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FCFC-CU

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MEMORANDUM FOR Record

SUBJECT: Maneuver Support Center of Excellence (MSCoE) Desired Enabling Capabilities for Fiscal Year 2021

1. Reference: TRADOC Pamphlet 525-3-1, The U.S. Army in Multi-Domain Operations, 6 Dec 18.

2. This memorandum presents the desired enduring capabilities to further enable the Protection and branch proponent contributions to Multi-Domain Operations (MDO). It is provided to inform Science & Technology (S&T) efforts and influence resource decisions. These enabling capabilities will require graduating levels of capability over time.

3. The following reflects MSCoE's capability enablers for FY21. These enablers are further refined in the attached annex.

a. Preserve Essential Capabilities. Preserving Critical Capabilities, Assets and Activities (CCAA) is necessary for the future force to survive and win in Large Scale Combat Operations (LSCO) in MDO. Inherent in the process of preserving essential capabilities is the determination of what constitutes essential verses non-essential forces. Broad areas of capabilities desired include the ability to Integrate, synchronize and implement layered all-domain protection of CCAAs (cognitive/virtual dimension), preserve joint power projection globally, preserve converging methods, means & seams, and balance dispersion/movement with hardening.

b. Deny Enemy Freedom of Action. Denying enemy freedom of action is the active approach to countering the enemy's ability to see, understand and strike friendly force CCAAs. Active protection processes should characterize the threat and nominate protective counter actions or defensive countermeasures to expand the preservation of CCAAs throughout all domains, the Electromagnetic Spectrum (EMS) and the Information Environment (IE). Broad capabilities desired include the ability to implement protection in targeting and all-domain C2 processes to coordinate proactive counter actions against: Weapons of Mass Effect/Weapons of Mass Destruction, Mobility, Obstacles and Hazards, UAS and Swarms, and Observation/Sensors.

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c. Enable Persistent Access. Army forces enable persistent access to expand exploitable conditions at echelon and in depth across the competition continuum. To ensure persistent access, future Army forces will employ persistent, distributed and resilient all-domain sensing capabilities to continuously detect and monitor enemy activity across the battlefield and competition continuum. Broad capabilities desired include the ability to: establish & retain bases and support areas and establish & retain mobility & movement corridors to access decisive spaces (maneuver corridors).

d. Understand the Operational Environment (OE). Joint Publication 3-0 defines Operational Environment as *"Composite of conditions, circumstances, and influences that affect the employment of capabilities and bear on the decision of the commander."* The future OE presents unique and unprecedented challenges that the Army must be prepared to overcome during competition, armed conflict, and the return to competition phases of the competition/conflict continuum. U.S. Forces, Unified Action Partners (UAP), and Allies require the capability to understand the OE across all domains. The Maneuver Support Center of Excellence (MSCoE) and Maneuver Support Capability Development Integration Directorate (MS CDID) emphasis is in areas such as sensing of threats, geospatial data collection & mapping (surface, sub-surface, interior), terrain & infrastructure assessment, and mobility assessment.

e. Robotic/Autonomous Systems and Artificial Intelligence (RAS/AI). The potential of leveraging RAS/AI to achieve the functions described in para 3a-d above should be thoroughly investigated. Even in situations where there exists an adequate means of accomplishing a task/function via a manned solution, the potential of performing the function remotely (teleoperation, RAS, AI, etc...) should be considered.

4. The capabilities contained in this memorandum, support modernization efforts and can inform portfolios in future years POM and SPAR processes.

5. The point of contact for this effort is Mr. Dennis Hutchinson, (573)563-5253, dennis.g.hutchinson.civ@mail.mil.

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1. **Preserve Essential Capabilities.**

a. **Survivability.** Future Army forces require the capability to conduct continuous survivability operations to preserve combat power in decisive spaces and to protect CCAAs across the battlefield and the competition continuum. ***Desired enabling capabilities include:***

1) Capability to secure and protect fixed critical capabilities, assets, and activities to survive and win across the competition continuum.

2) Capability to secure and protect semi-fixed critical capabilities, assets, and activities to survive and win across the competition continuum.

3) Capability to secure and protect forces, activities, and ensure access to operating areas temporarily or on a permanent basis during direct conflict to preserve essential capabilities.

4) Capability to improve physical survivability of critical capabilities, assets, and activities that can withstand threat attack across the battlefield framework.

5) Protective equipment to enhance the survivability of personnel, platforms, and facilities against adversary attack across the battlefield framework.

6) The ability to identify threats and environmental impacts on use of land, air, and sea areas against pollution, population and economy across the battlefield framework.

b. **Contamination Mitigation (CONMIT).** Future Army forces require the capability to mitigate CBRN contamination using multiple, scalable means that reduce the hazard, reduce manpower, time and resources, and increases commanders' flexibility to support MDO. ***Desired enabling capabilities include:***

1) Networked CBRN sensors to create high fidelity assessment of contamination.

2) Improved capability for precise and dynamic modeling updated with networked meteorological and CBRN sensors. Also applies to paragraph 1e, R&S/IEW.

3) Improved capability to provide realistic models for use in experimentation and exercises to provide training and rich assessment of CBRN mitigation capabilities.

4) Physiological monitoring to provide prompt and precise protocols for treatment, to include reducing the "worried well" phenomena. Improved standoff detection capability with greater range and fidelity.

5) Improved capability to leverage RAS or Manned-Unmanned Teaming (MUMT) for operations conducted within CBRN environments to minimize soldier exposure.

6) Prophylactic treatments, such as vaccines, to reduce soldier vulnerability to CBRN agents.

7) Improved protective equipment which is cost effective and provides minimal physiological burden.

8) Improved non-aqueous, crew-level decontamination capability supported by organic equipment and personnel.

9) Improved medical countermeasures for known CBRN hazards, which can be carried and distributed by the unit at the point of contamination.

10) Improved disparate, multi-modal sensor feeds with low-fidelity and high-density.

c. Police Operations. Future Army forces require the capability to conduct police operations to protect critical capabilities, assets and activities; facilitate and preserve the rule of law and counter irregular threats across the battlefield and competition continuum. **A desired enabling capability is the ability to conduct Police Operations across the battlefield framework to preserve, promote, and enable the rule of law, and support the consolidation of gains.**

d. Detention Operations. Future Army forces require the capability to conduct detention operations to shelter, sustain, guard, protect and document detainees while simultaneously supporting host nation and partners enemy prisoner of war operations across the battlefield and competition continuum. **A desired enabling capability is the ability to conduct detainee operations across the battlefield framework to enable freedom of action. Included in this area is a capability to model, detect, and conduct displaced persons migration in order to ensure freedom of maneuver.**

e. Inherent Protection. Future Army forces require the capability to protect individual Soldiers, platforms and equipment from enemy attack and against environmental hazards to preserve life, enable freedom of action and ensure resiliency in the force in MDO across the competition continuum. **Desired enabling capabilities include:**

1) *The ability to provide alarms, alerts, and other information for U.S. Forces and allies to take immediate protective actions throughout the depth of operations including fixed sites in the strategic support area.*

2) *Sensors, Systems, and Lethality to Detect, Deter, and Defeat Threats across Competition to Conflict and Return to Competition continuum from the SSA to the Deep fight.*

f. Protect Power Projection. Future Army forces require the capability to provide protection of installations, lines of communications, the organic industrial base, depots, arsenals, munitions factories and stockpiles through a synchronized Army and other government agencies whole of government approach to support readiness to deter, react and project forces in response to pacing threat aggression.

g. Resilient Installations. The Future Army requires installations to be resilient against disruption and attack with robust capabilities to prevent, protect, mitigate, respond to and recover from all threats and hazards impacting mission readiness, sustainment and force projection across the MDO framework and throughout the competition continuum.

h. Train and Prepare. Future Army forces require the capability to train and prepare leaders on conducting the protection staff function to preserve the force and apply maximum combat power across the battlefield and competition continuum.

i. Basing. Future Army forces require the capability to establish and retain bases and support areas with integrated protection to preserve CCAAs across the battlefield and competition continuum.

j. Protect Critical Infrastructure. Future Army forces require the capability to protect critical infrastructure (oil fields, dams, nuclear facilities, industrial facilities, ammunition depots, airfields, roads, ports and rail transportation nodes, anything that creates hazards on the battlefield) that are exploitable by the adversary and reduce freedom of action across the battlefield. ***A desired enabling capability is the ability to conduct critical site security missions to secure critical capabilities, assets, and activities.***

k. Force Health Protection. Future Army forces require the capability to conduct force health protection operations to preserve the force from health threats associated with MDO operations.

l. Explosive Ordnance Disposal (EOD). Future Army forces require the capability to counter explosive hazards to enable sustainment, protect critical capabilities, assets and activities and maintain freedom of action across the battlefield and competition continuum.

Annex: Decomposition of Desired Enabling Capabilities Supporting Maneuver Support Center of Excellence (MSCoE) for Fiscal Year 2021

m. Command and Control (C2). Future Army forces require the capability to C2 protection capabilities and plan, coordinate, integrate, synchronize, and converge protection effects in and across all domains, the EMS and the IE and throughout competition continuum. ***A desired enabling capability is decision and planning support tools that enable commanders and staff to identify, synchronize, and coordinate protection across the competition continuum to preserve critical capabilities, assets, and activities and maximize combat effectiveness.***

n. Protection Lethal/Non-Lethal fires. Future Army forces require the capability to increase the accuracy, speed and synchronization of protective lethal and nonlethal force effects across all environments to preserve CCAAs across the battlefield and competition continuum. ***Desired enabling capabilities include:***

1) Increased lethality to defeat Level I, II, and reconstituted or bypassed Level III threats across the battlefield framework.

2) Improved Nonlethal (Intermediate Levels of Force) capabilities in support of Riles of Engagement and Escalation of Force continuums. Protect the Force and Preserve Combat Power. Improved capability to detect and deter the enemy and threats during LSCO.

o. Counter DEW. Future Army forces require the capability to protect critical capabilities, assets and activities against directed energy weapons (DEW) to include laser, microwave, sound and particle beam lethal and nonlethal force threat systems across the battlefield and competition continuum.

p. Civil Affairs. Future Army forces require the capability to conduct civil reconnaissance of the operational environment to provide situation understanding to assist in decision making, set the conditions to interact with the local civilian population, identify critical threats and leverage multinational capabilities to enhance operations that enable the future force to preserve critical capabilities, assets, and activities in MDO.

q. Air & Missile Defense (AMD). Future Army forces require the capability for a deployable, integrated, air and missile defense to counter regional and transregional missile threats to preserve critical capabilities, assets and activities across the MDO framework, including installations and key infrastructure within the strategic support area, in competition and armed conflict.

2. Deny Enemy Freedom of Action.

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a. Counter Unconventional Warfare (UW). Future Army forces require the capability to detect, characterize and counter unconventional warfare to preserve CCAAs across the battlefield and competition continuum.

b. Counter Intelligence, Surveillance, & Reconnaissance (ISR). Future Army forces require the capability to deny or degrade adversary ISR capabilities in all domains to detect and understand friendly intent and actions to preserve CCAAs, and to enable freedom of action across the battlefield and throughout the competition continuum.

c. Counter Observation and Sensing. Future Army forces require the capability to counter observation and sensing to preserve CCAAs across the battlefield and competition continuum. ***Desired enabling capabilities include:***

1) Capability to detect, identify, and disrupt or deny adversary detection, observation, and targeting of friendly critical capabilities, activities, and assets across the battlefield framework in competition and in conflict.

2) Capability to identify the threat, understand threat actions, and anticipate impending attack that reduces and preserves friendly critical capabilities, assets, and activities across the battlefield framework.

3) Capability to reduce friendly force signature (noise, visual, thermal, physical, and electronically) that reduces the adversary's ability to detect, observe, and target across the battlefield framework.

4) Capability to converge and synchronize multi-modal (multi-domain) effects that reduce vulnerabilities and enhance survivability of friendly capabilities, assets, and activities across the battlefield framework.

5) Persistent surveillance capabilities to detect, deter and defeat threats during Large Scale Combat Operations (LSCO).

d. Counter Fires/Air & Missile. Future Army forces require the capability to sense, target and neutralize or destroy enemy aircraft, drones, missiles, rockets, artillery and mortars both before and after launch, and to integrate with JIIM partner counter air and missile capabilities across the battlefield and competition continuum.

e. Counter Information Warfare. Future Army forces require the capability to counter enemy information warfare that preserves friendly force access to the information environment, controls the threat narrative and influence over domestic and foreign audiences and reduces impact on command nodes and the network across the MDO framework and throughout the competition continuum.

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- f. Counter Space, Cyberspace, and EMS. Future Army forces require the capability to detect, characterize, mitigate effects and counter enemy use of space, cyberspace, and the electromagnetic spectrum that degrades and denies friendly operations across the battlefield and competition continuum.
- g. Counter Deception. Future Army forces require the capability to detect and counter adversary all-domain deception to preserve CCAAs the battlefield.
- h. Counter Weapons of Mass Destruction/ Weapons of Mass Effect (WMD/WME). Future Army forces require the capability to detect, identify and characterize WME and WMD; prevent their employment and mitigate their consequences and to prevent catastrophic death and destruction across the battlefield and the competition continuum.
- i. Counter Robotic Autonomous Systems (RAS). Future Army forces require the capability to counter RAS, AI and drone swarming to reduce adversary speed, standoff, communication and decision-making across the battlefield and competition continuum.
- j. Plan Countering. Future Army forces require the capability to characterize threats then plan and coordinate the countering activity with the appropriate element to preserve CCAAs, and deny enemy freedom of action across the battlefield.
- k. Convergence. Future Army forces require the capability to converge land, air and maritime capabilities with operations in space, cyberspace and the EMS to support the opening of and exploitation of windows of superiority, thereby protecting the ability to conduct friendly operations in degraded, disrupted and/or denied operational environments across the battlefield and competition continuum.
- l. Counter Mobility. Future Army forces require the capability to conduct countermobility denying enemy freedom of action and restrict freedom of movement, and to enable friendly force freedom of maneuver across the battlefield achieving a decisive tactical advantage. ***Desired is the capability to enable operations by shaping the physical environment in the threat's non-permissive area where all domain and long range fires originate to achieve desired effects, such as denying the enemy's ability to use key terrain for creating standoff and denying their freedom of movement and/or maneuver.***
- m. Counter Intelligence. Future Army forces require the capability to further understand the environment, enemy actions, and suspected actors through counter intelligence activities to preserve CCAAs, counter enemy actions to enable freedom of action throughout the battlefield and competition continuum.

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n. Counter Coercion. Future Army forces require the capability to detect, characterize and counter enemy coercion activities to preserve CCAAs across the battlefield and competition continuum.

3. Enable Persistent Access.

a. Security and Mobility. Future Army forces require the capability to conduct security and mobility support that protects and secures critical capabilities, assets, and activities, lines of communication and movement corridors which enable operational and tactical maneuver across the battlefield and competition continuum. ***Desired enabling capabilities include:***

1) Capability to conduct Security and Mobility Support operations across the battlefield framework to enable and ensure freedom of action across the battlefield framework.

2) Capability to cross dry and wet gaps, of any length, regardless of vehicle weight, while maintaining the rate of advance of maneuver elements. Wet gap capabilities also need to be useable with a flow of 0 to 10 feet per second. The development of 120/150 capacity logistics bridging remains a needed capability.

3) Capability to emplace bridges from safety of vehicle cab.

4) Capability to cross wet gaps without the need to construct bridges.

b. Protected Corridor. Future Army forces require the capability to establish and maintain protected movement (strategic, operational and tactical), mobility (close and tactical support), and maneuver (deep maneuver and close) corridors in all domains to ensure persistent freedom of action across the battlefield and the competition continuum.

c. Counter Obstacles and Hazards. Future Army forces require the capability to detect and counter obstacles and hazards, enable friendly freedom of movement and preserve CCAAs across the battlefield resulting in a secure environment. ***Desired is the capability to conduct WMD Explosive Hazard Detection from standoff.***

d. Deploy. Future Army forces require the capability for timely mobilization and deployment from strategic support areas to the JOA to deter escalation and defend against threat offensive operations across the battlefield and competition continuum.

4. Understand the Operational Environment (OE).

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a. Protection Preparation. Future Army forces require the capability to prepare the operational environment by building partner capacity and interoperability and by setting the theater through such activities as establishing basing and access rights, conducting preparatory intelligence activities, and mapping the EMS and computer networks in the operational support area in competition. ***Desired is the capability to operate and share critical information with joint, interorganizational, and multinational partners to synchronize efforts throughout competition throughout Large Scale Combat Operations (LSCO).***

b. Critical Capability Assessment. Future Army forces require the capability to assess friendly vulnerabilities, determine protection requirements, prioritize CCAAs, and employ coordinating measures to preserve forces across the battlefield and competition continuum. ***Desired enabling capabilities include:***

1) Capability to collect and analyze threat, obstacle and hazard data, predict threat actions, determine vulnerabilities, prioritize protection requirements, identify and allocate resource to preserve critical capabilities, assets, and activities, and develop mitigating strategies to recover from incidents across the battlefield framework, and in competition and conflict.

2) Capability to visualize and understand the physical, cognitive, and virtual environments to characterize threat activities and environmental hazards, and support decision making across the entire battlefield framework in peace and in conflict.

3) Capability to autonomously build (generate), manage, analyze, and distribute (disseminate), usable Standard and Sharable Geospatial Foundation (SSGF) data, and three-dimensional geospatial data, as required to develop and maintain an echelon based common operational picture (COP), and to build required application products.

4) Capability to provide suitable automated terrain analysis, based on user needs.

5) Capability to provide increased generation to support high resolution three-dimensional geospatial information for small unit implementation and increased overall operational terrain situational awareness.

6) Capability to build and use mathematically-based (Vector) geospatial information, versus image-based (Raster) information, in order to increase automation, reduce storage and management overhead and for increased analytical capability. (Vector Tile mapping)

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c. Chemical, Biological, Radiological, Nuclear (CBRN) Reconnaissance and Surveillance (R&S). Future Army forces require the capability to employ CBRN R&S that informs commanders at all echelons via Integrated Early Warning which provides real time understanding of CBRN threats and hazards by means of deployable platforms and novel sensors dispersed throughout the battlefield creating predictability and enabling forces to respond in timely manner to reduce the impact of adversary attack. ***Desired enabling capabilities include:***

- 1) All source information reception to CBRN staff consumers.***
- 2) Information assessment by CBRN machine intelligence.***
- 3) Trend Development by CBRN machine intelligence.***
- 4) Analysis by CBRN staff elements with decision support tools.***
- 5) Integration vertically and horizontally of CBRN early warnings.***
- 6) A network for sensor integration, decision support, and AI/machine intelligence to reside.***
- 7) Improved sensor solutions capable of detecting multiple hazards with one device, platform mounted and handheld.***
- 8) Improved CBRN reconnaissance capability to detect and identify CBRN hazards at a distance, rapidly, and on the move.***
- 9) Integrated robotics (UGV & UAS) and AI into CBRN reconnaissance platforms, increasing reach, survivability and decision cycle of CBRN enablers and staffs.***
- 10) Improved CBRN monitoring capability to conduct continuous monitoring by report, unmanned, and unattended means, and report in real time that populates a common operating picture (COP) under all operational conditions to facilitate freedom of action.***

d. Police Intelligence Operations (PIO). Future Army forces require the capability to conduct police intelligence operations to synchronize information from multiple sources and to analyze and disseminate a clear understanding of criminal and security threats to commanders across the battlefield and competition continuum. ***Desired is the capability to conduct police intelligence operations, for a clear understanding of criminal and security threats and activities across the battlefield framework and in all phases of the competition continuum.***

e. Forensics and Biometrics. Future Army forces require the capability to conduct battlefield forensics and biometrics activities to authenticate friendly forces and to identify intelligence to target threat actors, explosives, CBRN hazards and cyberspace-crimes across the MDO framework and competition continuum. ***Desired is the capability to conduct forensics and biometric activities that identify, characterize, and target threat actors, explosives, CBRN, and cyber-crimes across the spectrum of competition in peace and in conflict.***

f. ISR. Future Army forces require the capability to conduct, synchronize, and analyze ISR activities to identify, characterize, and counter all domain threats, obstacles and hazards across the battlefield and competition continuum.

5. Robotic/Autonomous Systems and Artificial Intelligence (RAS/AI).

a. RAS. Future Army forces require the capability to augment Soldier performance and capacity to increase situational awareness, lighten Soldier physical and cognitive workloads, facilitate movement, secure and protect CCAAs and sustain the force with improved distribution across the battlefield and competition continuum. ***Desired enabling capabilities include:***

1) Capability to autonomously emplace bridges from standoff locations and distances; including self-connecting float bridge bays with preprogrammed emplacement coordinates

2) Capability to autonomously breach explosive and non-explosive hazards.

3) Capability to autonomously construct non-kinetic obstacles to turn, block, fix, disrupt threat maneuver and/or movement.

4) Capability to autonomously emplace kinetic obstacles to turn, block, fix, disrupt threat maneuver and/or movement.

5) Capability to autonomously emplace obstacles, via aerial based delivery, with loiter and dynamic re-tasking functions.

6) Capability for automated tools to leverage three-dimensional topographic data and services.

7) Capability to employ kinetic obstacles, which are developed with remote disarming functions and autonomous systems, developed to switch from active to dormant.

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8) ***Autonomous, rapid, non-aqueous, large-area decontamination of key terrain.***

b. AI. Future Army forces require the capability to process large amounts of data from multiple sources, infer, aid in decision making, reduce cognitive load of commanders and leaders, develop enemy courses of action to preserve CCAAs, and maintain enhanced situational understanding across the battlefield and competition continuum. ***Desired enabling capabilities include:***

1) ***Capability to identify, from remote locations, obstacles in time and space to provide leaders the ability to make informed decisions to breach or bypass.***

2) ***Protection/ CONMIT related Decision Support tools leveraging artificial intelligence, machine learning, and robotics.***