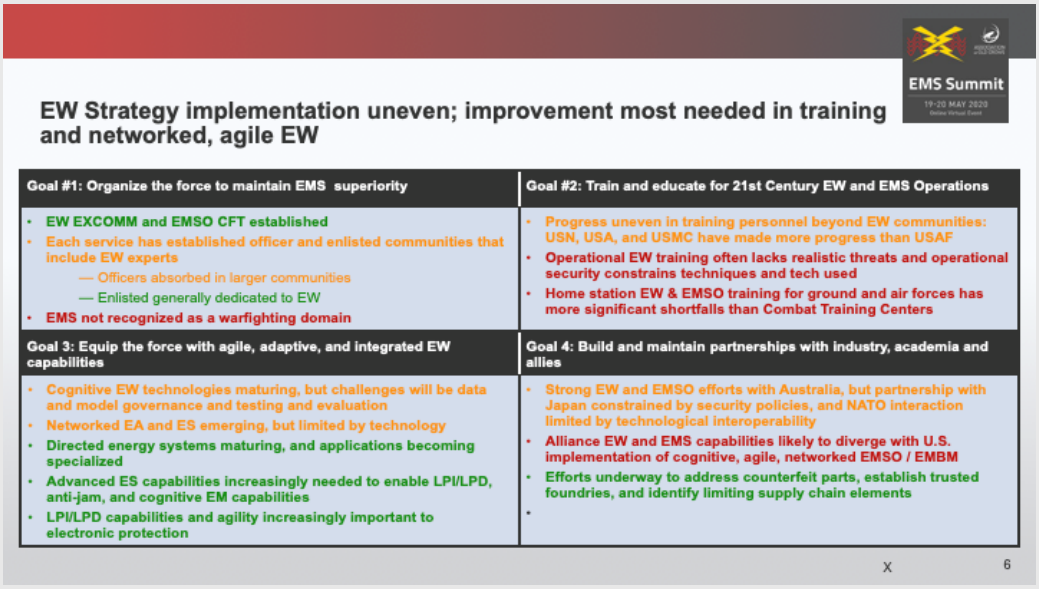
AOC Virtual EMS Summit
Post Event Report

The AOC hosted its inaugural Virtual EMS Summit on May 19-20. More than 1400 persons attended the summit from 38 countries around the world. The summit offered nine (9) sessions covering Collaborative EW, Multi-Domain Operations in the EMS, and EW Capability Gaps and Enabling Technologies.

The summit began with presentations on Collaborative Electronic Warfare (EW), which is the incorporation of networked artificial intelligence and machine learning algorithms to quickly analyze and adaptively generate a countermeasure against new and evolving threats without preprogramming. **Mr. Bryan Clark, Senior Fellow, the Hudson Institute**, asserted that the US faces a disadvantage in the EMS against peer competitors. Despite a plethora of studies and strategies, recommendations have been implemented unevenly, especially as it pertains to transitioning technologies to programs of record and training warfighters using realistic threat scenarios. To turn this around and establish and enduring advantage, the Department of Defense (DoD) should implement maneuver warfare in the EMS that requires "shifting to passive, multi-static, or LPI sensing, implementing EMBM TTPs and technologies, networking spectrum dependent systems, and addressing interoperability. Given that defense funding is unlikely to increase, and may even decrease, in future years, DoD must focus its improvement on two areas: virtual/constructive training and networked and agile EW systems.



Mr. James Bauer of Virginia Systems and Technology (VaST) followed by discussing collaborative EMS systems specifically, and noting that the Joint Interface Control Document (JICD) 4.x specifications provides a Government Off-the-Shefl (GOTS) approach to enable collaborative ESM between platforms and sensors. The nature of collaborative operations today crosses boundaries between DoD and military service organizations and CONOPS. This creates significant challenges in three areas: (1) system connectivity; (2) interoperability across both US and partner country systems; and (3) program cost.

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The next speakers provided service perspectives on leading collaborative EW technologies and capabilities. **Lt Col Mark "Ernie" Gombo, MAGTF EW/OCO/Space Branch Head, HQMC**, gave an update on the US Marine Corps' MAGTF EW concept. Lt Col Gombo reiterated that operations in one part of the battlespace often have profound and consequential effects on other areas. To avoid cascading effects of EMS operations, the commander must always view the battlespace as an indivisible entity. He argued that there is a need for synergy between 2/3/6 (Intelligence/Operations/Resourcing) organizations across the military services. Furthermore, from a system perspective, we need to create adaptable systems with distributed, cooperative decision-making capability in response to complex and dynamic threats.

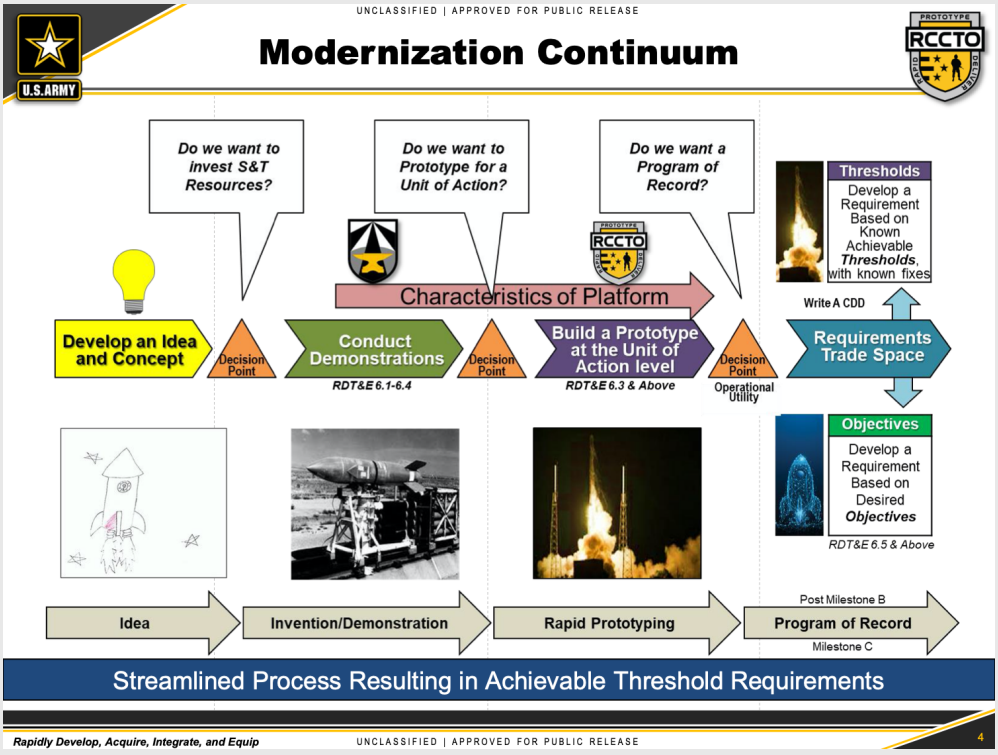
CAPT Orr, USN, Program Manager, Airborne Electronic Attack Systems Program Office (PMA-234), followed to discuss ALQ-249 Next Generation Jammer Mid-Band. According to CAPT Orr, the Next Generation Jammer System (NGJ) is the next step in the evolution of a continuously expanding Airborne Electronic Attack (AEA) mission. The NGJ is is necessary to meet current and emerging EW gaps, ensure kill chain wholeness against growing threat capabilities and capacity, and keep pace with threat weapons systems advances. The AOC recently released an Issue Brief on the NGJ. You can read it **here**.

The final speakers for the Collaborative EW sessions were **Dr. Melissa Midzor, NASCTN Program Manager, National Institute of Standards and Technology (NIST)** and **Dr. Armen Kvryan, Materials Engineer, Naval Surface Warfare Center Port Hueneme.** Dr. Midzor discussed Metrology for Complex Networked Systems. She argued that as complex networked systems are deployed, test and evaluation challenges increase significantly. Specifically, there is an inherent variability and deficit of models and data to accurately characterize the range of response. Therefore, there is a growing need for accurate, reliable, and unbiased measurements and analyses to support increased spectrum sharing by both federal agencies and commercial users.

Dr. Kvryan followed to share an update on Advanced Protective Covers for the Electromagnetic Spectrum. According to Dr. Kvryan, there is an increasing threat from malicious radio

frequency signals at Navy peers and ports. These RF signals can be used to acquire important information about Navy communications and combat systems and interfere with them while in port. A Cooperative Research and Development Agreement (CRADA) with industry was initiated to provide solutions to prevent exterior RF intelligence gathering of these topside systems. As this initiative progresses, there may be uses on other platforms and to use as protection against other threats such as high-altitude EM pulse (HEMP) or hand-held EMP devices.

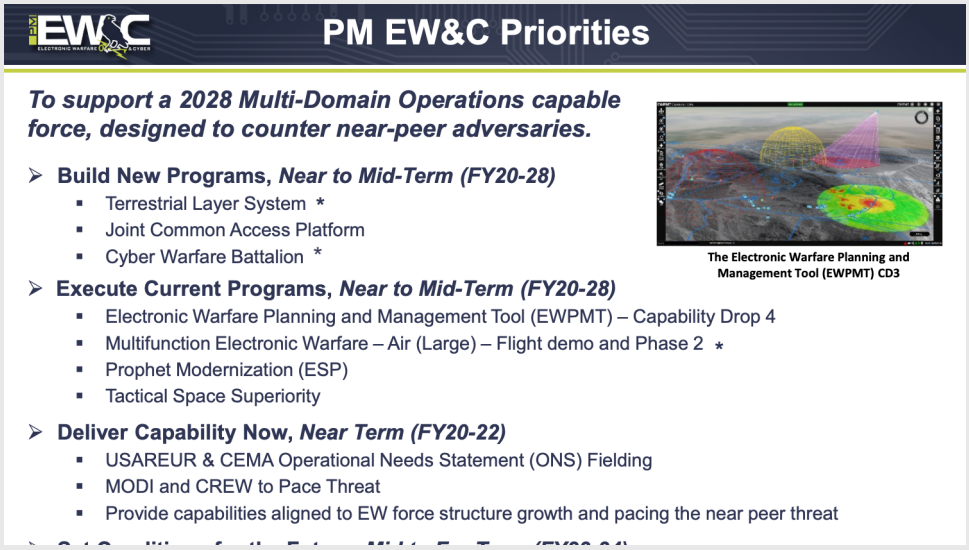
Following sessions on Collaborative EW, the Virtual EMS Summit shifted to presentations on US Army Perspectives on Multi-Domain Operations (MDO) in the EMS. **GEN John M. Murray, USA, Commander, United States Army Futures Command**, kicked off the session with a discussion on implications of MDO on Army modernization. His key takeaway is that the Army must adopt a persistent modernization campaign to recapitalize and upgrade current systems and create an expedited path for insertion of new technology and sensors. L**TG Neil Thurgood, USA, Director for Hypersonics, Directed Energy, Space and Rapid Acquisition**, followed to talk about rapid prototyping to meet emerging challenges. He examined the Army's Modernization Continuum that focuses on Invention, Demonstration and Rapid Prototyping. He noted that the Army needs to be faster in the development from concept to fielded system. The Rapid Capabilities and Critical Technologies Office (RCCTO) provides an ability to rapidly and efficiently research, develop, prototype, test, evaluate, procure, transition, and/or field critical enabling technologies and capabilities that address near-term and mid-term threats. The RCCTO executes this mission consistent with the Army's modernization priorities that maximize Soldiers' capabilities to deploy, fight, and win on future battlefields.



Next, **LTG Scott David Berrier, USA, Deputy Chief of Staff, G-2** discussed the Army Intelligence responsibilities to MDO. According to LTG Berrier, Multi-Domain Intelligence is a framework to modernize and deliver a ready Army Intelligence Team to enable MDO by 2028 and dominate by 2035 through modernized sensors, data management and advanced analytics. In

other words, the Army must "See Farther than We Can Shoot" in multiple domains. To this end, he outlined three lines of modernization efforts that guide the Army Intelligence in MDO today: (1) recapitalize equipment (legacy); (2) upgrade equipment (limited capability); (3) new sensors capable of collecting throughout the MDO battlefield.

COL Kevin Finch, USA, Program Manager, Electronic Warfare & Cyber (PM EW&C) concluded the MDO session by providing a portfolio perspective of how the Army is investing in operational capabilities across EMS and Cyber. Central to the Army's modernization initiative is the ability to adopt modular open systems architecture (MOSA), which will reduce integration costs and risks, mitigate obsolescence, interoperability and reuse and accelerate fielding and deliveries. He reinforced that the US must keep pace with the threat, both in terms of capability and capacity to maintain kill chain wholeness across all warfighting domains.



The Electronic Warfare Planning and Management Tool (EWPMT) CD3

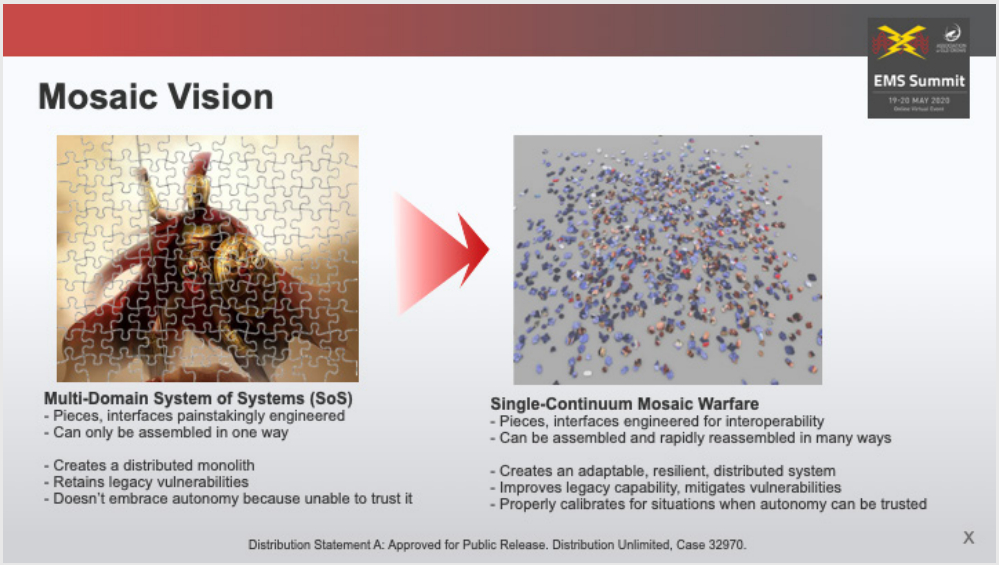
The second day of the AOC Virtual EMS Summit focused on EW Capability Gaps and Enabling Technologies. **Maj Gen Lance Landrum, USAF, Deputy Director for Requirements and Capability Development (J8), Joint Staff,** and **Mr. Christopher O'Donnell, SES, DASD, Platform and Weapon Portfolio Management OUSD, A&S** began the day with an update on current initiatives of the EMSO Cross Function Team, authorized by the US Congress in 2019. Specifically, they highlighted the forthcoming EMS Superiority Strategy and Implementation Plan. They discussed the fact that today every warfighting domain is contested and we face an ever more lethal battlefield. The EMS simultaneously connects all domains all the time. A necessary reform the CFT is advancing in the near-term is budget certification analysis to enable a capability portfolio management approach.

Mr. O'Donnell focused his remarks on requirements, budget and the acquisition process. He reinforced the need to field innovative solutions in a timely manner and develop a more coherent investment strategy. He reiterated that the attributes of future EMS (including EW) capabilities & systems must be Agile, Adaptable, and Adaptive (consistently able to change).

Mr. Thomas Dahlheim, Distinguished Engineer Advanced EW, Naval Surface

Warfare Center, Crane Division and **Dr. Michael Christensen, Director, Sensors and Communications, Office of Under Secretary of Defense (Research & Engineering)** followed by discussing the evolution and present challenges of EMS operations, especially as they relate to great power competition and gray zone operations. They noted that EW must be seen more as an offensive asset that is distributed throughout the force structure. In other words, a system without an EW suite is a legacy system in waiting. The DoD must recognize how all functions of EW can deliver an offensive effect. Capability must drive technology. Attributes of future EMS (including EW) capabilities & systems include AI enabled, multi-spectral, multi-domain, distributed, and manned/unmanned teaming.

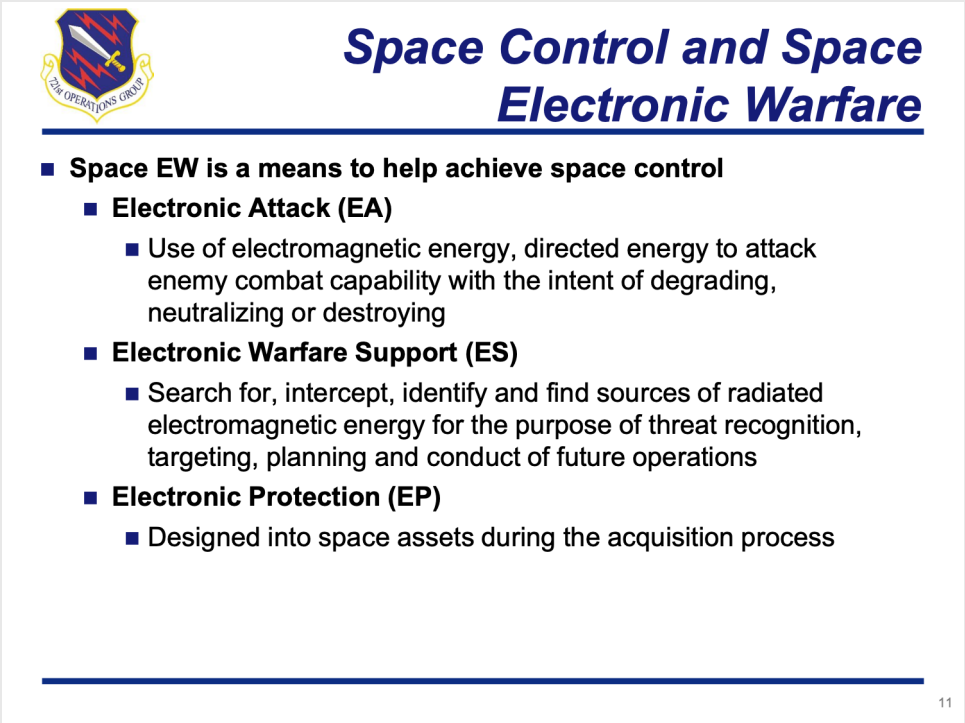
The remaining sessions of the summit focused on updates of various EW technologies and warfighter community initiatives. **Dr. Paul Zablocky, Program Manager, Defense Advanced Research Projects Agency (DARPA)** began with a discussion of DARPA's Mosaic and Electronic Warfare Vision. According to Dr. Zablocky, the traditional systems approach is typically expensive and retains legacy systems and vulnerabilities while upgrades are incremental. Mosaic Warfare is single-continuum vision. Technology is engineered for interoperability. This approach creates an adaptable, resilient, and distributed system that improves legacy capability and mitigates vulnerabilities. For EW, Mosaic Warfare creates an ability to compose new kinetic and non-kinetic effects, real-time, with any available system through automated design, integration, and system operations (scale and adaptation). DARPA programs include Adapting Cross domain Kill-webs (ACK), SoS Enhanced Small Unit (SESU), Aerial Dragnet, and Air Space Total Awareness for Rapid Tactical Execution (ASTARTE). DARPA's MOSAIC Warfare concept helps to address the problems associated with the future operational environment & A2/AD and provides technologies to enable Joint All-Domain Command and Control (JADC2), as well as the Army's Multi-Domain Operations (MDO) Concept.



Next, **Mr. John C. Bowling, NH-04, DAF, Technical Expert, Avionics Architectures and Interoperability, AFLCMC/EZAC** discussed the progress of the Sensor Open System

Architecture (SOSA) initiative to develop a unified technical OSA standard for radar, EO/IR, SIGINT, EW and Communications. OSA is a key enabler of Mosaic and other service modernization visions. SOSA will improve platform affordability and shorten cycle times to emerging threats. Current efforts on SOSA will continue to support prototyping, analyze feedback, and develop edition 1.0 to better integrate and harmonize standards. The Services must also start to combine missions so that CMOSS and SOSA can be used for multi-mission Tactical Communications, EW, SIGINT, and Battlefield Computing all in one system. Such an effort will reduce the SWAP on our various platforms for the military electronics, and unify the Industry around common military hardware, as well as software, standards.

The summit concluded with updates on the development of Space Force and the need for Space Control through EW. **Col John Thien, USAF, Commander, 721 Operations Group (USSF)** discussed the strategic significance of SATCOM that provides real-time, over-the-horizon transmission of voice and data. SATCOM can accesses places where no other modes of communications and data exchange can take place. It also affords low probability of detection (LPD) and allows for higher data rates. SATCOM is vital for US and allied forces and our adversaries know this. They are actively seeking to degrade this advantage. Thus, we need to focus efforts on Space Control achieved through EW. Col Thien defined Space Control as Offensive Space Control and Defensive Space Control operations to ensure freedom of action in space and, when directed, defeat efforts to interfere with or attack US or allied space systems. The 721st Operations Group fields one EA and two ES active duty units. Total Force partners in the Air Force Reserve and Air National Guard augment these active duty units with three EA and one ES unit.



The closing presentation was from **CAPT Matthew Duffy, USN Commodore, Airborne Command & Control and Logistics Wing**. CAPT Duffy provided an update on the Hawkeye Community. The E-2 Hawkeye is US all-weather, carrier-capable tactical airborne early warning

and control (AEW/C) aircraft. The most recent variant of the E-2, currently still in production, is the E-2D Advanced Hawkeye. It incorporated arguably the most capable airborne sensor systems ever designed and produced—and the core of the air defense mission of the carrier strike group. AEW is "tip of spear" for EMS Superiority. The E-2D's ALQ-217 system can provide inputs to the EW picture, along with satellite systems, the systems aboard an EP-3 or RC-135, not to mention the systems of the EA-18G Growler. As more attention is paid to gray zone operations and great power competition, AEW becomes the "tip of the spear" to gain and maintain EMS Superiority. Read the recent AOC Issue Brief on the E-2 Hawkeye **here**.

For more information on any of the above presentations and topics, please contact Ken Miller, AOC Director of Advocacy and Outreach at **kmiller@crows.org**.