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INTEGRATED AIR & MISSILE DEFENCE

CENTRE OF EXCELLENCE

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1st/2024 Steering Committee Meeting
POINT PAPER

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SUBJECT: **IAMD CoE Modelling & Simulation (M&S) Capabilities exploitation to:**

a. **Support NATO - Nations DST (IAMD) activities**

b. **Support Wargaming & Experimentation activities**

c. **Become a HUB on IAMD Synthetic Training Environments**

d. **Utilize 3D visualization, Virtual Reality (VR), and Augmented reality (AR) technologies to enhance E&T activities**

e. **Study the applications and the effectiveness of VR in military Education and training activities to support NATO digital transformation**

No: **3**

PURPOSE: To inform the SC on IAMD CoE M&S capabilities and seek approval to further support, accepted RFSs, NATO - NATIONS DST Activities, Wargaming & Experimentation, in becoming a HUB on IAMD Synthetic Training Environments, and Emerging & Disruptive Technologies exploitation in E&T and in studies.

BACKGROUND: SACT's vision and intent (Dec 2023) identify "Better Understanding" as a Strategic Priority. In this regard, leveraging Innovation and Agility is of paramount importance and ACT intends to accelerate and scale up NATO Experimentation and Wargaming levels of activity, with the Nations, Academia and Industry, to drive forward NATO understanding, knowledge and assessment of emerging trends, opportunities and threats. Respectively, by "Maintaining Technological Edge / Strategic Ad-

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vantage" as a strategic enabler of the aforementioned priority, SACT intends to leverage the understanding, experimentation, adoption and application of new and emerging technologies to accelerate transformation.

Furthermore, M&S is a powerful method used across many other COEs to replicate and analyze complex real-world systems. Innovative ways of training are to be further developed, to complement live training in multi-domain operations.

Such shift to the synthetic environment is urgent, considering adversary observation capabilities, current range limits, the need to integrate multiple platforms with high operating cost, airspace capacity including environmental considerations, and that some training and test aspects cannot be efficiently take place in a live environment.

All in all, modern IAMD threats require a new generation of capabilities that can only be developed and suffice if we digitally transform to make qualitative leaps forward. To cultivate Alliance military culture to out-excel, a Synthetic Environment is needed to foster persistent preparation in the modern arena networking daily various Live Virtual Constructive (LVC) Environments, thus reinventing the way we train and developing our IAMD Capabilities in the Multi Domain Operational context.

ANALYSIS &
STATUS:

IAMD COE has the aspiration to become a strong active proponent of the Synthetic Environment exploitation and a hub to support relevant IAMD Capabilities Transformation. In line with SACT's vision and intent and in accordance with IAMD COE's Medium-Term Operational Plan for 2026-2030, the Centre is steadily enhancing its M&S capabilities.

In details, to properly support referred vision and accepted RFSs [23#168 (Understanding the Human Factors in Multi-Domain Operations: Implications for training and Performance Enhancement), 23#169_(Understanding the Instruments of Power effects on Military IoP in MDO for training purposes), 23#171 (Support to NATO Distributed Synthetic Training – DST)] IAMD COE regarding its M&S Capabilities:

    a. Requested the Framework Nation to ensure Combined Federated Battle Laboratories Network (CFBLNet) connectivity to its current and future premises. CFBLNet is a laboratory environment which utilizes

a distributed Wide Area Network (WAN) as the vehicle to simulate training environments[1].

   b.   Setup a Virtual Reality Flight Tactical Simulator (VR-FTS) able to simulate various fixed and rotary wing platforms in combination with various relevant software.

   c.   Experimented with a free trial of Modern Air Combat Environment (MACE) EW Software.

   d.   Proposed the framework nation to include in the new building a standalone M&S (NS) room.

Relevantly, IAMD COE to further exploit its M&S Capabilities in supporting accepted RFSs and envisioned IAMD Capabilities Transformation is planning to:

   a.   Extent its engagement in NATO - Nations DST IAMD activities, with the first activities to be USAFE/UAWC Spartan Alliance (SA) and Spartan Warrior (SW) 24-2 exercises, due on SEP 24, and further support RFS 23#171 deliverables by directly engaging with SMEs in tactical and operational level DST activities. Synthetic exercises serve as a powerful tool for testing, training, and preparing for real-world challenges in a controlled and safe environment.

   b.   Support Wargaming activities (as ACO Operational Requirement Statement for the Audacious Wargaming Capability) and moreover exploit M&S capabilities in experimentations regarding C-UAS and Hypersonics capabilities development in concert with relevant IAMD COE past/ongoing projects (HYPERSONICS & AIRE5G).

   c.   Share information on existing Synthetic Training LVC environments and engage stakeholders to help overcome anticipated institutional friction fueled by incoming emerging and disruptive technologies exploitation. Any major institutional change produces an inherent friction that might be overcome by constantly addressing relevant attributes, e.g. by organizing workshops, studies, ad-hoc Tiger teams & projects, and publishing articles and FFT papers.

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[1] Since 2001, membership has been established and represented by three core parties: the U.S. Joint Staff, the Combined Communications and Electronics Board (Australia, Canada, New Zealand, United Kingdom and United States), and the North Atlantic Treaty Organization (including NATO agencies and 31 member nations).

    d.   Utilize 3D visualization, virtual reality (VR), and augmented reality (AR) to provide intuitive and immersive views of simulations in various E&T activities (e.g. in CET-P) & further support RFS 23#169 (in developing Effective Training Programs for Personnel Engaged in Utilizing Instruments of Power). Provided E&T can be further enhanced by providing courses where modern technologies are exploited to upgrade Desired Learning Objectives in ways unprecedented in current curriculums (e.g by designing an enemy IADS, visualize Ballistic Missiles Trajectories, Visualize EW effects, Last ditch Maneuvers to counter incoming missiles).

    e.   Conducting studies concerning VR technologies exploitation to provide comprehensive insights into applications and effectiveness of VR in military Education and training activities. By evaluating the benefits, challenges, and prospects, such studies will contribute to the understanding and advancement of VR technology in the military sector, directly supporting NATO digital transformation & further support RFS 23#168 (to Identify training strategies and technologies to enhance human performance and decision-making in multi-domain contexts & to Assess the impact of emerging technologies, such as artificial intelligence and augmented reality, on human centric MDO).

<u>FINANCIAL CONSIDERATIONS & FUNDING</u>:	Any financial impacts of the aforementioned activities will be covered from the existing budget of the current year (and by transferring of appropriations within the authorization granted to the Director in accordance with Financial Administrative Procedures, if required) without the need for a supplementary budget. Any financial obligations for the next years will be foreseen in the shared budget of the respective Fiscal Years within the established limits of the respective Medium-Term Financial Plan.
<u>RECOMMENDATIONS & DECISION</u>:	Concerning SACT's vision and relevant Strategic Priorities, the benefits that M&S offers in concert with the relevant vision of IAMD COE and its M&S capabilities, and to effectively address relevant RFSs, SC members are requested to approve IAMD COE proposals to:

    a.   Support NATO - Nations DST (IAMD) activities.

    b.   Support Wargaming & Experimentation activities.

    c.   Become a HUB on IAMD Synthetic Training Environments.

    d.   Utilize 3D visualization, Virtual Reality (VR), and Augmented reality (AR) technologies to enhance E&T activities.

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    e. Study the applications and the effectiveness of VR in military Education and training activities to support NATO digital transformation.

FOR THE IAMD COE:

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IAMD COE Director

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