigate the complexities of future defence landscapes.

'Drone Drills' White Paper on Immediate Drone Response Measures. While established protocols exist for common emergencies such as fire drills, organizations often lack specific plans for drone incidents, which are becoming more prevalent due to increased

Drone Drills
How to Prepare for a Drone Incident

https://www.japcc.org/white-papers/drone-drills/

Joint Personnel Recovery in an Urban Environment

https://www.japcc.org/white-papers/joint-personnel-recovery-in-an-urban-environment/

drone usage. Responses to drone incidents require tailored plans covering threat assessment, protection measures, and implementation of immediate procedures. Effective response to drone incidents might be delayed as Counter-Unmanned Aircraft System (C-UAS) technology is not yet widely available. Therefore, immediate actions upon detection are crucial to minimizing harm, damage, and potential casualties. Regular drills are essential to ensure readiness and proficiency.

This White Paper aims to provide actionable drone response measures that one can quickly and easily implement to cover the timeframe from drone detection to the arrival of emergency responders or until a dedicated C-UAS system can intervene. Furthermore, examples of an immediate drone response warning sign, a preparatory measures info sheet, and a drone sighting report sheet are provided in the annexes. Customizable templates are also available as a digital download on the JAPCC website. Finally, this paper recommends preventive, cost-effective and easy-to-implement structural, organizational, and educational measures to complement and support the recommended immediate actions.

The Joint Personnel Recovery (JPR) in Urban Environment White Paper. This project, completed in September 2024, characterized the urban environment and identified new education and training requirements, promising current and future technologies, and operational concepts which informed NATO nations about an understudied but genuine military challenge. The authors encouraged JPR stakeholders to significantly improve all four phases of the PR system (Preparation, Planning, Execution, and Adaptation) in an ever-evolving landscape.

Concept Development

The JAPCC's support to Joint A&S Power concept development in 2024 included the following:

- Agile Combat Employment (ACE);
- NATO Multi-Domain Operations (MDO);
- NATO Science and Technology Organization (STO) study (AVT-359);
- NATO Science and Technology Organization (STO) study (AVT-ET-252).

Agile Combat Employment (ACE). ACE is a proactive and reactive operational scheme of manoeuvre executed within threat timelines to increase survivability while generating combat power throughout the integrated deterrence continuum and it must be considered 'The new normal'. It is AIRCOM's intent to develop a flexible NATO ACE concept that encompasses dynamic dispersal, deployment, and basing for tailored implementational cross-member nations to create targeting dilemmas for our adversary while enhancing survivability during uninterrupted combat operations.

JAPCC is currently working on several projects that support ACE:

- Contributing to the development of an ACE Doctrine;
- Resilient Basing;
- Aircraft Cross Servicing (ACS);
- Logistics – Definition of nations' role (framework, HN, SN, transit):
  - Peacetime vs. wartime restrictions;
  - ACE logistic roles (JSEC, JLSG, ALCC);
  - The need for an airfield database;
  - Munitions requirements.
- FP Decision Support Tool.

ACE Doctrine Development. NATO Allied Command Transformation (ACT) is leading the efforts to prioritize interoperability. Joint doctrine is a key element in this endeavour. JAPCC proposed a Joint approach for the development of an ACE Doctrine. This ensures alignment with the principles of effective joint and multinational operations. While AIRCOM has been the first to raise the need for an ACE doctrine, it is expected that the proposed Joint approach of the ACE doctrine will benefit from and involve a broader range of contributors across NATO.

Multinational Multi-Domain Command & Control (M2C2) Interoperability Project. The M2C2 Interoperability project team met throughout 2024 and published their final product in December 2024. The document, titled 'Multinational Multi-Domain Command and Control Interoperability', defined national capabilities and development objectives necessary for NATO members and partner nations to achieve command and control architecture interoperability, as well as education and training requirements required to enable the changes. In addition to determining the current state, the team provided over 30 recommendations on how nations can improve interoperability and move towards integrations and full implementation of the MDO concept as it is adopted into doctrine. This project is part of an ongoing modernization effort toward standardizing a NATO-wide federated mission network to prepare members for participation in coalition operations.

NATO Force Protection Decision Support Tool (FPDST) Development. On 8 December 2022, the JAPCC and Cunning Running Software Limited delivered a highly successful 'Proof of Concept' brief as the final event of the JAPCC's Force Protection Decision Support Tool (FPDST) project. This event marked the completion of work initiated by an RfS from NATO Air Command that required the JAPCC to explore the feasibility of automating the process by which the FP challenges facing the Air Component are analysed; this process is often referred to as 'The FP Estimate'. The Estimate is a structured way of working through a problem to derive a solution. However, it must be undertaken by individuals with training and experience and is time-consuming.

At the time of the request, an incident during a NATO exercise had brought FP into focus as NATO Air suffered a catastrophic (exercise) loss due to flawed FP decisions based on inadequate information. This incident not only highlighted the validity of early Air Power theory

but refocused attention on real-world incidents such as the 2012 Taliban attack on Camp Bastion, where the subsequent incident report cited failings in FP decision-making as a major causational factor.

As demonstrated, the FPDST can capture Enemy capabilities, deduce Friendly Force requirements, generate the FP Order of Battle, build an FP Estimate and create a report with a full supporting presentation. This is done by guiding the user through a standards-based process underpinned by fully configurable databases. The software can handle dependencies between Force Elements (FEs) and automatically identify support requirements for those FEs. Outputs are automatically generated in standard, editable formats (Word/PowerPoint).

For the first time, the FPDST will enable headquarters to task subordinate units to work with the software to understand better the FP challenge specific to their location and the FP capabilities necessary to mitigate them. In turn, headquarters will be able to build and maintain a comprehensive 'library' of individual locations that, once consolidated, will provide the FP overview necessary to allow proper senior-level FP decision-making.

The proof of concept was delivered in 2022; the next step is for interested nations, installations, or headquarters (NATO or national) to work with the software developer to operationalize the product. Ownership is at AIRCOM, and JAPCC will remain in an advisory capacity and can facilitate contact with Cunning Running for any interested parties who wish to take advantage of this opportunity to improve force protection while reducing the associated time and cost.

NATO STO SCI-SAS-351 Space Deterrence Framework. The Space Deterrence Framework was convened in 2019 to investigate what actions NATO could undertake to deter aggression in the Space Domain. Over four years, the Space SMEs have participated in multiple planning conferences and finally conducted the first-ever involvement of space in a war game. This was conducted at the strategic level by ten ambassador representatives to understand what NATO can do to deter aggression in the Space Domain. This was the first and only space exercise or wargame dedicated to Space in all of NATO. Its objective was to determine the complex nature of how Article 5 could and would be declared because of aggressions in the space domain. At the 2021 Brussels Summit, the Allies agreed that an attack in space would constitute an attack on all. However, they did not indicate what level of an attack would constitute the basis for an Article 5 response, hence the importance of this war game. ACT has published a final report at the NATO Secret level for those interested in additional information. The JAPCC hosted the mid-term planning conference for the '24 wargame. The JAPCC will assume a larger role in future wargames as the JAPCC Space Section was appointed the red cell lead for the '24 and '25 games. The wargame in '25 will be led by ACT as STO hands over the effort to them from here on out. ACT intends to continue this Wargame in the future with an annual Wargame execution. The JAPCC intends to be a key player in the planning and execution of this year's Wargame.

NATO STO SAS-200: AI tools for Operational Planning. This initiative is a NATO research effort focused on integrating artificial intelligence (AI) into military decision-making. Led by Canada and involving multiple NATO nations, this project explores the role of AI in enhancing operational planning by leveraging machine learning (ML) and reasoning-based AI, to assist in the decision-making process. This initiative aligns with existing NATO doctrines and planning frameworks, such as the NATO Comprehensive Operations Planning Directive (COPD), ensuring AI solutions are tailored to real-world military needs.

The project's goal is not to replace human decision-makers but to augment their capabilities by improving the speed and quality of planning. It aims to analyse current AI developments, assess potential applications, and develop practical use cases. The expected outcomes include AI-driven tools that support mission analysis, course-of-action development, logistics, intelligence gathering, and execution monitoring.

STO-CSO SCI – 357: Comparison of Allied Nations Space Strategies. In December 2024, the first kick off meeting was conducted to identify the necessary team for this effort and to discuss the way forward. This effort consists of researching each Allied Nation's space strategy and to seek out any potential synergies, conflicts, and/or harmonization with one another, along with the Alliance overall. The participants plan on meeting twice a year to provide progress and update on new tasks.

NATO SCI-SET-353 C-UAS Mission-Level Modelling & Simulation. JAPCC UAS/C-UAS SME co-chairs the SCI-SET-353 task group. With the ever-increasing capabilities of UAS, an enormous proliferation, and the widespread deployment of UA in recent conflicts, it is evident that C-UAS capabilities are relevant to NATO forces. Effective Modelling & Simulation (M&S) can identify shortfalls of existing C-UAS systems in specific scenarios and reveal where improvements are needed to deal with the threat effectively. The objective of the SCI-SET-353 task group is to develop a common M&S framework that can evaluate relevant scenarios at the mission level. The framework shall be able to model all relevant characteristics of the UA, the environment, detection methods, C2 systems and effectors. The modelling shall be performed at an effects-based level sufficient to capture the essential aspects of the C-UAS process. The framework shall subsequently be used to simulate specific scenarios, such as some of the vignettes derived in the SCI-301 task group. Ideally, the framework shall be verified by modelling scenarios that are executed at NATO trials, after which the results of the simulation and the real-life event can be compared.

NATO STO-359 Impact of Hypersonic Operational Threats on Military Operations and Technical High-Level Requirements. With JAPCC as co-chair, this study focused on military applicability, with the OODA loop (Observe, Orient, Decide, Act) as the baseline reference. Phase 1 was published early in 2022, and Phase 2 was completed in the first half of 2024, replaced thereafter with STO-252 (below). Although many facets of hypersonic threats and capabilities have been analysed in the past four years, aspects still need further scrutiny. JAPCC SME, Lieutenant Colonel Andreas Schmidt, published a Journal article titled 'Hypersonic Capabilities, A Journey from Almighty Threat to Intelligible Risk', highlighting the work that has been done understanding hypersonic threats, and identifying aspects that need further scrutiny.

NATO STO-252 Effectivity, Feasibility and Affordability Assessment/Trade-Off for High-Speed Strike Vehicles. This initiative began in 2024 and will conclude in 2025. AVT-ET-252 is a NATO exploratory team assessing the potential of hypersonic missiles and glide vehicles. It examines technical challenges like propulsion, materials, and guidance, alongside strategic missions such as deterrence and integration into NATO defence frameworks. The team's findings aim to shape policy and operational strategies for emerging threats. With the help of experts from multiple nations, it will conduct hypersonic research activities, including Specialist Teams, Research Workshops, and Research Task Groups to perform an assessment of performance, survivability and costs of hypersonic and high Mach supersonic cruise missiles. A trade-off against other strike weapons will be attempted. Both technological and operational aspects shall be addressed.

Exercise Support

Exercise support is a key mission area for the JAPCC. The JAPCC leads teams drawn from across NATO to provide Red Air, Space, and Cyber support to exercises and experiments, as such capability is not resident at the Joint Warfare Center (JWC), Stavanger.

The JAPCC supported the following exercises in 2024:

Steadfast Deterrence 24. STEADFAST DETERRENCE 2024 (STDC24) is a SHAPE sponsored exercise which evaluated NRDC-ITA as the ARF 3 Stars HQ. STDC24 is the first iteration of the new Major Joint Exercise (MJX) series, and it is aimed at training Strategic and Operational level HQs – through Command Post/Computer Assisted Exercises (CPX/CAX) – while conducting peacetime vigilance activities and the Deterrence and Defence of the Euro-Atlantic Area (DDA)

Family of Plans (FoP) against a peer adversary. This was the first opportunity to exercise aspects of DDA at the strategic/operational level using the new NATO Force Model (NFM), thus challenging the Alliance in peace and crisis. Finally, it will set the benchmark for future ARF HQ training and certification. The exercise requires close adherence to the potential situation in case of a real activation and following deployment. This readiness during planning is meant to test the reaction of staff within time constraints. This will require excellent organization and coordination, especially as the personnel come from different backgrounds. Doing this will require using the standard procedures consolidated in over 20 years of NRDC-ITA HQ experience. The JAPCC supported by sending SMEs to fill the OPFOR Air and OPFOR Space positions within the exercise.

Steadfast Duel 24. Following the formal agreement with the Joint Warfare Centre (JWC), JAPCC supported the complete cycle of Steadfast Duel 24 at the JWC in Stavanger, Norway. Support was provided during the Strategy Workshop, the Incident Development Workshop, the MEL/MIL Scripting Workshop and the Execution. Knowledge of the Red Forces and the employment of those forces was provided. A complete RED ATO was built for three different JOAs to give the TA an air picture. The ATO consisted of over 500 RED missions flown every day of the exercise. Besides the support in Norway, preparatory work at the JAPCC has been done. Red Space's involvement (2/3 JAPCC Space SMEs) in the exercise was ~15 %, covering ~400 injects, and addressing 15 (~40 %) storylines over three Joint Operational Areas. The JAPCC conducted a Hand-Over Take-Over (HOTO) with the newly accredited NATO Space COE to assume the OPFOR role for future Steadfast exercises. The JAPCC anticipates the need for space SMEs to continue exercise support will remain high. However future support will be contingent upon formal RfS submissions.

Ramstein Flag 24. Ramstein Flag (RAFL) is a new, tactical-level, live air exercise (LIVEX). HQ AIRCOM's vision for RAFL24 is to provide participants with high-end training opportunities, including realistic problem sets in a complex operational environment. The first iteration, RAFL24, was conducted in Greece in October 2024. Several JAPCC SMEs were involved in developing tactics, exercise planning and coordination. They helped shape the exercise objectives and participation, mentored NATO exercise planning teams, and provided an observation team of large force exercise (LFE) experts to help provide lessons learned for the exercise. JAPCC will continue to participate in subsequent RAFL events, which AIRCOM plan every two years beginning in 2025.

Loyal Leda 24. LOYAL LEDA 2024 represented the pinnacle of simulation exercises, blending strategic thinking with cutting-edge technology. These units showcased their ability to operate across the full spectrum of modern conflicts, where information and reactivity are paramount to success. The exercise specifically evaluated the Corps de Reaction Rapide France in their NATO Warfighting Corps capabilities, demonstrating the readiness of these forces to respond to emerging threats effectively. The Exercise Control team, stationed at the Joint Force Training Centre in Bydgoszcz, Poland, ensured that LOYAL LEDA 2024 was both challenging and realistic, pushing Allied forces to remain cohesive, vigilant, and operationally ready. This computer-assisted exercise was a command post exercise focused on practicing Alliance collective defence in response to a simulated attack. LOYAL LEDA 2024 was based on a compelling scenario that challenged those being trained with a multi-domain, rapidly evolving environment. It included political, military, economic, social, information, and infrastructure domains to replicate the complexities of modern warfare. Participants operated in this authentic online environment, preparing them to execute similar tasks in real-life scenarios. The JAPCC sent both air and cyber SMEs to support all three phases of this exercise.

Falcon Strike. Falcon Strike is Italy's premier 5th generation fighter exercise focused on high-end counter anti access/area denial (C-A2/AD), integrated air and missile defense (IAMD), and integration with 4th generation fighters. This joint exercise hosts GBR Navy, Italian Navy, USA Air Force, Hellenic Air Force, French Air Force, Italian Army, and possibly Dutch Air Force

assets. The exercise will take place in October/November 2025, and JAPCC supported the Initial Planning Conference conducted at Poggio Renatico, ITA. JAPCC participated pursuant to a request for support from the Italian Air Force staff.

Space Deterrence Wargame 2024. In the realm of *NATO STO SCI-SAS-351 Space Deterrence Framework* (see pertinent paragraph in previous Chapter 2.2), a team of researchers from the NATO Science and Technology Organization (STO) and Headquarters Supreme Allied Command Transformation (HQ SACT) carried out a wargame on space deterrence, bringing together 37 participants from nine NATO nations. Hosted by the Dutch Ministry of Defence (NLMOD) – Royal Netherlands Air Force – Space Centre, the 2024 wargame was held 29 April–2 May at the Majoor Jan Linzel Complex in The Hague, providing national decision-makers a series of evolving vignettes in the 2040-time frame.

Nimble Titan 26 (NT26). JAPCC is supporting Nimble Titan as a full member among three organizations and 26 Nations. Nimble Titan is a multinational, strategic level wargaming exercise focused on integrated missile defence and space operations. Conducted under the leadership of the US Department of Defense, it brings together NATO allies and partner nations to explore policy, strategy, and operational coordination for countering ballistic missiles, hypersonic threats, and evolving space challenges. The experimental exercise emphasizes coalition interoperability, multinational decision-making, and future defence capabilities, helping participants refine concepts for Integrated Air and Missile Defense (IAMD) in complex geopolitical environments. The JAPCC co-chairs the Wargaming Control Group.

Education and Training

In 2024, the JAPCC supported NATO Education and Training in the following areas:

Air Force Protection (FP) partnership with the European Air Group (EAG). JAPCC continues collaborating closely with the European Air Group (EAG) on Air Force Protection (FP) subjects. Areas of mutual interest in 2024 included continued work to incorporate the EAG's work on Air Mobility Protection Teams (AMPT) into future NATO Air FP Doctrine, the development of the Force Protection Decision Support Tool (FPDST) as well as development of a Letter of Intent (LoI) to capture EAG support in the delivery of FP Courses at NATO School. Additionally, JAPCC members provided academics and a keynote presentation for the first annual Military Aircraft Cyber Security (MACS) event in Madrid, Spain.

NATO School FP Courses. This year has again seen the delivery of three FP courses at the NATO School (the 'Introduction to FP in NATO'). Unfortunately, two iterations of the 'NATO Advanced FP (Practitioners)' course were cancelled, due to the unavailability of critical external support required to successfully deliver this course. Since 2008, the JAPCC has acted as the Office with Principal Responsibility (OPR) providing an Action Officer (AO) for these courses on behalf of SHAPE as the Requirements Authority (RA). The 'Introduction to FP in NATO' course continues to be one of the premier courses run by the NATO school regarding student satisfaction, student numbers attending and revenue generation.

Upon request of the nations in the forum of the NATO FP Working Group (FPWG), the JAPCC was asked in 2012 to develop an advanced FP course, and JAPCC delivered a pilot course in 2019. The course is highly regarded and well attended and almost exclusively run by the JAPCC. The NATO school has regrettably paused the course due to recent changes in resource availability, despite substantial demand and a waiting list of eager students.

Air FP Support to the Baltic States. This activity is an annual follow-on from the highly successful extended regional visits in 2015 and 2016. These initial and highly successful engagements, leading to structural changes in the region, have now evolved into delivering an in-depth and intellectually demanding FP package for the three Baltic Air Forces' officers at the Command and Staff College in Vilnius, Lithuania.

The package is a development of the JAPCC-authored and run Advanced FP (Practitioners) Course; however, it is tailored to be both Air FP specific and Baltic Region focused. Given events in Ukraine and the renewed attention to reassurance, this package remains exceptionally well received, and a request to repeat the package in 2025 is imminent. Future delivery of the package might be delivered through hybrid means. This enables resource efficient and cost-effective usage of limited SME availability. However, it is a practical example of the JAPCC's contribution to broader, more operationally focused NATO activity. Finally, the Air element of the Military Academy of Lithuania is seeking closer ties with the JAPCC-facilitated Think Tank Forum.

JPR Education and Training. JAPCC continued to support both NATO and EDA JPR Staff courses and the NATO Air Centric Personnel Recovery Operatives Course, held at TLP (Spain). JAPCC also supported the AirC2 courses held in Kalkar by delivering a specific lecture on JPR.

NATO CIMIC COE Course Support. The JAPCC supported the NATO CIMIC COE in European Deployment Preparation Course with multiple lectures and instructor support in Kielce, Poland.

NATO Common Education & Training Programme. The JAPCC supports the IAMD COE CET-P courses with SME expertise.

NATO School SBAMD Course. A JAPCC SBAMD SME supported AIRCOM in executing the 'Introduction to SBAMD' course with SME briefings and leading the course's syndicate work.

Competence Centre for Surface-Based Air and Missile Defence (CCSBAMD) Support. JAPCC supports the CCSBAMD comprehensive IAMD course with SME expertise.

Active Engagements

The JAPCC continues actively engaging with various air power stakeholders through working groups and other face-to-face meetings. These engagements included but were not limited to:

- ACT Multinational Solutions Synchronization Conference.
- ACS conference.
- Aerospace Capability Group 2.
- AIRCOM ACE Symposium 2024.
- AIREPAC 2024 at Ramstein.
- Air Operations Working Group.
- Air Warfare Development Team.
- Cross Domain Command Concept Development.
- European F-35 Users Grp Working Group (UGWG).
- NATO Allied Joint Force Protection Working Group (FPWG).
- NATO Countering Class I Unmanned Aircraft Systems Working Group (C-UAS WG).
- NATO Joint Capability Group Unmanned Aircraft Systems (JCGUAS).
- NATO Joint Capability Group Surface-Based Air and Missile Defence (SBAMD).
- International Concept Development & Experimentation Conference.
- Integration of Cyberspace into Joint Air & Space Power.
- Global AAR Strategy Team Collaboration.
- NATO AAR Working Group Chairmanship.
- Maritime Unmanned System Working Group (MUS WG).
- Multinational Capability Development Campaign/Multinational Multidomain Command and Control Working Group.
- MHTC Helicopter Collaboration and Coordination.
- NATO BiSCSWG (Space) is a biannual meeting of space SMEs to discuss and decide the progress of implementation of space as a domain. JAPCC participated in one of the meetings of 2024. The JAPCC intends to participate in the BiSCSWG meeting in spring 2025.
- Interim AAR Matrix: built and used for AAR Planners and Decision Makers alike. In accordance with STANAG 3971 & ATP-3.3.4.2.4, JAPCC will continue to update and maintain the AAR matrix, current interim solution contains all NATO nations' SRD data as well as nations from Indopacific region and industry partners; permanent/commercial solution in development via NATO AIS funding.

- NATO Space Center Users Group: no meeting occurred in 2024 however, this remains a working group that the JAPCC finds value.
- Personnel Recovery/Search and Rescue Working Group.
- European Air Group (EAG) Cyber Forum.
- NATO Science and Technology Organization (STO) SAS-200.

Annual Joint Air and Space Power Conference. The 2024 iteration of the Joint Air Power Competence Centre Conference, held from 8th to 10th October, was a watershed event in the calendar of NATO's strategic air and space discourse, focusing on 'Challenges and Opportunities for Air and Space Power in an Evolving Security Environment'. The conference was opened by a welcome address by Lieutenant General Thorsten Poschwatta, Executive Director Joint Air Power Competence Centre, Commander of the German Air Operations Command (today re-named Air Component Command), and Commander NATO Combined Air Operations Centre Uedem, followed by the introductory keynote speech of Dr Gergely Németh, Director General of the Hungarian Defence Innovation Research Institute.

The first panel discussed the global security changes, the ripple effects of shifting power dynamics, the changing landscape of warfare and the need for the alliance to adapt to deter and prevail in future conflicts effectively. The afternoon of the first day was opened by Dr Jyh-Shyang Sheu from the Taiwan Institute for National Defence and Security Research, outlining the current challenges for his country. The subsequent panel then examined the role of joint air and space power in contemporary conflict.

The second conference day opened with a keynote address by General Stephen N. Whiting, Commander of United States Space Command. The third panel discussed how the proliferation of advanced drones, loitering munitions and precision missiles challenges the conventional paradigms of air dominance and how NATO needs to adapt. The concluding panel debated the industry's contribution to enhance NATO Allies' dedication to the defence sector in maintaining the necessary production capacity for defence during peace, crisis, and the preparation for conflict escalation.

This year the JAPCC Joint Air and Space Power Conference is embarking on a new chapter. In 2025, the conference will move to the nearby prestigious Grugahalle in Essen, Germany, providing enhanced space and resources to accommodate its increasing number of distinguished attendees, including senior leaders, experts, and innovators. This year is going to be a testbed because the following year, in 2026, JAPCC will take a significant leap forward by becoming a key component of the inaugural EUDEX (Euro Defence Expo), all while maintaining its reputation as the foremost event for the air and space power community.

With anticipation already building and plans heavily underway, JAPCC looks forward to welcoming its distinguished guests, between 30th September and 2nd October at the Grugahalle in Essen, Germany.

Think Tank Forum. The 11th TTF was jointly organized by the JAPCC and Headquarters Allied Air Command (HQ AIRCOM) in Ramstein from 13 to 14 March 2024, and

2024 Opening Video and welcome remarks presented by General James B. Hecker, USA AF, Director of the JAPCC.

it brought together 31 exceptional national and international entities, particularly Air Warfare Centres, HQs/staff, and A&S-related academic institutions. The TTF was structured into two parts: the participating entities shared their Programmes of Work and innovative segments featuring active syndicate work. The initial phase allowed participants to exchange information about major projects in their respective PoWs, while the syndicates primarily revolved around AIRCOM's priorities.

The syndicates collaboratively tackled some of NATO's most pressing air and space power challenges, advancing agile combat employment strategies, reinvigorating force protection frameworks, redefining close air support and air-land integration in contested environments, enhancing air-maritime interoperability, and driving innovation in integrated air and missile defence. These efforts fostered cross-domain synergy, doctrinal evolution, and operational readiness across the Alliance. The outcomes were shared with participating delegates, agencies, and organizations to support continued development and refinement of these topics and were introduced as input in preparation for the next Think Tank Forum.

Following the success of TTF 2024, also the 2025 edition is organized in Ramstein in collaboration with AIRCOM HQ, from 15 to 16 April 2025, and for the first time it will be associated to Aircom's Air Warfare Development Team (AWDT).

Joint Air and Space Power Network Meeting 2024. The 11th JASPN meeting took place from 19th to 20th November 2024 at JAPCC's home base in Kalkar. This unique platform brought together representatives from twelve distinguished NATO, European Union and international organizations, and over the course of two days, participants discussed their Programmers of Work (PoWs), shared experiences, and engaged in productive conversations to address current challenges in advancing Air and Space Power capabilities. Once again, the JASPN was heightened by the diverse perspectives of representatives from distinguished entities, including Supreme Allied Command Transformation (SACT), NATO HQ, NATO Science & Technology Organization (STO), and the European Defence Agency (EDA), to name a few. The roundtable and breakout discussions underscored the importance of collaboration and networking. Insights gained and knowledge

shared during the meeting have paved the way for potential collaborations and efforts to avoid duplication of effort.

European Safety & Security Professionals Network. The European Safety & Security Professionals Network (SSPN) organization brings together specialists from industry, academia, civilian law enforcement and the military. Its aim is to share ideas, discuss challenges and ultimately create or update best practices. The JAPCC participated in the SSPN Seminar in 2024 and delivered a JAPCC Mission Brief. Participation in the SSPN allows JAPCC to maintain its understanding of developments in the civilian environment (including industry and academia) and compare and contrast these with those in the military. This, in turn, enables JAPCC FP SMEs to capture best practices and input this into the entire spectrum of JAPCC FP work. The network enjoys JAPCC input into several academic activities within The Hague University of Applied Sciences (THUAS) curriculum as well as providing opportunities for THUAS Safety and Security Management Studies (SSMS) students to apply for Internships at JAPCC. Currently, JAPCC is hosting three THUAS SSMS interns (from November 2024 until May 2025) and has received two Internship applications for 2025–2026. Furthermore, the facilitation by THUAS of the SSPN also provides a mechanism for the JAPCC to develop both the Asset Protection Handbook and, eventually, an International Standard for Asset Protection.

Engagements at NATO Steering Bodies

JAPCC personnel fill chairmen, co-chairman, and panel positions on numerous NATO steering bodies and provide custodianship to several NATO doctrine documents, as highlighted below.

Chairmanships

- Air Operation Working Group;
- Co-Chair the Maritime Air Coordination Conference;
- NATO Air-to-Air Refuelling Working Group (AARWG) & NATO AAR Workshop (NAFAG endorsement);
- NATO Air Transport Working Group (ATWG); (currently transferred to to the current vice chairman ATWG until AT SME is available in JAPCC);
- Doctrine, Organization, and Interoperability (DOI) Panel, subordinate to NATO Allied Joint Force Protection Working Group (FPWG);
- Nimble Titan 20/24, Wargame Control Group and Analysis Team;
- DEU Hypersonic Workshop with Fraunhofer;
- Joint Capability Group Unmanned Aircraft Systems Terminology Working Group (JCGUAS TWG);
- Co-Chair the NATO STO SCI-SET-353 task group on C-UAS Mission-Level Modelling & Simulation;
- Co-Chair the NATO STO AVT-359 Study about Hypersonic capabilities.

Panel Member/Working Group

- Allied Joint Operations Doctrine Development Working Group (AJOD WG);
- BMD Operational User Group;
- Counter-UAS Working Group;
- NATO Allied Joint Force Protection Working Group (FPWG) and ACO Force Protection Advisory Group (FPAG);
- Helicopter Operations from Ships other Than Aircraft Carriers Working Group;
- Integrated Air and Missile Defence Policy Committee;
- Joint Capability Group Unmanned Aircraft Systems (JCGUAS);
- Maritime Operations Working Group;
- Maritime Tactical Operation (Fixed-Wing) Working Group;
- Maritime Unmanned Systems Steering Board;
- Personnel Recovery/Search and Rescue Working Group;
- Cross Domain Command Concept (CDCC) Working Group.

Doctrine Development (Custodianship & Contribution)

Over the last year, the JAPCC has held the following Custodianships, led and/or participated in the following doctrine development efforts:

- MC 485/2 NATO Suppression of Enemy Air Defence Policy (Custodian);

- MC 0610, Force Protection Policy for NATO-Led Operations (Custodian);
- MC 0656, Policy for Force Protection of Alliance Forces (Custodian);
- MC 064/12 NATO Electronic Warfare Policy;
- AJP-3.3 Allied Joint Doctrine for Air and Space Operations (Custodian);
- AJP-3.14 Allied Joint Doctrine for Force Protection (Custodian);
- AJP-3.6 NATO Joint Electronic Warfare Doctrine;
- AJP-3.29 Space Doctrine Writing Team membership. SD1 published in 2024;
- AJP-3.3.2 Allied Joint Doctrine for Close Air Support and Air Interdiction;
- AJP-3.3.3 Air-Maritime Coordination;
- AJP-3.7 Allied Joint Doctrine for Recovery of Personnel in a Hostile Environment;
- ATP-3.3.4 Vol I Air Transport (AT) Doctrine (Custodian);
- ATP-3.3.4 Vol II Air-to-Air Refuelling (AAR) Doctrine (Custodian);
- ATP-3.3.4.1 Tactics, Techniques and Procedures for NATO Air Movements (JAPCC will release the custodian role for STANAG 7213 to the current vice chairman ATWG until the STANAG revision is complete);
- ATP-3.3.4.2 Air-to-Air Refuelling (and introducing new AAR-website) (Custodian);
- ATP-3.3.4.2.1 A Guide to Obtaining Air-to-Air Refuelling Clearances and Compatibility Assessments (Custodian);
- ATP-3.3.4.2.2 Recommended Air-to-Air Refuelling (AAR) Aircrew Certification and Currency;
- ATP-3.3.4.2.3 Tanker Capabilities;
- ATP-3.3.4.2.4 Tanker/Receiver Clearance – Technical Compatibility Matrix;
- ATP-3.3.4.3 Tactics, Techniques and Procedures for NATO Air Transport Operations (JAPCC will release the custodian role for STANAG 3998 to the current vice chairman ATWG until the STANAG revision is complete);
- ATP-3.3.4.4 Tactics, Techniques and Procedures for NATO Airborne Operations;
- ATP-3.2.49 Use of Helicopters in Land Operations Doctrine (Custodian);
- AASSEP-13 Edit A Ver 1 Allied Aircraft Cross-Servicing Publication (Custodian);
- ATP-3.3.2.1 (D) Tactics, Techniques and Procedures for Close Air Support and Air Interdiction;
- ATP-3.3.2.2 Joint Terminal Attack Controller Program;
- ATP-3.3.3.1 Air-Maritime Coordination Procedures;
- ATP-3.3.4.5 Ed B Ver 1 AAR Equipment: Boom-receptacle system and interface requirements;
- ATP-3.3.4.6 Ed A Ver 1 AAR Aerial Refuelling Equipment: Probe-Drogue receptacle interface Characteristics;
- ATP-3.3.4.7 Ed A Ver 1 AAR Refuelling Signal Lights in Hose and Drogue Systems;
- ATP-3.3.6 NATO Force Protection Doctrine for Air and Ground-Based Space Activity;
- ATP-3.3.8.1 Minimum Training Requirements for Unmanned Aircraft Systems (UAS) Operators and Pilots;
- ATP-3.3.8.2 Unmanned Aircraft System Tactics, Techniques and Procedures;
- ATP-3.6.3 EW in Air Operations;
- ATP-3.6.4 SEAD Doctrine;
- ALP-4.3 Air Forces Logistics Doctrine;
- ALP-4.3.1. Site survey guidelines;
- ATP-90 Operational Competencies for Helicopter Crews in Support of NATO-led Land Operations and Exercises;
- ATP-109 Fast Rope & Rappelling (FRR) & Special patrol Insertion & Extraction Operations;
- ATP-117 Countering Class I Unmanned Aircraft Systems;
- AD 80-25 Allied Command Operations Force Protection Directive (Co-Custodian);
- MPP 02 Vol I Helicopter Operations from Ships Other Than Aircraft Carriers (HOSTAC);
- MMP 02 Vol II Multinational Through-Deck and Aircraft Carrier Crossdeck Operation (MTACCOPS);
- Functional Planning Guide for Joint Air Operations Planning (FPG AIR);
- Cyberspace Discipline Alignment Plan (DAP);
- NATO Concept of Employment (CONEMP) Digitally Aided Close Air Support (DACAS);
- NATO IAMD Policy;
- NATO Countering UAS Doctrine;
- Draft Doctrine Proposal for the development of a NATO Agile Combat Employment (ACE) Doctrine.

2025 Outlook

Future Projects

Food for thought paper on Mission Command within the Air C2 Planning. Does the current Air C2 Cycle have characteristics of Mission Command, and if so, could they be exploited? Where does the current Air C2 process offer steps to adapt or change ongoing planning? What is required to ensure cross-component planning, coordination, and availability of capabilities of other components to optimize Mission Command? What is needed outside of the 72-hour cycle to ensure the application of mission command? How must cross-component mission packages be structured to ensure Mission Command? And are there currently any structures at hand to allocate appropriate authorities to execute agile Mission command?

How to increase the resilience of a future JFAC HQ or AOC. The future battlespace holds a variety of threats across the continuum of conflict and throughout multiple domains, from terrorist threats to hypersonic missiles. If a JFAC HQ or an AOC are not able to continuously execute their functions, there is a high risk to NATO that decisive cross domain air power capabilities. This increases the risk that NATO does not achieve campaign objectives to prevail over an adversary, which is unacceptable. The food-for-thought-paper investigates how the resilience of an JFAC HQ or AOCC can be improved.

Integrating UAS in the ISTAR Cycle. Capitalizing from LI/LL emerged from recent operations and employments, this new project will focus on Class 1 drones, as they represent a key area of interest in the near future due to the exponential growth of their technical capabilities. Specifically, interest will be aimed at exploring how Class 1 UASs affect ISR processes and targeting in current and future warfare – while maintaining in strong consideration relevant information on Counter-UAS operations and ongoing studies on the topic.

White Paper on Protecting Surface-Based Air and Missile Defence against Threats from Small Unmanned Aircraft Systems. The rapid proliferation of Unmanned Aircraft Systems (UAS) poses a growing threat, especially with the dual-use nature of commercially available small drones (Class I UAS). These drones have emerged as a significant risk to military operations, as demonstrated in the ongoing conflict in Ukraine. Commercial drones have been repurposed for intelligence, surveillance, target acquisition, and reconnaissance (ISTAR) and as airborne improvised explosive devices (IEDs). These drones can conduct direct attacks on friendly forces and assist in target detection and identification, enabling quick and precise enemy artillery strikes, leaving minimal time for evasion. This threat is particularly concerning for deployed military equipment and weapon systems that cannot be rapidly relocated (moved) to avoid enemy counter-fire. Considering this, the JAPCC explores potential solutions for countering this threat, focusing on Surface-Based Air and Missile Defence (SBAMD) systems like the PATRIOT weapon system. The goal is to identify both short-term and long-term options for addressing the issue. This WP was meant to be delivered during 2025, but a 6-month TDY ordered by the Bundeswehr of one of the UAS and C-UAS SME key to this project (starting from April 2025) forced delay of the WP to 2026.

White Paper 'Planning in Multi-Domain Operations'. In the NATO Vision 2030, NATO articulated the will to be better prepared to counter any threat of the future battle space, like emerging disruptive technologies and peer or near-peer opponents. The current operational concept, acting Joint, is deemed inappropriate to ensure this, as it focuses too much on the services and components. The future battlespace necessitates a broader approach. It demands the ability to effectively coordinate capabilities across all domains, rather than just within specific services, with utmost speed and relevance. This is crucial to outwit, outmanoeuvre, and outlast any adversary. NATO must collaborate

with non-military entities to harness the full potential of both state and non-state capabilities, enabling coordinated and synchronized actions against any threat from all directions. The groundbreaking concept of MDO will serve as the cornerstone of this assurance.

MDO is focused on achieving decisive effects across various levels, ranging from strategic to tactical. To accomplish this, MDO relies on capabilities that possess reach, speed, and flexibility. Airpower has the capabilities, from drones to strategic bombers, from Ground-Based Air Defence to 5th Gen Fighters. At the same time, airpower has a standing C2 structure, already active in peacetime, to ensure timely and agile application of airpower, from air policing in peacetime to deep strike capabilities in conflict. Airpower is a fundamental pillar of MDO. However, if it is not effectively integrated, MDO will significantly diminish its decisive capabilities.

The concept of Multi-Domain Operations (MDO) is open to interpretation and allows for various development streams, ranging from doctrinal to technical projects. Most developments focus on technical aspects, as MDO heavily relies on establishing shared situational awareness and understanding, which necessitates the use of technology. However, it is important to note that MDO is not solely reliant on technology; it represents a shift in mindset from focusing on service capabilities to domain capabilities. This shift requires a new approach to C2 and planning of the utilization of capabilities of all components across all domains. The current planning process is service-centric rather than domain-centric. The White Paper aims to investigate how the existing planning process can be adapted to fully leverage all capabilities across all domains within the context of MDO.

Resilient Basing Workbook & Questionnaire. In response to an RfS from the Royal Netherlands Air Force (May 2021) to better analyse the current resilience status of Alliance members against a full spectrum of threats, the JAPCC published the Resilient Basing Enhancement Workbook. The Workbook intends to take a comprehensive approach across civilian infrastructure and military installations, enabling organizations to identify their strengths and vulnerabilities, and challenge them to mitigate any identified shortfalls. This Workbook challenges nations to self-evaluate their resilience by answering questions and sharing their findings, including mitigating strategies, via an embedded response sheet. The number of inputs received in 2023 was insufficient to make a thorough assessment. As a result, JAPCC produced an unclassified version of the workbook and has requested the NATO Resilience Committee to reach out to nations to promote receiving sufficient inputs to assess, identify lessons learned, and inform nations about the results in a White Paper. As of now, we have not received any further inputs. The JAPCC will continue to monitor this situation until the fourth quarter of 2025.

Asset Protection Handbook (FP). The JAPCC has always considered this project to be a long-term initiative. It is the forerunner to developing an International Standards Organization (ISO), standard for asset protection. The concept captures best practices from industry, academia, civilian law enforcement and the military and sets it down using common terminology that each cohort can recognize.

Within the military across NATO, one of the biggest single challenges, as discussed in the 2021 JAPCC White Paper *'NATO Force Protection on a Knife-Edge',* is the current lack of expertise and experience in the field of FP. Within Air Forces, this coupled with an over-focus on exquisite air platforms, without the commensurate investment in war-fighting enablers, such as FP.

The Asset Protection Handbook Project is designed to capture the core of FP knowledge developed within NATO since the Cold War and meld it with knowledge and best practices from academia and industry in the field of what they refer to as Safety & Security Management and Industrial Security (the civilian equivalents of FP). The purpose of setting down this information in a single publication is to create a foundation for the consideration of the issue of Asset Protection. This, in turn, will create a set of robust underpinning principles and supporting practices for FP.

The outcome should be to remove the need to regularly revisit and reword FP publications, which is currently the case and delivers little if any, advancement in considering or understanding the subject. Progress with this project has continued throughout 2024. It is intended to deliver a first complete draft by the end of 2025.

Study on Distributed Maritime Sensors. This research study aims to optimize multinational maritime surveillance capabilities within NATO. Themes include networking, patrol optimization, resource management, and future capabilities and requirements. The study will finish in 2025.

White Paper on Future Carrier Strike Groups. This white paper examines the current and future requirements of carrier strike groups within NATO, with a focus on European nations' carrier requirements. The White Paper began in late 2024 and will be completed in 2025.

Autonomous Collaborative Platforms (ACP), CONEMP and Wargame. Having followed closely the 6th gen aircraft and weapon system development ongoing (such as the USAF NGAD, USN FA-XX, GCAP and FCAS), JAPCC is developing a concept of employment and a wargame in support of ACP concept development within NATO. These emerging unmanned platforms can perform missions autonomously while accepting commands from human operators. ACPs can conduct diverse missions including 'loyal wingmen', also known as Collaborative Combat Aircraft (CCA), transport, air refuelling, and can potentially serve as live training aids. The CONEMP and wargame development began early 2025 and will conclude in 2026.

Artificial Intelligence Handbook. The advent of large language models (LLMs), a new flavour of artificial intelligence (AI), introduced new powerful capabilities and attracted growing attention to this field. These new developments ignited new research, in NATO and nations, to investigate the applicability of these emerging AI capabilities, supported by classic AI methods like Deep Learning, in the military domain to enhance military processes, and even empower autonomous or semi-autonomous systems. Soon, new AI-empowered tools will support human operators in most critical military processes and even AI agents will be employed to fulfil time-consuming structured tasks.

In this new emerging AI landscape military personnel, especially the decision makers, should not only know the basic principles of AI but also the challenges and risks it presents. This handbook aims to introduce AI to the general audience, provide use cases and potential future scenarios, and finally discuss the legal and ethical challenges that this technology poses.

2025 Events

15–16 April 2025: Think Tank Forum (TTF). Following the success of previous events, the 12th TTF aims to maintain and enhance the high level of collaboration and information sharing among participating nations. This year's forum will once again be held at HQ AIRCOM Ramstein, marking the second time it has hosted the event. The forum will continue to bring together exceptional national and international entities, including Air Warfare Centres, HQs/staff, and A&S-related academic institutions. The event will be structured to allow participants to share their Programmes of Work (PoWs) and engage in innovative syndicate work, focusing on key priorities and fostering strategic discourse.

28 April 2025: NATO AAR Workshop. With the support from NATO Air Force Armarments Group (NAFAG), AAR WG Chair will continue to convene AAR Workshops in support of STANAG 3971 improvement in the absence of AAR WG. Nations, industry partners and NATO Military Authorities are invited to participate and discuss matters related to AAR compatibility issues.

11–12 June 2025: Steering Committee (SC)/Senior Resource Committee (SRC) Meetings. The annual SC meeting serves as a platform to update the Sponsoring Nation Air Chiefs or their designated Flag/General Officer representatives on the JAPCC Programme of Work (POW), the Director's priorities, and the current state of the Centre. This meeting also allows the Committee to offer strategic guidance for the future POW.

The SRC, which oversees legal, financial, personnel, infrastructure, and other administrative matters on behalf of the Sponsoring Nations, follows immediately after the SC meeting. It is designed to review the decisions made during the previous day's meeting and conduct the normal budget review, including a summary of the past year and the current year's execution.

30 September–2 October 2025: The JAPCC Joint Air and Space Power Conference, Grugahalle Essen, Germany. The 2025 iteration of the JAPCC conference is themed: 'Disrupting Dominance: The Future of Air Superiority?' Like in previous years, this annual conference is the flagship event bringing together senior NATO and national military and political leaders, members of academia, think tanks, and industry partners in a forum that encourages open discussion of issues of strategic interest to the Alliance and partners.

Additionally, in 2025 the Conference will move to the Grugahalle at Messe Essen. From 2026 the Conference will be held in cooperation and at the same time as the EURO DEFENCE EXPO (EUDEX), a completely new trade fair format in Germany. Link for more information: The trade fair for security | EURO DEFENCE EXPO

November 2025 (dates tbd): Joint Air and Space Power Network (JASPN) Meeting. In November, building on the successful work of previous events, the 2025 JASPN meeting aims to sustain and elevate the high level of collaboration and information sharing among participating organizations. This year's meeting will continue to foster strategic discourse and knowledge exchange, reinforcing JASPN's pivotal role within the Joint Air and Space Power community.

Conclusion

Thank you for having dedicated your time to peruse the JAPCC Annual Report for 2024. We sincerely hope that this report has provided you with valuable insights and a deeper appreciation for the significance and pertinence of the JAPCC within the Alliance.

Should you require further information regarding the JAPCC or our work, please do not hesitate to reach out to us via email at ***contact@japcc.org*** or visit our website at ***www.japcc.org.***

Notes

JAPCC JOINT AIR & SPACE POWER CONFERENCE

Joint Air & Space Power Conference 2025

Disrupting Dominance

The Future of Air Superiority?

30.09.25–02.10.25
GRUGAHALLE Essen, Germany

www.japcc.org/conference

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