

# BATTLESPACE JOURNAL

Volume 2024-1



**DEMOCRATIZING AIRPOWER: AIR MOBILITY'S ROLE IN JOINT FIRES**  
MAJ NICOLE PEARL, USAF

**INTERMEDIATE OBJECTIVES AND INCREMENTAL BEHAVIOR CHANGE:  
RELOOKING A CURRENT PARADIGM FOR DOD FOREIGN  
INFLUENCE EFFORTS**  
MR. IAN COURTER, USA

**THE INTELLIGENCE, SURVEILLANCE, RECONNAISSANCE LIAISON  
OFFICER: A CRITICAL INTELLIGENCE NODE IN  
AGILE COMBAT OPERATIONS**  
MAJ MELISSA SIDWELL-BOWRON, USAF AND CAPT MATTHEW WINOT, USAF

**5G AND EDGE COMPUTING: THE FUTURE OF THE DOD AND JADC2**  
CAPT MICHAEL MOLINARI, USAF



**AIR LAND SEA SPACE  
APPLICATION  
CENTER**

# BATTLESPACE JOURNAL

## FEATURE ARTICLES

Democratizing Airpower: Air Mobility's Role in Joint Fires.....	5
Intermediate Objectives and Incremental Behavior Change: Relooking a Current Paradigm for DoD Foreign Influence Efforts.....	9
The Intelligence, Surveillance, Reconnaissance Liaison Officer: A Critical Intelligence Node in Agile Combat Operations.....	16
5G and Edge Computing: The Future of the DoD and JADC2.....	21

# AIR LAND SEA SPACE BULLETIN

ALSSA Mission and Intent.....	3
Battlespace Journal Submissions.....	3
MTTP 2025.....	3
Voting JASC Members.....	4
ALSSA Organization.....	4
Current ALSSA MTTP Publications.....	36
Access to ALSSA Products.....	39
Service Doctrine Center Links.....	39

## ALSSA Staff

### Director

COL Michael Reyburn, USA

### Deputy Director

Col Joshua Biedermann, USAF

### Bulletin Editor

Maj Matthew Jackson, USAF

### Editor

Mr. Rober Finn, Civilian, USAF

### Layout Artist/Illustrator

Ms. Laura Caswell, Civilian, USN

### Publications Officer

LTC Matthew Jensen, USA

**Purpose:** The ALSSA Center is a multi-Service Department of Defense field agency sponsored by the US Army Training and Doctrine Command (TRADOC), Marine Corps Training and Education Command (TECOM), Navy Warfare Development Center (NWDC), Curtis E. LeMay Center for Doctrine Development and Education (LeMay Center), and Space Delta 10. The *BATTLESPACE JOURNAL* is a vehicle to “spread the word” on recent developments in warfighting concepts, issues, and Service interoperability. It provides a cross-Service flow of information among readers around the globe. ALSSA publishes *BATTLESPACE JOURNAL* two times a year. This periodical is governed by Army Regulation 25-30.

**Disclaimer:** The *BATTLESPACE JOURNAL* is an open forum. The articles, letters, and opinions expressed or implied herein should not be construed as the official position of TRADOC, TECOM, NWDC, the LeMay Center, Space Delta 10, or ALSSA Center.

**Submissions:** Get published—ALSSA solicits articles and readers’ comments. Contributions of 3,000-5,000 words are ideal. Submit contributions double-spaced in MS Word. Include the author’s name, title, complete unit address, telephone number, and email address. Graphics can appear in an article, but a **separate computer file for each graphic and photograph (photos must be 300 dpi) must be provided.** Send email submissions to [ALSSAINFO@army.mil](mailto:ALSSAINFO@army.mil). Authors are responsible for ensuring that their unclassified submissions are cleared for public release through their publication or security office. The ALSSA Center reserves the right to edit content to meet space limitations and conform to the *BATTLESPACE JOURNAL* style and format.

**Reprints:** The ALSSA Center grants permission to reprint articles. Please credit the author and *BATTLESPACE JOURNAL*. Local reproduction of the *BATTLESPACE JOURNAL* is authorized and encouraged.

# ALSSA MISSION AND INTENT



## MISSION:

ALSSA provides multi-Service solutions for tactical warfighters by filling gaps in existing tactics, techniques, and procedures (TTPs) to improve near-term interoperability and lethality.

## INTENT:

ALSSA succeeds through professional networking, collaborative tools, digital/printed media, and persistent engagement with warfighters. Adaptability, credibility, and speed are pillars of ALSSA's organizational culture.

# BATTLESPACE JOURNAL SUBMISSIONS

Get published—ALSSA solicits articles and readers' comments. Contributions of 3,000 -5,000 words are ideal. Submit contributions double-spaced in MS Word. Include the author's name, title, complete unit address, telephone number, and email address. Graphics can appear in an article, but a separate computer file for each graphic and photograph (photos must be 300 dpi) must be provided. Authors are responsible for ensuring that their unclassified submissions are cleared for public release through their publication or security office. Send email submissions to [ALSSAINFO@army.mil](mailto:ALSSAINFO@army.mil). The ALSSA Center reserves the right to edit content to meet space limitations and conform to the BSJ style and format.

## MTTP 2025

### Priority

(1-3 Year Cycle)

Fighter Integration	1YR
Air Control Communication Multi-Service Brevity codes	2YR
Joint Application of Firepower Tactical Radios Joint Suppression of Enemy Air Defenses Airspace Control Air and Missile Defense Personnel Recovery Advising Foreign Security Forces Theater Air-Ground System Airfield Opening	3YR

### Routine

(5 Year Cycle)

Air Operations in Maritime Surface Warfare Aviation Urban Operations Dynamic Targeting Conventional Forces and Special Operations Forces Integration, Interoperability, and Interdependence Intelligence, Surveillance, and Reconnaissance Optimization Kill Box Planning and Employment Military Diving Operations Strike Coordination and Reconnaissance Survival, Evasion, and Recovery Tactical Convoy Operation Explosive Ordnance
-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

### Evaluation

(Assess for Future Disposition)

Air-to-Surface Radar Employment Tactical Employment of Biometrics in Support of Operations Defense Support of Civil Authorities Expeditionary Forensics Employment of Nonlethal Weapons Operation Assessment **Ongoing Revision**
-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

# VOTING JOINT ACTIONS STEERING COMMITTEE MEMBERS



Maj Gen Parker.  
Wright

Commander, Curtis E.  
LeMay Center for  
Doctrine Development  
and Education



Mr. Michael R.  
Durkin

Director,  
Navy Warfare  
Development  
Center



COL Bryan L.  
Babich

Director,  
Mission Command  
Center of Excellence



Col Karl R.  
Arbogast

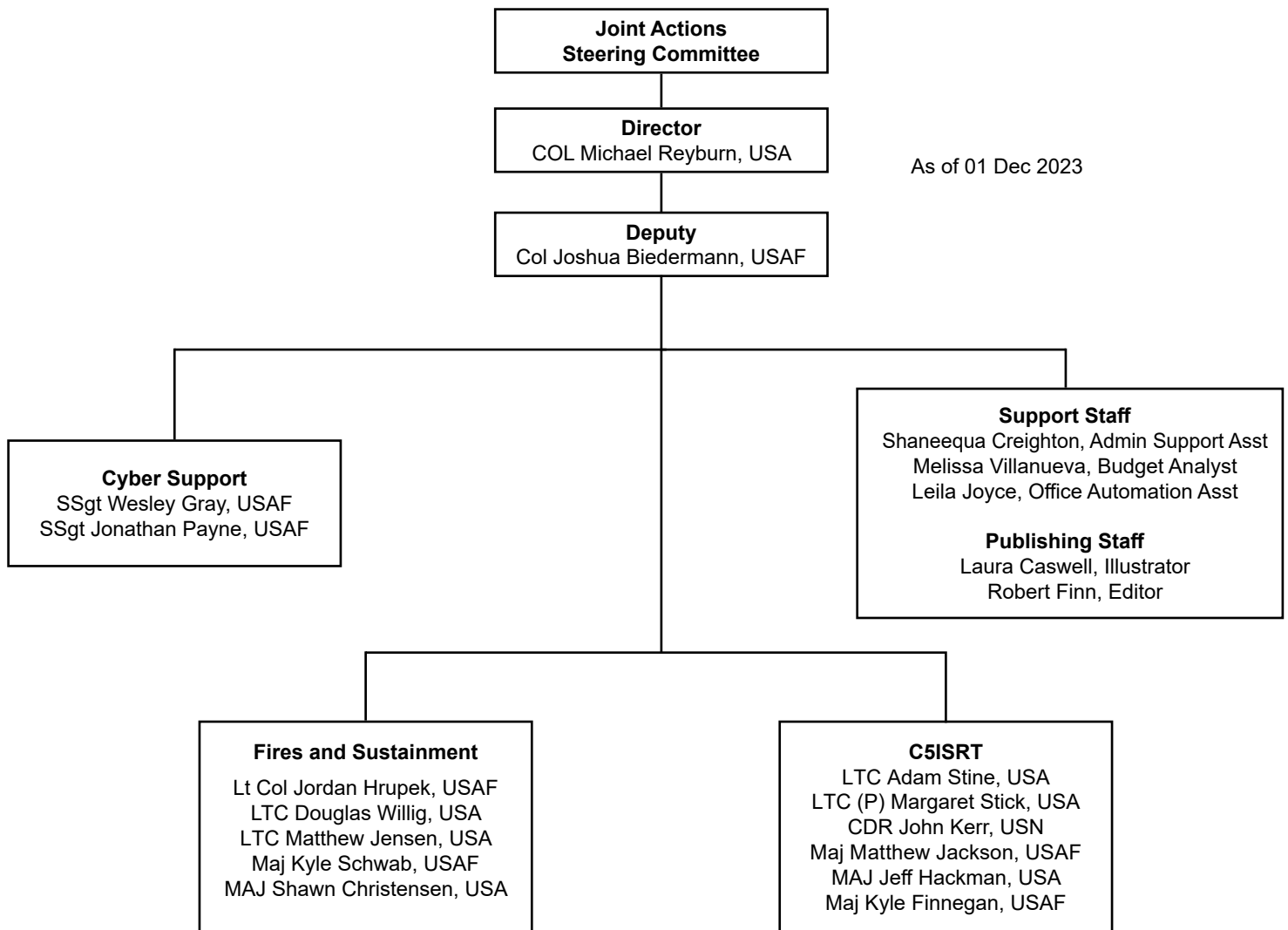
Director, Policy and Stan-  
dards Division, Training  
and Education Command



Col Jack D.  
Fulmer II

Commander, Space Delta  
10, Doctrine & Wargam-  
ing

## ALSSA ORGANIZATION



---

---

# DEMOCRATIZING AIRPOWER: AIR MOBILITY'S ROLE IN JOINT FIRES

---

---

By Major Nicole D. Pearl, USAF

*"Losing one's ship in peacetime is incompetence. Being unable to sensibly risk it in wartime is cowardice." — Royal Navy proverb*

## INTRODUCTION

The Air Force (AF) has recently codified changes to regulations that pave the way for the agile and dynamic air mobility operations we will need in the future. Traditional airfield survey relied on small teams spending hours on site, supported by several lift and fires aircraft, depending on the threat. Now, an airfield can be surveyed by remote means. Traditionally, airfield survey data would be hand typed into a PDF and staffed through the chain of command, languishing in bureaucratic purgatory. Now, data can be passed through tactical datalinks, and command approval can be attained in minutes rather than weeks. Until recently, authority to approve and control airland operations was nested in a small, specialized career field. Now, joint and Allied/partner warfighters can be trained to fulfill these duties with tools like the Fixed-Wing Tactical Landing Zone Brief.

## BACKGROUND

Figure 1 shows the proposed Fixed-Wing Tactical Landing Zone (Tac LZ) Brief included in the draft Multi-Service Tactics, Techniques, and Procedures for Joint Application of Firepower (JFIRE) dated 3 August 2022, currently under World Wide Review. This 12-line briefing is directly transcribed from the Tac LZ Survey in Department of the Air Force Manual (DAFMAN) 13 217, *Drop Zone, Landing Zone, and Helicopter Landing Zone Operations* and the brief's inclusion in the JFIRE has sparked some debate among the JFIRE community.<sup>1</sup> Some contend that the JFIRE is focused on the direct execution of fires missions, therefore a non-fires brief is irrelevant to most JFIRE users. This article argues that air mobility, while a distinct function, is an integral counterpart to fires within the parent concept of maneuver. Recent decades attest to the close proximity of fires and mobility, and future warfighting concepts only accelerate this interconnection.

The JFIRE is highly used at the tactical level across the services, North Atlantic Treaty Organization, and coalition forces and the Tac LZ brief is included to put requisite tools in the hands of operators. Analysis and wargames indicate a critical need to increase speed in decision making and execution; this article summarizes updated AF regulations that delegate and expand airland mission authorities and recommends the next steps for warfighters throughout the joint community. New regulation changes democratize air mobility operations beyond AF stovepipes and equip joint warfighters to maneuver in complex battlespaces more effectively.<sup>2</sup> Inclusion of the Tac LZ Brief in the JFIRE is the first step in exercising and refining new dynamic joint mobility and fires tactics, techniques, and procedures (TTPs) in a repeatable and risk-mitigated manner.

## EXPANDED MANEUVER

The nature of war may be unchanging, but as the Joint Force prepares for future conflicts, the changing character of war is palpable. We will need to operate with unprecedented speed and synchronize effects across domains. To do so, we will need to receive, process, and share information at the tactical edge, and delegate authorities lower and more broadly. Success in these endeavors will rely heavily on both joint synchronization and integration with our Allies and partners.<sup>3</sup> The Joint Chiefs of Staff introduced the idea of *expanded maneuver* in the latest Joint Warfighting Concept. As General John Hyten, Vice Chairman of the Joint Chiefs of Staff, explains, "in every area that an adversary can move, you have to figure out how to fill that space in time before they can move."<sup>4</sup>

Joint doctrine reminds us that movement, maneuver, and fires are complementary warfighting functions.<sup>5</sup> In particular, air mobility is essential to joint fires providing speed, range, and mass that may be unattainable by ground vehicles. If not directly providing kinetic effects, air mobility assets move the personnel, weapons, ammunition, fuel, and equipment that do. And in most missions, these same aircraft fulfill a critical casualty evacuation role to the fires mission.

**Table 86. Fixed-Wing Tactical Landing Zone Brief (12-Line)**

**\*\*IAW DAFMAN 13-217: For all operations, LZ must meet minimum requirements for MDS aircraft used\*\***

This brief may be transmitted by voice or data. Units of measure are standard unless briefed and/or denoted. Include imagery as time and/or conditions permit. Lines 2-6, 12, are mandatory read backs (\*). The controller may request additional read backs. CCT/STO surveyor (or Gov Civ/Ctr CCT/STO) will conduct the Tactical LZ Survey or validate all data required below and report data to the OPCON authority as the LZ subject matter expert. OPCON MAJCOM, air component commander, COMAFSOF, or designated authority will provide overall operational risk management and waiver authority of the LZ data and requirements to operations.

Controller: " \_\_\_\_\_, this is \_\_\_\_\_ for Tactical LZ Control" (voice only transmit)  
(aircraft call sign) (controller call sign)

1. Call Sign: " \_\_\_\_\_ "
- \*2. Runway capability: "PCN \_\_\_\_" (paved) or Controlling Reading + Allowable Load and Passes " \_\_\_\_ " (semi-prep/failed AC paved)
- \*3. Hazards " \_\_\_\_\_ " (By exception, see Note)
- \*4. Runway Dimensions (feet): Length: " \_\_\_\_\_ " Width: " \_\_\_\_\_ " Overrun: " \_\_\_\_\_ "
- \*5. Approach End Location: " \_\_\_\_\_ " MSL Elevation: " \_\_\_\_MSL" (MGRS, latitude/longitude)
- \*6. Departure End Location: " \_\_\_\_\_ " MSL Elevation: " \_\_\_\_MSL" (MGRS, latitude/longitude)
7. Glideslope Ratio (From end unless displaced, primary rwy/opposite direction rwy): " \_\_\_\_ "
8. RWY Longitudinal Slope: " \_\_\_\_\_ "  
(ID individual controlling slopes that affect aircraft performance in Hazards)
9. Surface: " \_\_\_\_\_ " (e.g., sand, gravel, silt, clay, asphalt, concrete)
10. Runway Condition Rating (RCR): " \_\_\_\_\_ "
11. Surface Wind, Temperature: " \_\_\_\_\_ " (ex: Wind 240(mag)/8(knots), 60°F)
- \*12. Restrictions: " \_\_\_\_\_ "

(e.g., runway in use/approach/egress directions. Tactical approaches)

REMARKS (as appropriate):

Airfield markings/Locations and sizes of taxiways, aprons/threats to aircraft/enemy threat suppression coordinated/position of friendlies/hazards to ground movement (e.g., structures, terrain, towers)/airspace de-confliction, SPACI, RFF, center point grid, cross winds, cloud ceilings, visibility.

Additional WX data: Estimated ceiling and visibility

Timing:

Time on Target (TOT): " \_\_\_\_\_ " or Time to Target (TTT): " \_\_\_\_\_ "

NOTE: "By Exception" information includes conditions that affect aircraft performance based on 3.3. LZ Minimums (e.g., Distresses, WBC, threshold displacements, vertical obstruction clearance violations, steep transverse slope. Include locations.)

Legend:

AC—aircraft  
CCT—combat controller  
Civ—civilian  
COMAFSOF—Commander, Air Force Special Operations Forces  
Ctr—contractor  
DAFMAN—Department of the Air Force manual  
Gov—government  
ID—identification  
LZ—landing zone  
MAG—magnetic  
MAJCOM—major command  
MDS—mission design series

MGRS—military grid reference system  
MSL—mean sea level  
OPCON—operational control  
PCN—pavement classification number  
RCR—runway condition rating  
RFF—rolling friction factor  
RWY—runway  
SPACI—semi-prepared airfield condition index  
STO—Special Tactics Officer  
TOT—time on target  
TTT—time to target  
WBC—weight bearing capacity  
WX—weather

Figure 1. Fixed-Wing Tactical Landing Zone Brief (Draft 2023 JFIRE, Table 86).

For special operations forces of the last two decades, Gen Hyten's mandate to rapidly aggregate and disaggregate has been a mainstay of operations in Afghanistan and Iraq. AF Special Operations Command (AFSOC) aircrew and special tactics airmen are well versed in the general idea of rapid aggregation and disaggregation to support joint fires. As the United States' (US) footprint in Afghanistan condensed and forward operating bases were abandoned, the concept of mission support sites emerged. On a nightly occasion, MC-130s would dutifully pack their cargo compartment with ground force personnel and re-arming/refueling teams, seizing abandoned airfields that could act as tactical lily pads for Army helicopters and ground teams to launch assaults. Over the course of a few hours, the airfield would be secured and controlled by AF special tactics teams, as Army lift and fires helicopters transitioned to and from their target, all while fixed-wing intelligence, surveillance, and reconnaissance and fires aircraft covered the "vertical flank." Hours later, the airfield would collapse, and the war machines would disappear into the darkness.

## **EXPANDED MANEUVER IN TACTICAL EXECUTION**

DAFMAN 13-217 governs drop zone, landing zone (LZ), and helicopter LZ operations, to include survey and assessment procedures and processes for all AF aircraft and personnel. Recent changes to this regulation open new and dynamic opportunities for air mobility assets to integrate with joint and partner nation units. Through training and certification in LZ operations, joint warfighters are empowered to employ airpower to achieve multidomain effects.

Traditional survey procedures required an on-site evaluation by teams of specially trained and certified surveyors, usually AF Combat Control Teams/Special Tactics Officers (CCT/STO) in combat operations. These members gather all pertinent data for safe aircraft landing operations, such as the airfield dimensions, surrounding obstacles, weight bearing capacity of the surface, any damage, ruts, potholes, etc. Depending on the threat and operational environment, on-site survey may be impossible, or may jeopardize tactical speed and surprise, placing the mission or the CCT at risk. Thanks to innovations in airborne and on-orbit imaging, Tac LZs can be surveyed with high fidelity and confidence by teams of imagery analysts and certified surveyors from any location.<sup>6</sup> This allows our aircraft to operate at more locations and

with less lead time, and most importantly, with little to no signature.

Removing the requirement for on-site survey does result in some transference of risk that must be accounted for and mitigated to the maximum extent practical. One means of reducing risk is by utilizing an LZ Safety Officer (LZSO), a role that could be fulfilled by any joint warfighter.<sup>7</sup> AFSOC maintains the validated LZSO syllabus and provides LZSO training, and Marine Aviation Weapons and Tactics Squadron One (MAWTS-1) conducts a validated course for US Marine Corps personnel. The training covers LZ assessment and airfield control/operations, preparing attendees to direct air mobility operations in the place of a highly specialized controller. Typical LZSO classes last two weeks and include five days of classroom instruction plus five days of field/live fly instruction. Classes are conducted in person at Hurlburt Field, Florida, Robins Air Force Base, Georgia, and Yokota Air Base, Japan. For course information contact HQ AFSOC A3TA- Special Tactics, [AFSOCA3.A3TA.SpecialTactics@us.af.mil](mailto:AFSOCA3.A3TA.SpecialTactics@us.af.mil), <https://usaf.dps.mil/sites/AFSOC-A3/A3T/A3TA/ST> or <https://hcs.usmc.mil/sites/mawts1/> for more information concerning LZSO training. LZSOs must conduct an academic review and LZSO event every 12 months to maintain currency.

For contingency operations, certified LZSOs can instruct other Department of Defense personnel to perform LZSO duties.<sup>8</sup> Sister service and partner nation personnel can attend both AFSOC and USMC courses, but current regulations stipulate that sister service LZSO certification outside of contingency operations is coordinated through a memorandum of agreement. Future updates to the DAFMAN 13-217 must include provisions for sister service and partner nation personnel to be qualified without restriction upon successful course completion and remove this bureaucratic hurdle. AF Special Tactics and joint ground units have dedicated years of effort to training and building relationships with partner and Allied

---

**AF Special Tactics and joint ground units have dedicated years of effort to training and building relationships with partner and Allied forces...**

---

forces to build their capacity and ensure placement and access. If these forces cannot integrate with US airpower, we are sacrificing warfighting capability.

By maintaining a small cohort of LZSOs, joint and partner units operating in austere and dispersed locations can employ air mobility, assisted by USAF certified surveyors remotely. When a potential LZ is surveyed and approved remotely, the organic LZSOs can then make dynamic LZ assessments and direct aircraft landing operations with the JFIRE Tac LZ Brief as their guide. The capabilities and impacts of a relatively small group of experts can now be multiplied across the battlefield and airpower can be brought to bear in previously unimaginable ways.

### TAKING THE RIGHT RISKS

By democratizing air mobility authorities and employing TTPs codified in joint publications, fixed-wing aircraft can be leveraged to support fires with speed and surprise. Success in complex and unpredictable operations is not borne from a lack of structure; rather, it depends on having a structure that amplifies and empowers dynamic warfare. With the right authorities and tools in our regulations and TTPs, our warfighters can harness agility throughout the joint functions.

Such changes to our TTPs underscore a change in the way we assess and accept risk in tactical execution. After years of low-intensity conflict in familiar areas of responsibility, we've driven risk down and pushed command authorities up. Now we face a threat to the world order. Our risk calculus should not and cannot be the same. The Joint Force collectively agrees that authorities must be delegated down, but authorities alone will not help our warfighters take the right risks. War is inherently chaotic and uncertain; "The side that anticipates better, thinks more clearly, decides and acts more quickly, and is *comfortable operating with uncertainty* stands the greatest chance to seize, retain, and exploit the initiative over an opponent."<sup>9</sup> Dynamic operating constructs and agile tactical tools provide the supportive framework for our force to thrive in complexity, take the right risks, and defeat our adversaries cognitively and kinetically. The JFIRE as an instrument for this change is widely disseminated, printed on waterproof paper, and carried in the pockets of the joint warfighter. The Tac LZ Brief should be the newest tool in their toolbelt.

---

### END NOTES

---

<sup>1</sup> Department of the Air Force Manual (DAFMAN) 13-217. Drop Zone, Landing Zone, and Helicopter Landing Zone Operations, 19 APRIL 2022. [https://static.e-publishing.af.mil/production/1/af\\_a3/publication/dafman13-217/dafman13-217.pdf](https://static.e-publishing.af.mil/production/1/af_a3/publication/dafman13-217/dafman13-217.pdf)

<sup>2</sup> DAFMAN 13-217

<sup>3</sup> Milley, Gen Mark A. Chairman of the Joint Chiefs of Staff. Written Statement to House Armed Services Committee Hearing: Fiscal Year 2023 Defense Budget Request. 5 April 2022. <https://armedservices.house.gov/cache/files/3/6/36fd4325-7e13-4740-b11d-0bf40ad-d0af1/>

<sup>4</sup> Hyten, Gen John. Joint Chiefs of Staff Vice Chair on Defense Technology. CSPAN video. 38 mins. 26 July 2021. <https://www.c-span.org/video/?513684-1/joint-chiefs-staff-vice-chair-discusses-defense-technology#>

<sup>5</sup> Joint Chiefs of Staff. Joint Fires Support. JP 3-09. Washington, DC: Joint Chiefs of Staff, 10 April 2019. [https://www.jcs.mil/Portals/36/Documents/Doctrine/pubs/jp3\\_09.pdf](https://www.jcs.mil/Portals/36/Documents/Doctrine/pubs/jp3_09.pdf)

<sup>6</sup> DAFMAN 13-217, paragraph 4.2.6.

<sup>7</sup> The requirement for an LZSO or controller may be waived by a SOG/CC or COMAFSOF. DAFMAN 13-217, paragraphs 4.8, 4.9

<sup>8</sup> DAFMAN 13-217, paragraph 4.8.1.5.

<sup>9</sup> Headquarters, Department of the Army. The Operations Process. ADP 5-0. July 2019. [https://armypubs.army.mil/epubs/DR\\_pubs/DR\\_a/ARN18126-ADP\\_5-0-000-WEB-3.pdf](https://armypubs.army.mil/epubs/DR_pubs/DR_a/ARN18126-ADP_5-0-000-WEB-3.pdf)



---

# INTERMEDIATE OBJECTIVES AND INCREMENTAL BEHAVIOR CHANGE: RE-LOOKING A CURRENT PARADIGM FOR DOD FOREIGN INFLUENCE EFFORTS

---

By Ian J. Courter

In operations around the world, the Department of Defense (DoD) relies upon a simplistic approach to influence foreign individuals and groups to achieve U.S. military objectives—suppress a current negative behavior while simultaneously eliciting a new positive behavior. Consequently, current Joint and Service doctrine addresses the shifting of a selected individual or group from an undesired behavior to what is frequently a polar opposite desired behavior. The failure to address the required intermediate steps between the opposing behaviors is a significant gap that particularly affects operational planning and assessment.

This article proposes a simple planner process based on established military concepts and psychological principles to develop clear and measurable intermediate objectives that begins to address the previously mentioned gap. Since the Army Psychological Operations (PSYOP) Branch holds the bulk of DoD purpose-built organizations with the primary function of conducting influence activities, the discussion derives from an Army PSYOP perspective. However, there are implications for the Joint Information Function, Joint Operations in the Information Environment, Army information advantage activities, targeting, and other functional areas, but those discussions exceed the scope of this article.

## CURRENT PRACTICE

In the current Army PSYOP Branch doctrine model, units typically conduct influence activities in foreign countries to move a selected individual or group from an undesired current behavior posing an obstacle to achieving military objectives<sup>1</sup> towards a desired new or altered broad behavior called a psychological objective (PO).<sup>2,3</sup> Generic examples of POs include *increase support for the government, reduce incidents of illicit smuggling, and reduce interference with United States and coalition operations.*

While any given PO may be clearly articulated, achieving one is complex, focusing on group-centric behaviors requiring multiple supporting behaviors to be achievable. Consequently, there are at least two supporting psychological objectives (SPO) associated with each PO.<sup>4</sup> SPOs are the specific goals towards which influence efforts move a selected individual or group, called a target or target audience (TA), depending on context. Multiple SPOs represent specific related behaviors that together drive the achievement of a PO. Example SPOs address participation in the electoral process, voluntarily joining the military and law enforcement institutions, and other behaviors that collectively help achieve the broader PO to *increase support for the government.* Figure 1 illustrates the current model in simplified form.

---

**There is a crucial missing piece in current practice that lies between the current behavior and the SPO**

---

There is a crucial missing piece in current practice that lies between the current behavior and the SPO—specific intermediate objectives required to move selected individuals and groups sequentially from an undesired behavior towards a completely different behavior. This gap directly affects assessment by hindering the identification of explicit and measurable indicators of SPO accomplishment that could lead to a more precise effectiveness measurement at any given time. The concept of intermediate psychological objectives (IPO) fills this void and enables continuous assessment.

## INTERMEDIATE PSYCHOLOGICAL OBJECTIVES EXPLAINED

IPOs are a series of *sequential* behavioral goals that bridge the distance between a current undesired

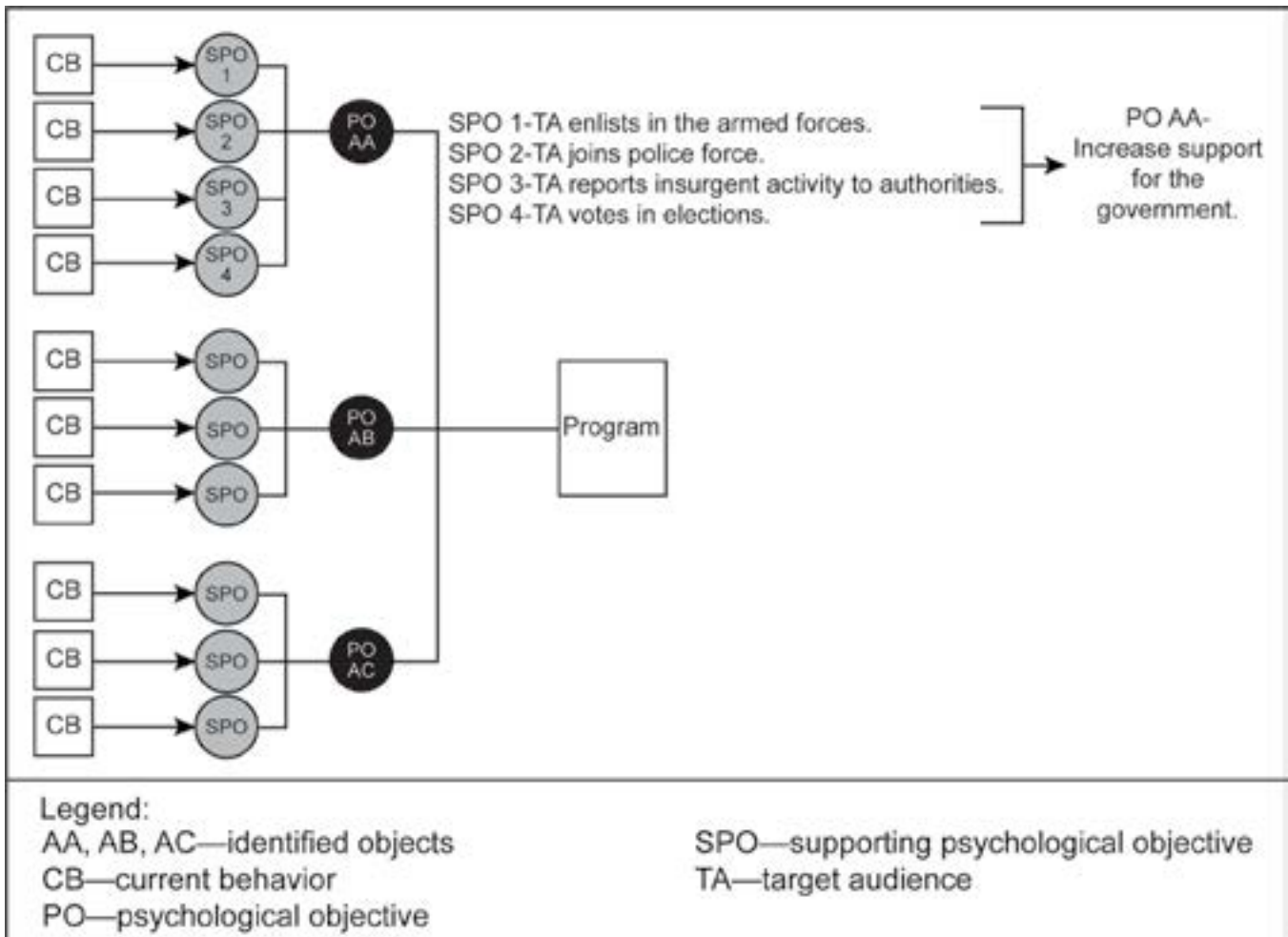


Figure 1. Current doctrine model with example POs and SPOs.

behavior and a desired behavior. More specifically, IPOs are observable and measurable behaviors that represent desired changes in a well-defined sequence like a line of operation.<sup>5</sup> Thus, IPOs aid in the planning of specific actions and messages that move targets and TAs from one behavior to another in a series of steps rather than attempting to achieve a quick, profound change. Achieving a dramatic change in human behavior is extremely challenging and arguably more difficult to make enduring even if it happens to be achieved. Planners and unit leaders must continually manage expectations to emphasize that most efforts to change ingrained behavior require a long-term effort to accomplish and be enduring, such as reducing institutional corruption in developing countries and decreasing blood feuds in tribal societies.

Achieving a dramatic change in human behavior is extremely challenging and arguably more difficult to make enduring even if it happens to be achieved.

## THE ROOTS OF INTERMEDIATE OBJECTIVES

The idea of developing intermediate objectives is neither new nor unique to military planning. Both Joint and Army doctrine discuss the concept in their respective keystone planning publications. Joint doctrine in particular states “Intermediate objectives should identify discrete, identifiable, and measurable conditions or effects”.<sup>6</sup> The terms *discrete*, *identifiable*, and *measurable* precisely describe what each IPO should be for behavior change as well. Figure 2 depicts joint examples of intermediate objectives found in the last two iterations of JP 5-0.

*Essentially, intermediate objectives (and associated conditions/ effects) are multiple time-or condition based objectives that are between initiation of the campaign and achievement of campaign objectives. Accordingly, at the strategic assessment level, intermediate objectives are criteria used to observe and measure progress toward campaign desired conditions and evaluate why the current status of progress exists. – JP 5-0 (2020)*

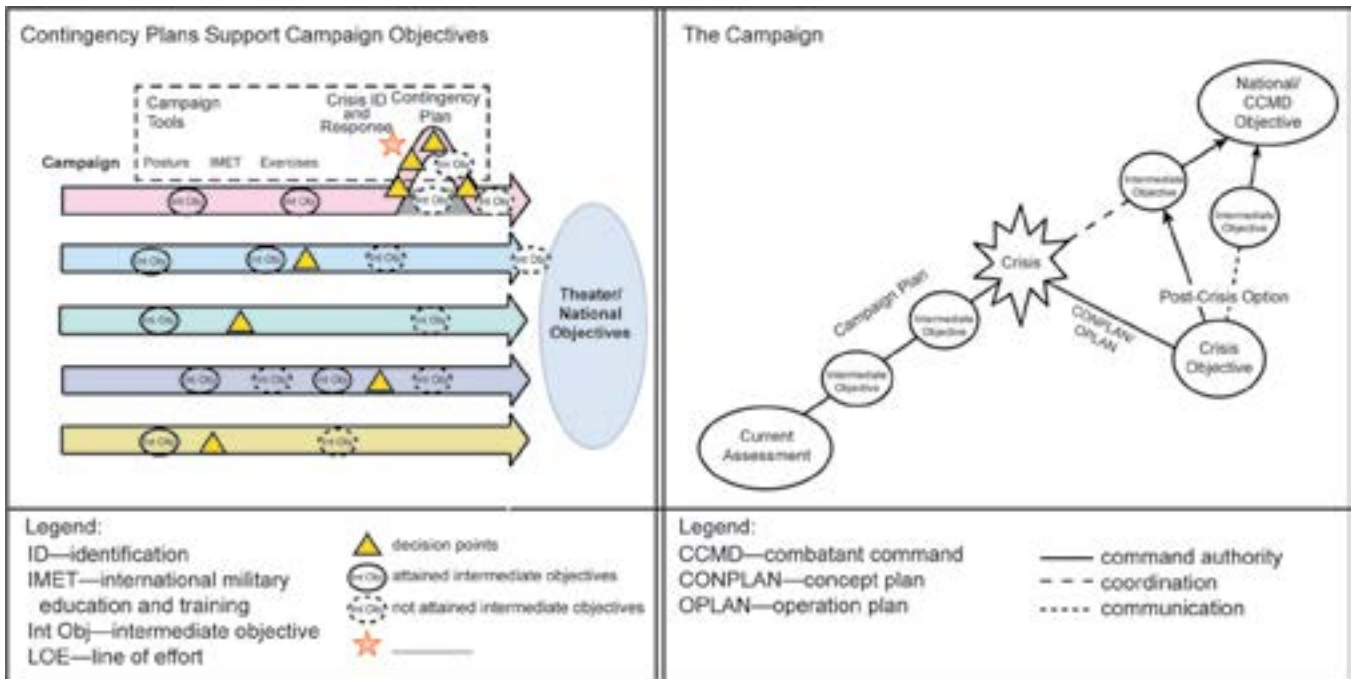


Figure 2. Example joint usage of IPOs (From JP 5-0, 2011 and 2017).<sup>7</sup>

Combatant command campaign plans include intermediate objectives derived from Global Campaign Plans, Transregional Campaign Plans, Regional Campaign Plans, and Functional Campaign Plans. For a Joint Force Commander, intermediate objectives contribute to achieving national objectives that, in turn, lead to achieving military end states. More specifically, intermediate objectives help joint planners "... assess progress toward the longer-range objectives established by the [National Defense Strategy], [National Military Strategy], or [Joint Strategic Capabilities Plan]."<sup>8</sup> In combatting terrorism, counterdrug, and other operations where an end state is elusive or simply unachievable, intermediate objectives help quantify progress towards objectives.<sup>9</sup> This last point speaks directly to the type of long-term perspective required for influence activities where there is no identifiable end to a conflict.

For the Army, intermediate objectives directly correlate to a line of operations. "Lines of operations connect a series of intermediate objectives that lead to control of a geographic or force-oriented objective. Operations designed using lines of operations generally consist of a series of actions executed according to a well-defined sequence."<sup>10</sup> As FM 5-0 describes them, Army intermediate objectives align more with a yes/no answer to any assessment of achievement rather than something quantified, but the underlying concepts of discrete objectives and use of a well-defined sequencing towards an end state fully align

with both the joint concept and use of intermediate objectives in an influence context. Figure 3 illustrates the Army concept of intermediate objectives and sequencing.

### INTERMEDIATE OBJECTIVES IN THE INFLUENCE CONTEXT

Figure 1 illustrated how several SPOs support achievement of a single PO, but otherwise only link to each other by supporting the same PO. Each SPO represents a separate and distinct influence effort for an influence-focused series<sup>12</sup> that may or may not target the same TA as another SPO under the same PO. In contrast, IPOs link in a clear sequence from a current behavior to their respective SPOs and incrementally move a TA towards a specific desired behavioral response. Figure 4 depicts the concept of the relationship between the three types of objectives in context with current behaviors. The number of IPOs shown is notional and only intended to illustrate sequencing.

An important difference between SPOs and IPOs is that SPOs *collectively* contribute to PO achievement while IPOs *sequentially* achieve a SPO. Consider that out of the five notional SPOs shown in figure 4, if only four succeed it could still be possible to achieve the overarching PO. However, if any one of the IPOs in a given line fail to happen, then it is unlikely the associated SPO is achievable. Progress

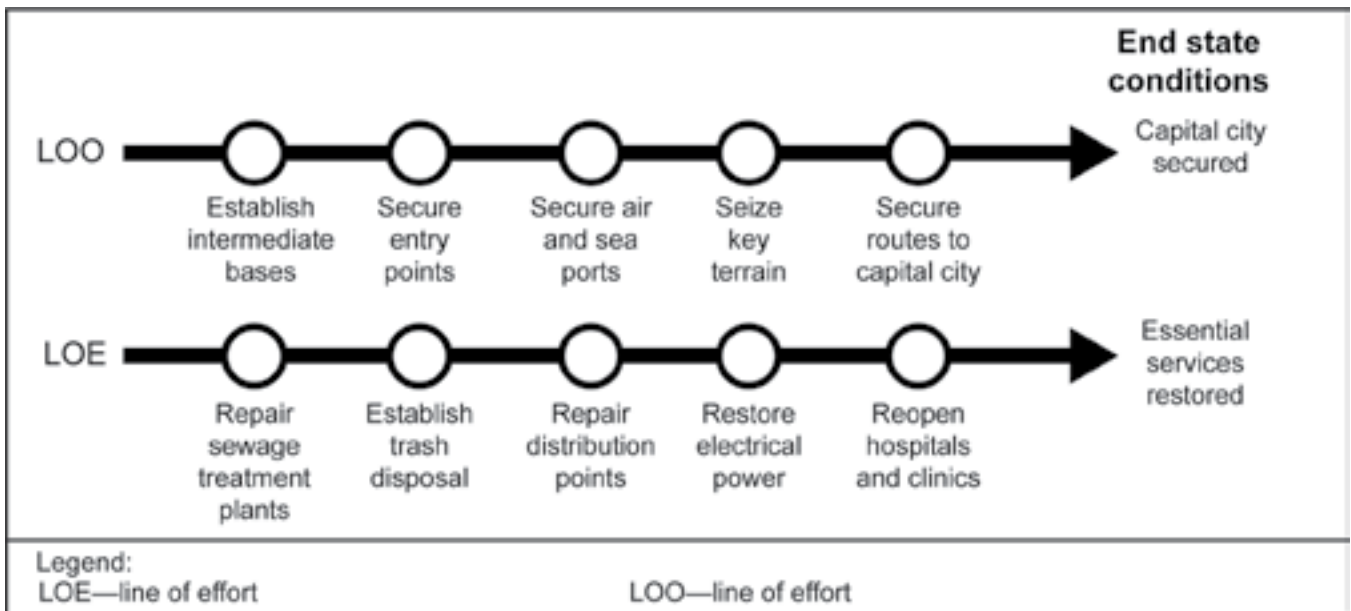


Figure 3. Sample line of operations and line of effort (From ADP 5-0).<sup>11</sup>

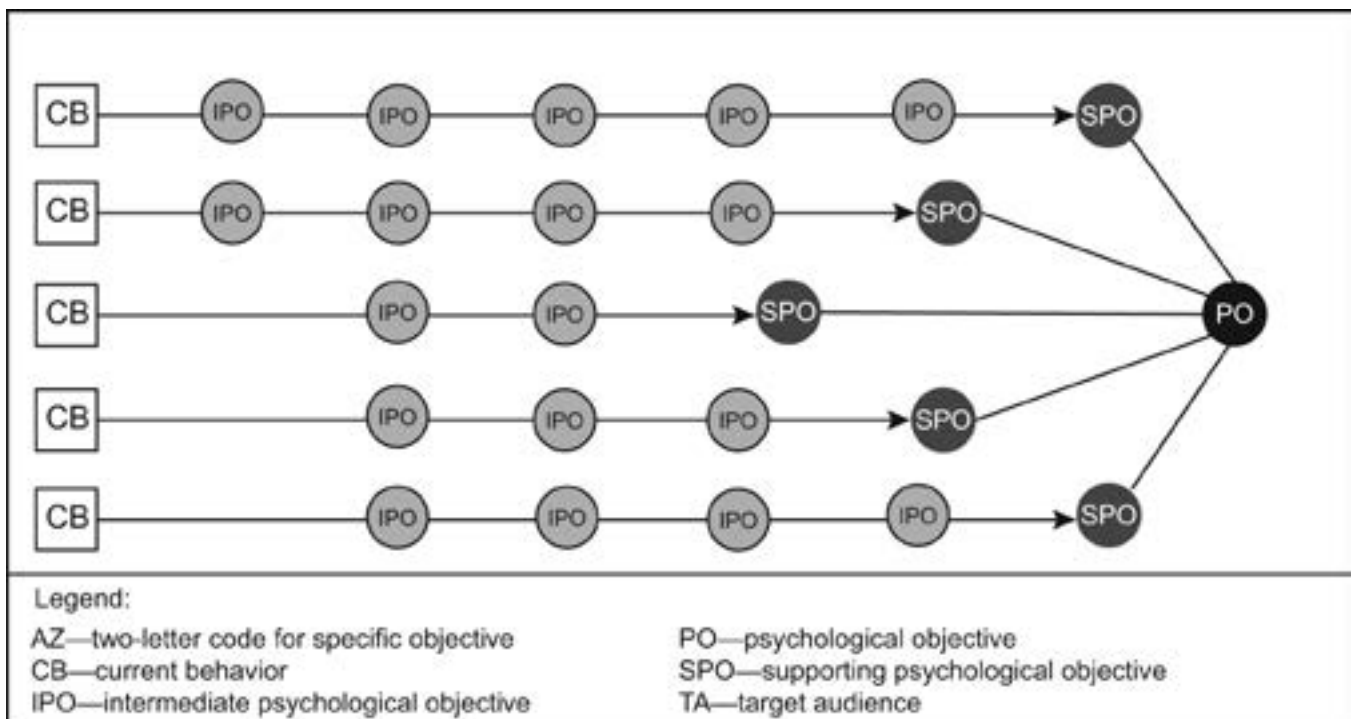


Figure 4. Conceptual relationship of the types of objectives.

towards the SPO likely halts with that failure, which will require analysis to determine why it occurred and if it can be overcome. Figures 5 and 6 illustrate the sequential nature of IPOs using notional examples.

Key to developing IPOs for influence purposes is breaking down the required sequence of behaviors between a current behavior and a SPO. This part of the proposed approach likely requires a new analytical model with personnel having to determine precisely what those behaviors are. In any case, this task requires the use of strong, measurable verbs that clearly articulate the desired behaviors as IPOs. Use

of such measurable verbs differs from SPO development in that IPO development more closely resembles backwards planning. Planners compare the current behavior with the desired behavior and then identify the required intermediate behaviors working backwards towards the current behavior. For example, before a person can vote, they must register. Before they make the effort to register, they require the motivation, willingness, and a permissive environment that allows them to go to a place of registration. Figure 5 provides notional examples of sequential progression for IPOs that address increasing local populace participation in the electoral process as part

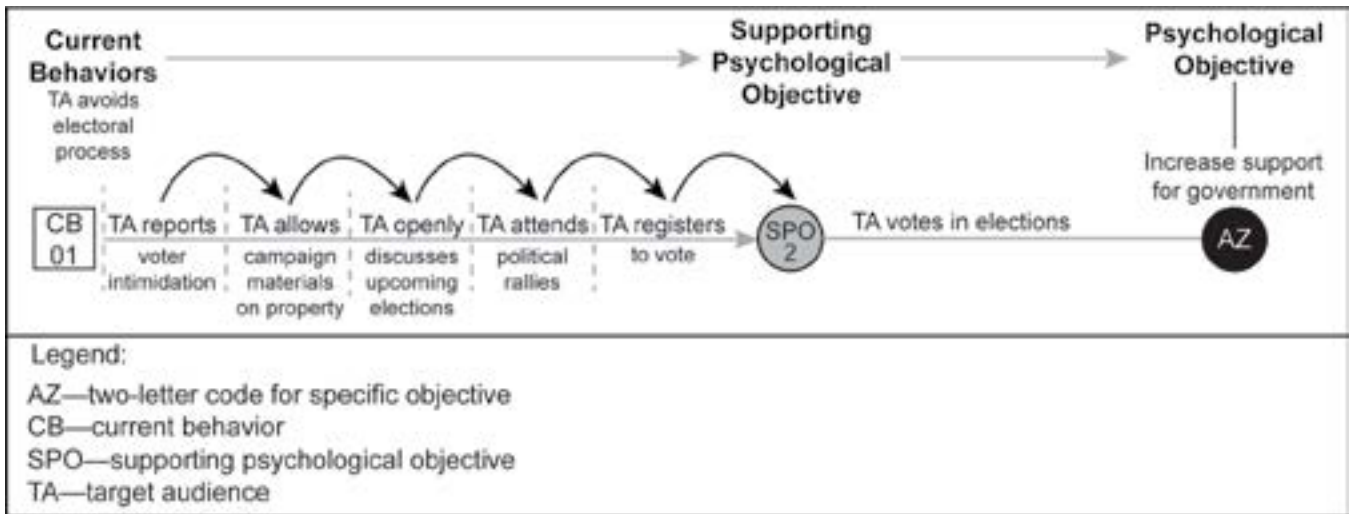


Figure 5. Example sequential IPO progression.

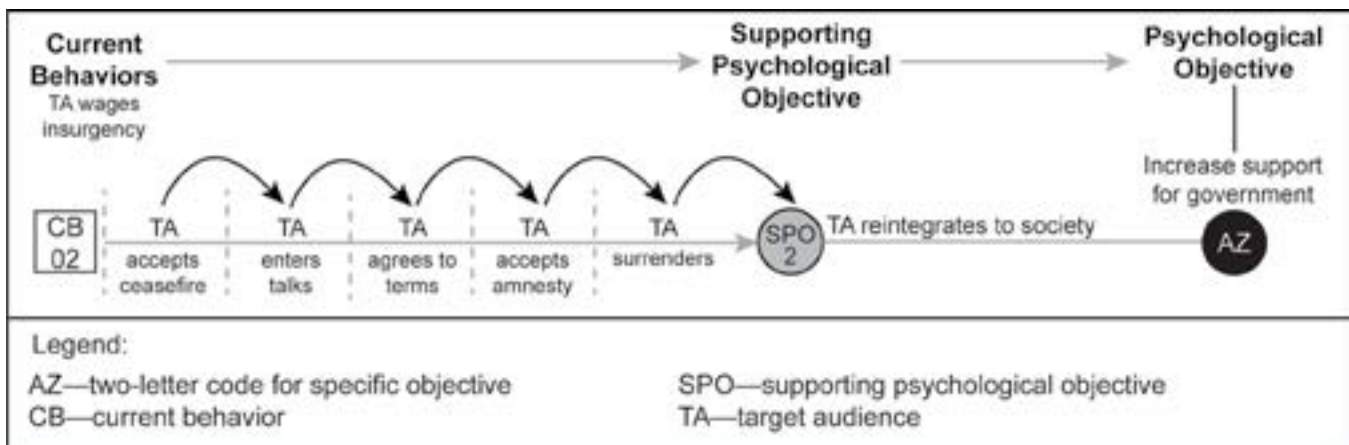


Figure 6. Example IPO progression in a COIN scenario.

of the PO increase *support for government*.

The number of IPOs required, and the time required to achieve them depends on how close the current behavior is to the desired behavior articulated in a SPO. As the TA reaches each IPO, it moves further along the path towards the SPO. In the end, planners should have the minimum number of necessary and distinct IPOs that bridge the gap between a current behavior and a corresponding SPO. Figure 6 depicts an example where a TA actively participates in an insurgency against an U.S.-partner government. The notional IPOs represent incremental behavior changes leading the TA (the insurgents) away from the undesired behavior (waging an insurgency) towards the notional SPO TA *reintegrates into society*.

In figure 6, the current behavior (CB02) is TA *wages insurgency against the government*. The intervening IPOs serve as incremental changes in behavior that lead to the gradual adoption of the SPO as a desired behavior. If any one of the intermediate behaviors in the sequence fail to occur, then it is unlikely that SPO

02 will occur. The insurgents (or even many of them) could accept and abide by the ceasefire and even enter talks, but if they do not agree to the terms of a peace negotiation, then the TA could simply revert to actively waging an insurgency. In a similar manner as depicted in the SPO 02 line, other current behaviors can be charted out to identify the required intermediate behaviors. However, there is an important caveat to any influence effort in an insurgency scenario. If the local-national government does not work toward addressing the root causes of the insurgency (mass poverty, inequalities, oppression, etc.), then all the influential messaging in the world will likely have little effect on those fighting the insurgency.

## INTEGRATION INTO STAFF PROCESSES

An important question about integrating IPO development into staff planning processes is: who does it? Also, once developed, which entity approves them and at what echelon? In general, since IPOs derive from existing, approved SPOs and directly tie to the actual efforts to change behavior, IPOs should

be a series-level item. Series developers identify IPOs for each SPO linked to a specific TA from the approved list. If developers find that existing approved TAs fail to address a current behavior/SPO linkage, then planners use the chain of command to request approval of additional TAs to fulfill the need. As for IPO approval, since they are part of series development, they should also be included in series approval packets under the appropriate approval process established at echelon per authorities.

### KEY ISSUES

There are two key issues identified with implementing the use of IPOs. First, aside from general difficulties associated with influence activities, there are the innumerable internal and external factors that also affect IPO achievement or even promote the maintenance of current, undesired behavior(s). Figure 7 illustrates several of the potential factors affecting if and to what extent the target(s) engage in the desired behaviors. These factors and others should be part of any analysis process but must also be part of a subsequent effectiveness assessment.

Second, while the development of IPOs makes quantification of specific behaviors simpler in theory, there is still the matter of how exactly would success in achieving the SPO be measured? In the above instance where the TA surrenders, would a simple, raw percentage of insurgents that surrender

indicate the degree of success? For example, out of 10,000 insurgents, if 50%+1 (5,001) surrender, then does that constitute success? A deeper analysis of this question is the next step as part of an overall look at influence processes to improve assessment.

---

**...SPOs require higher approval prior to use and deconfliction with the highest operational PSYOP unit.**

---

### CONCLUSION

This article introduces a revised approach to move a TA sequentially from a current undesired behavior towards a new desired behavior. This approach contrasts with the current model that seeks to substitute one behavior for another. This updated approach comes into use within the Army PSYOP influence process [an internal methodology] during planning. More specifically, series planners would conduct the task “develop intermediate psychological objectives” with approved SPOs, then going through each SPO in turn and developing the required number and sequencing of IPOs. This revised process is necessary because SPOs require higher approval prior to use and deconfliction with the highest operational PSYOP unit. Planners would waste time and effort

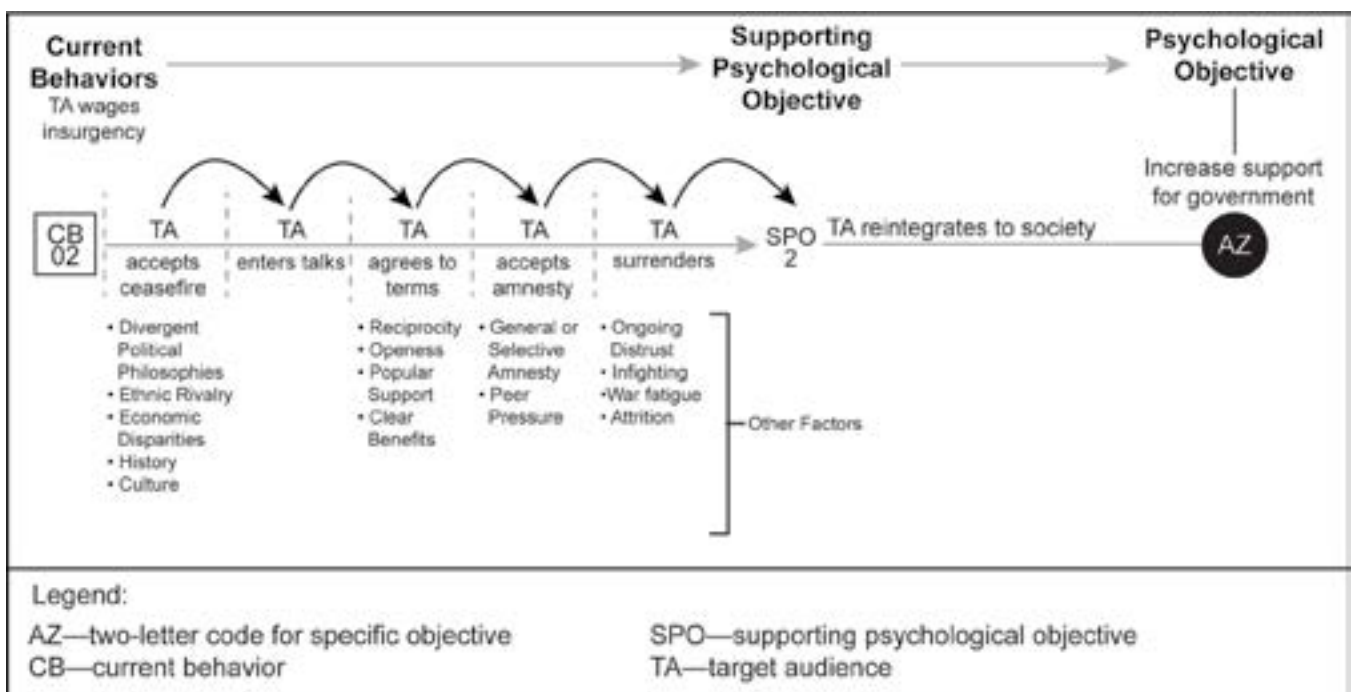


Figure 7. Example factors affecting possible adoption of IPOs.

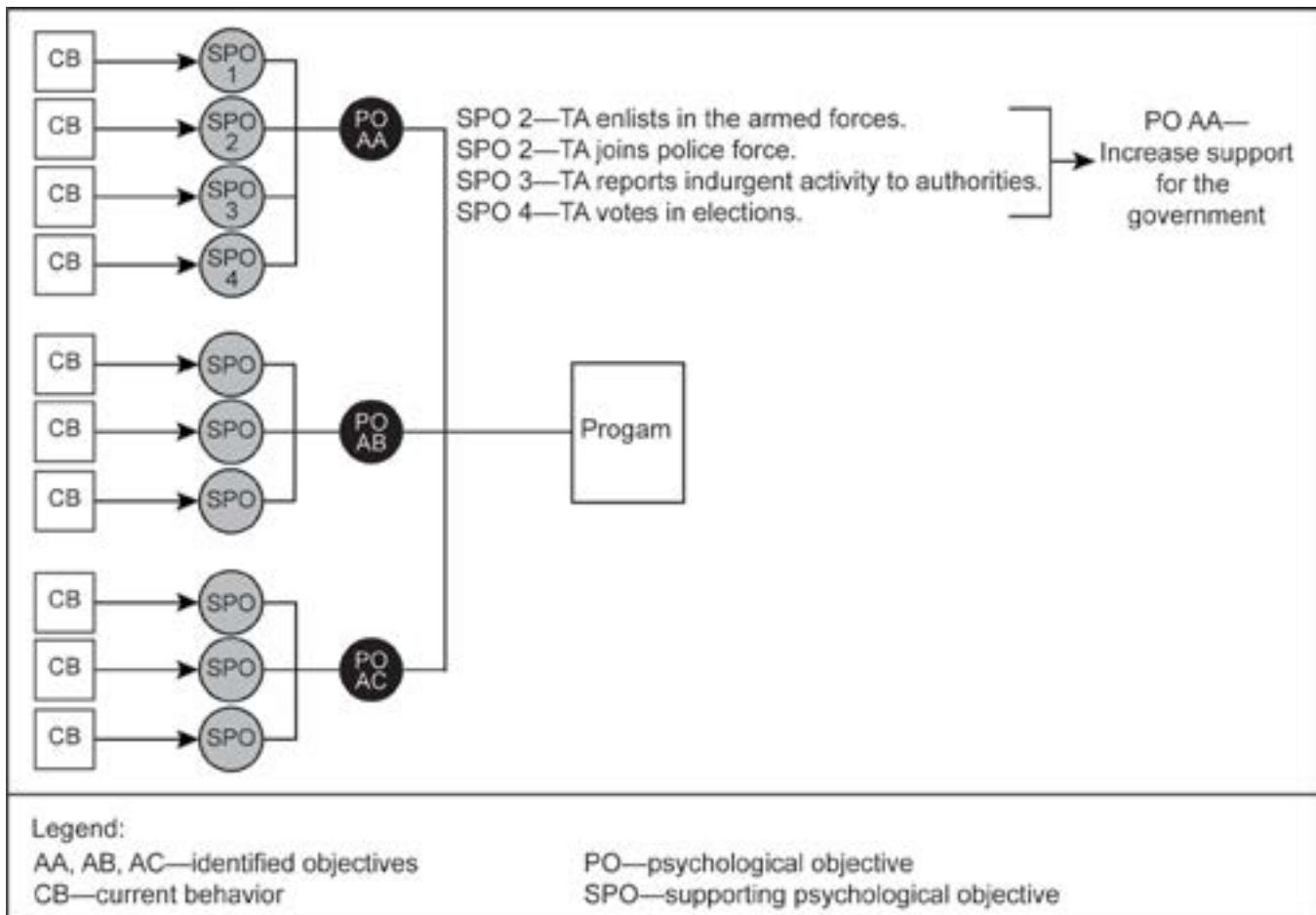


Figure 8. IIPO development in the context of Phase I: Planning.

to develop IPOs for several SPOs only to potentially have numerous SPOs and their subordinate IPOs rejected. Figure 8 depicts when IPO development occurs in the planning phase.

**Mr. Courter is a doctrine developer and analyst assigned to the Doctrine Division of the Psychological Operations Proponent Office, of the United States Army John F. Kennedy Special Warfare Center and School, Fort Bragg, North Carolina.**

tions. July 31, 2019.

<sup>6</sup> JP 5-0, Joint Planning. December 1, 2020. Pg I-19.

<sup>7</sup> Figure 2 left side, JP 5-0 (2017), pg II-22; Figure 2 right side, JP 5-0 (2020), pg V-2.

<sup>8</sup> JP 5-0 (2020), pg I-9, I-19.

<sup>9</sup> JP 5-0 (2020), pg II-4.

<sup>10</sup> ADP 5-0, The Operations Process. (2019), pg 2-13.

<sup>11</sup> ADP 5-0 (2019), pg 2-13.

<sup>12</sup> Series – all actions and products developed in support of a single supporting objective and single target audience combination. (Draft FM 3-53, 2022).

## END NOTES.

<sup>1</sup> Objective – the clearly defined, decisive, and attainable goal toward which an operation is directed. (JP 5-0)

<sup>2</sup> The psychological objective (Army) and the MISO objective (Joint) are similar in terms of definition. The difference between the two is that Joint doctrine derives the term MISO objective from a single function. For Army PSYOP forces, the use of psychological objective also applies to deception and other influence operations and activities the branch executes that are separate and distinct from MISO.

<sup>3</sup> (Army) A PO is “a short statement of measurable response that clearly reflects the specific desired attitude or behavior change of a selected foreign relevant actor or group.” (Draft FM 3-53, (U) Psychological Operations Forces (CUI). 2022) Note: definitions are not CUI.

<sup>4</sup> (Army) A SPO is “a specific behavioral response purposely triggered in a selected individual or group to achieve an associated psychological objective.” (Draft FM 3-53, 2022)

<sup>5</sup> For more information on lines of operation, refer to ADP 3-0, Opera-

---

# THE INTELLIGENCE, SURVEILLANCE, RECONNAISSANCE LIAISON OFFICER: A CRITICAL INTELLIGENCE NODE IN AGILE COMBAT OPERATIONS

---

By Maj Melissa Sidwell-Bowron (USAF) and  
Capt Matthew Winot (USAF)

## 1. PURPOSE

General George Kenney, Commander of Allied Air Forces in the Southwest Pacific, 1942-45 famously said “Air power is like poker. A second-best hand is like none at all — it will cost you dough and win you nothing.” When the stakes are at their greatest, in the midst of major combat operations (MCO), the joint force must employ each asset prudently and judiciously to ensure maximized lethal combat application.<sup>1</sup> The United States Air Force (USAF) coined the framework, agile combat employment (ACE), in order to obtain the winning hand in a complex and potentially dangerous poker match. Furthermore, within ACE, expeditionary intelligence Airmen will form the contingency intelligence network (CIN), creating an interconnected web, serving not only to inform aircrew survivability, but maximizing the successful application and dominance of air power across all domains.

A critical node of this network, rapidly deployed in support of the 2022 Ukraine Crisis with Task Force (TF) Dragon, is the USAF Intelligence, Surveillance, Reconnaissance Liaison officer (ISRLO), interwoven into the fabric of the joint force through association with the US Army (USA) and tactical air control party (TACP). Various economists and academics propose that data is “the oil of the 21st century,” while a key USA Colonel (O-6) deployed with the same task force confirms “the key to the success for the US forces in the future is going to be data-centric warfare.”<sup>2</sup> Arguably, ISRLO placement and access demonstrated the ability to quickly parse and disseminate pertinent information and connections critical to air and joint force successes. TF Dragon ISRLOs successfully demonstrated the global reach of the CIN in MCO through serving a ground to air and air to ground intelligence interlocutors between the air component A2 staff and operational ISR units and the land component G2, Corps and Division commanders and staff.

This article offers observations in conceptual and practical employment of ISRLOs in an expeditionary capacity whether in support of the USAF or its sister components. It can be leveraged by MAJCOM and COCOM operations and intelligence staffs to identify appropriate emplacement and requests for forces, as well as apprise sister services of ISRLO capabilities, placement, and access. First, we propose a perspective of how to best employ ISRLOs embedded in support of multiple domains through liaising with ground and maritime partners in MCO, optimizing joint force air component commander (JFACC) capabilities to include surveillance, collection and processing assets and finished intelligence products in an austere, distributed/degraded environment in support of the combatant commander. Second, the success of interconnectedness and true distributed reach demonstrated in support of EUCOM’s Operation New Normal (ON2) offers a blueprint for the codification of CIN best practices employable in a future conflict as a plug and play mechanism, especially amongst changing TACP and fires tactics, techniques, and procedures (TTP). Finally, this article highlights strengths demonstrated by the ISRLO specialty, while noting potential weaknesses to mitigate rather than succumbing to an achilles heel in the network. Ultimately, this article serves to advertise the role of the ISRLO in future all domain ACE operations, offer a CIN illustration in various phases of MCO, and to strengthen the greater combat air force (CAF) by increasing interaction between key operational warfighting echelons and air and joint force decision makers.

## 2. MULTI-DOMAIN CONTINGENCY INTELLIGENCE NETWORK IN THEATER AIR CONTROL SYSTEM/ARMY AIR GROUND SYSTEM (TACS AAGS)

### A Novel proposal to employ expeditionary TACP Intelligence Airmen (ISRLOs) in MCO

Traditional ISRLO duties focus on the triad of “advise, assist, and educate.” Historically, they embed with USA corps, division, and subordinate echelons to leverage airborne and national ISR assets to satisfy com-



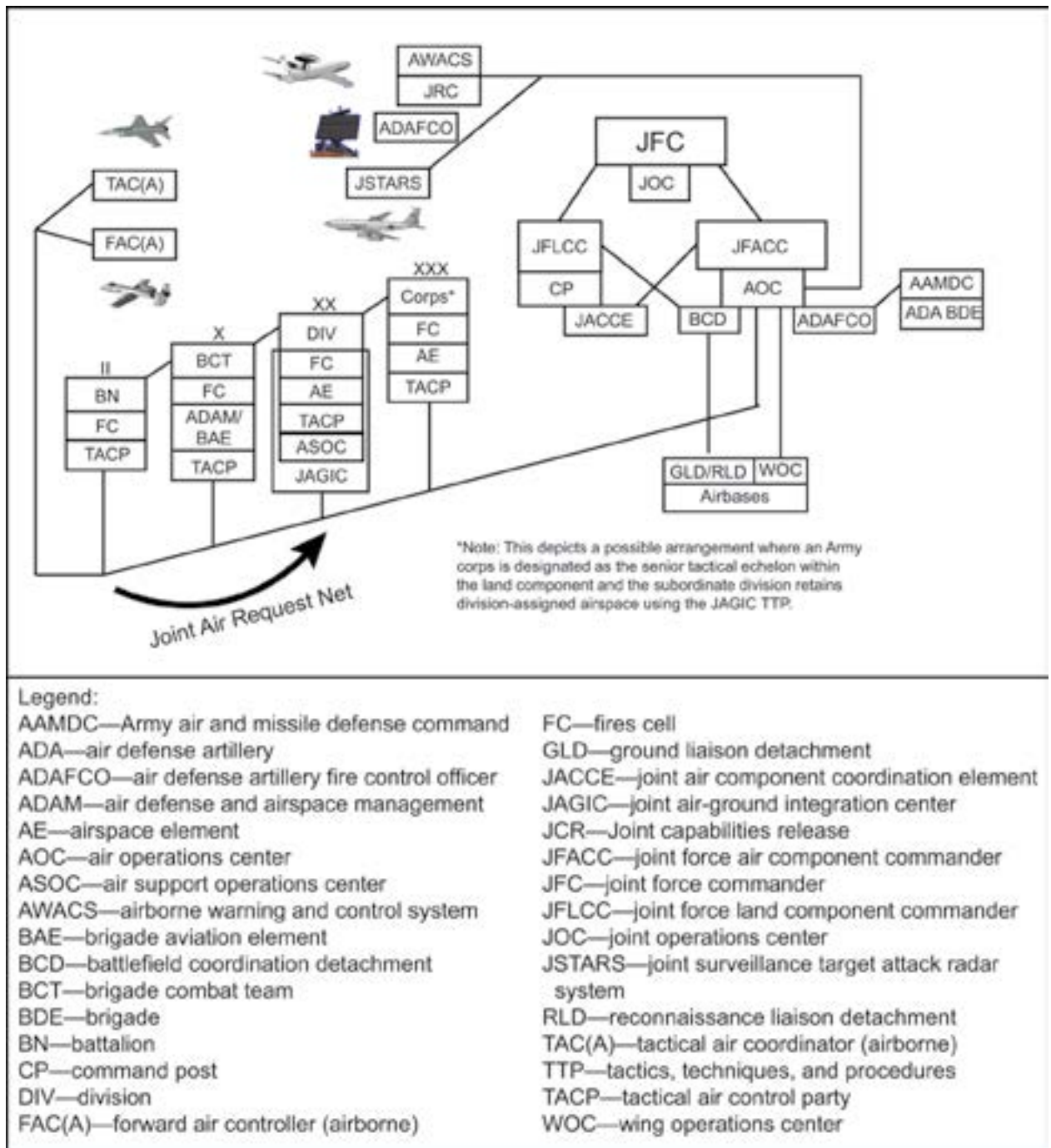


Figure 1. TACS/AAGS–Joint Air-Ground Integration Center (2019).

mander’s information requirements and targeting objectives.<sup>3</sup> ISRLOs are often the sole USAF intelligence officer at echelon within the ground or special operations component. Their placement and access allow them to apprise the aligned unit commander on joint force collection operations, airborne ISR assets, and current/future employment. (See TACS/AAGS in Figure 1)

ISRLOs often use their flexibility of being “aligned, not assigned” to conduct *battlefield circulation* to their “downtrace units,” and to coordinate with the senior echelon of the TACS, the air operations center (AOC). Simply put, their distinct ability to travel to

different distributed sites allows them to be a force multiplier when it comes to instructing and advising their supported unit on how to best leverage airborne ISR assets, the air tasking order cycle, and processing, exploitation, and dissemination (PED). The ISRLO’s high demand, low density asset optimization skillset proved extremely critical within the Global War on Terror (GWOT), providing overwatch in low/moderate intensity conflicts where aerial assets and niche capabilities were at a premium. The input from intelligence airmen with TACP experience on component staff often made the difference between success and

failure of several ground operations that depended on mission critical information only obtained via airborne ISR and associated PED.

*Early 2020: Intelligence Airmen assigned to CJTF-OIR and the Military Advisory Group-Iraq (MAG-I) worked with Iraqi Security Forces (ISF) to leverage ISR for Destroy-Daesh (ISIS) operations. CJTF Airmen leveraged joint ISR assets and PED to find, fix, and track Daesh positions. Airmen advocated for and procured ISR and PED to support the ISF, despite higher priorities simultaneously coupled with a reduction of forces in theater. Air advisors (in conjunction with CJTF ISR assets) trained the ISF on basic ISR operational employment, fusion, and analysis principles. Both lines of effort by expeditionary intelligence Airmen allowed some of the first successful ISF-led D-Daesh ground operations supported primarily with Iraqi offensive air power and organic ISR not enabled by special operations forces or unconventional means. Iraqi Security Forces might not have otherwise been as successful without input and assistance from the unique placement of intelligence Airmen.<sup>4</sup>*

ISRLOs typically embed operationally with the Army via the TACP, primarily via the joint air-ground integration center (JAGIC), air support operations center (ASOC), or the joint air component coordination element (JACCE) at various echelons of the TACS-AAGS.<sup>5</sup> ISRLOs maintain situational awareness of and optimize theater and organic ISR assets to support ground operations. This enables critical support otherwise unavailable to conventional forces to assist with targeting and battle damage assessment collection. Within the USAF's new ACE framework, forward ISRLOs may assume an even more mission critical role of advising and assisting spokes in the field, far away from the hub. In ACE, multi-capable Airmen (MCA) are responsible for various facets of mission support. This includes communications, gathering, fusing, and disseminating information to their supported units, normally a broad variety of aircrew. This is tentatively known within Air Combat Command (ACC) as the CIN. The intent of the CIN is to maximize airpower success and aircrew survivability. Intelligence Airmen may be located at primary operating locations (OLs), wing operations centers (WOCs), contingency OLs, or even with aircrew in certain cases. They may embed with the TACP and CRC in future concepts such as the tactical operations center-light (TOC-L) and Air Control Integration Team (ACIT). Collection operations are necessary as well as the need to leverage the federated ISR enterprise for aircrew situational awareness

and targeting. MCO will face a resource constrained environment paired with a densely populated enemy threat picture of integrated air defense system, air, space, maritime, ground and electromagnetic warfare.

The inherent *flexibility* of ISRLOs allows them to *circulate* to the WOCs, squadrons, and other OLs. In an updated CIN construct, ISRLOs should exercise their core competencies to advise, assist, and educate intelligence Airmen on ground operations and the totality of ISR collection operations to include sensors (and associated PED) in support of the respective theater. Innate knowledge of and direct liaison authority (DIRLAUTH) to the AOC and ISR units facilitates targeting and mission planning for tactical USAF units. The ISRLO can link Airmen in the combat intelligence cell (CIC) and mission planning cells (MPC) into the TACP (ASOCs and JAGICs) and flying squadrons. This linkage offers enhanced targeting and threat reporting accuracy. (See Figure 2)

---

**The ISRLO can link Airmen in the combat intelligence cell (CIC) and mission planning cells (MPC) into the TACP (ASOCs and JAGICs) and flying squadrons.**

---

Critical to achieving various component objectives is the ISRLO's ability to function as a forward extension of the CIN in PHASE (PH) I and II of a MCO. Through placement, access, and relationships, ISRLOs facilitate not only air component ISR in support of the ground force, but may leverage US Navy (USN), SOF, and USA ISR and establish contracts with applicable support agencies (collections, targeting, and PED) to support the JFACC or joint forces maritime component commander (JFMCC). The ISRLO will be in a unique position to liaise with Lead Wing and ACE elements to bring joint ISR, planning, and PED capabilities to bear. Further, ISRLOs may be in the position to leverage joint support organizations, like combat support agencies (CSAs), US Marine Corps (USMC) air-ground task force (MAGTF) elements, and USA Military Intelligence Battalions (MIBs) or multi-domain task forces (MDTFs) to support joint efforts in PHI/II. To do this, the intelligence Airman should be stationed in/deployed to appropriate locations to leverage their flexibility.

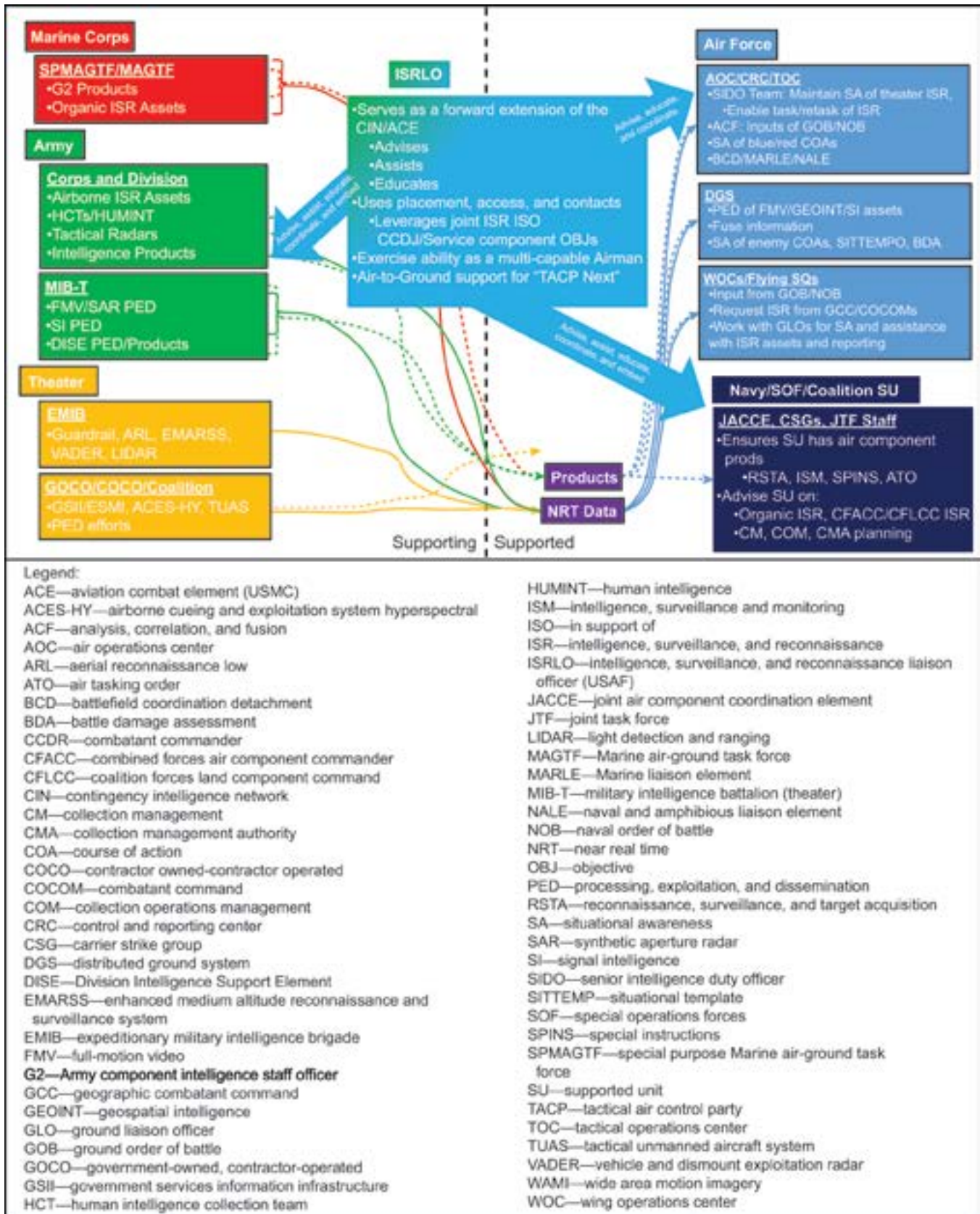


Figure 2. Conceptual ISRLO Employment in PHI/PHII.

*2020-2021: Intelligence Airmen (to include an ISRLO) exclusively positioned to work with CJTF-OIR, SOJTF-OIR, and sister task forces synchronized disparate organizations and assets to support malign actor targeting efforts within the Combined Joint Operations Area. Planners scheduled and established contracts with USAF, SOF, and coalition ISR assets to enable collections on theater priorities. Intelligence airmen regularly coordinated with the 609 AOC/ISRD to develop unique layered ISR operations with theater ISR. NTISR and PED expertise from the SPMAGTF was further leveraged to enhance lethal and nonlethal targeting efforts within the OIR CJOA. Planning and targeting support continue to this day in the form of the CJTF Multidomain Effects Division (MDED), a combination of lethal and nonlethal fires fed in part by a system established and facilitated by intelligence Airmen.<sup>6</sup>*

### **BLUEPRINT TO CODIFY CIN BEST PRACTICES (AS EMPLOYED BY TF DRAGON IN EUCOM)**

The success of interconnectedness and the true distributed reach of the USAF intelligence network demonstrated in support of EUCOM's ON2, offers a blueprint for the codification of CIN best practices employable in a future conflict as a plug and play mechanism. Two USAF ISRLOs forward deployed with TF Dragon in their mission to assure North Atlantic Treaty Organization (NATO) partners and deter Russian aggression in early 2022. Their function, as JFACC ISRLOs, was to optimize collection capabilities and air threat intelligence awareness in support of the ground force through advising, assisting, and educating USA counterparts. These individuals concurrently provided additional insight into the ground force collection concept, border crossing points, routes of interests and non-combatant evacuation safe havens to the air component, streamlining overwatch and communication. Ultimately, commanders and directors from both services relayed the resounding success of the intelligence network provided by a few key individuals embedded throughout the TACS-AAGS.

*February - July 2022: The TF Dragon ISRLOs showcased the ability to act as a CIN multiplier and extension in ACE. They served as the forwardmost Air Force Intelligence Liaison to the AOC/ISRD with access, placement, and the right-fit personality.*

*They are required to embody a well-rounded knowledge of joint, coalition, and SOF ISR operations to include key collections management principles of Collection Operations Management (COM), Collection Requirements Management (CRM) and Collection Management Authority (CMA), employment, layering, PED, tasking and further fusion of collected data.*

---

**...as a liaison, understanding the geography and environment in which you operate is critical, to include the layout of local and combatant command relationships.**

---

There are five key lessons learned for the ISRLO from deployment to the European theater in 2022. Most importantly, as a liaison, understanding the geography and environment in which you operate is critical, to include the layout of local and combatant command relationships. Secondly, in high operating tempo and times of uncertainty, interconnectedness through virtual syncs, be they daily, hosted by the intelligence directorate of the air component, or weekly amongst the air centered ISRLO network, allowed for the extended CIN enterprise to clarify operational priorities and practical applications. In these meetings, elements throughout the TACS/AAGS recalibrated focus in order to become more effective advisors and identify and act upon operational shortfalls. Air component-centered syncs also ensure USAF members embedded throughout the joint force avoid falling into a sort of Stockholm syndrome, constantly connected to, and advocating for the JFACC CIN while articulating embedded unit ground-truth realities, priorities and discoveries. Thirdly and tangentially, ISRLOs relayed their embedded unit's ground scheme of maneuver (GSOM), concept of collect and named areas of interest to the federated air and PED support enterprise, particularly those in a reach back support capacity. Fourth, in an advisory function, USAF ISRLOs assisted in bespoke collection and overwatch TTPs tailored to supported niche unit priority areas like enemy unmanned aerial system detection and reporting. Lastly, uniquely, but importantly, air intelligence liaisons plucked aligned-unit applicable threat data and collection capabilities based on broader IC and CIN fusion capacity, maximizing joint force operational understanding and enhanced battlefield awareness.

Finally, the most recent employment of ISRLOs in PHI/II of large scale combat operations demonstrated, despite a consistent quest for full automation in joint all-domain operations and C2, operational integration remains a people business. LNOs embedded with TF Dragon, reaffirmed a fundamental truth, that data and net-centric warfare requires human based relationships. In spite of a myriad of service endorsed multi-domain operations projects to include Advanced Battle Management System, RIDGEWAY and CONVERGENCE, technology ranging from hardware like graphic user interfaces to the software of common operating pictures, cloud networking, storage and connectivity is secondary and only work with the first point of human relationships in place. That said, the XVIII ABN Corps innovation projects continue to rightfully focus on “insight-based warfare” with collaboration between government, industry and the intelligence community (IC). Ultimately, we continue to move forward on “[bringing together] as much data as we can, and then rapidly make sense of that via insight,” as referenced by a key USA leader with whom the ISRLOs often coordinated to optimize USAF intelligence in joint force operations.

### **CHANGING TTPS, DOCTRINE, AND INFORMATION GAPS**

In the ever-developing world of tactics, ISRLOs and TACP support within the CIN/ACE construct are beholden to such beliefs. This rings true amongst current CAF lines of effort focused on changes in the air-ground enterprise. Efforts such as “TACP Next,” the TACP unit type code redesign, and operational test and evaluation of the TOC-L/ACIT concepts force the reexamination of the traditional roles of the ISRLO. ISRLO support to the ground component has been reaffirmed and codified in the new 2021 Army Air Force MOA (AAFMOA) for Liaison Support. That support, however, is specifically focused on (PH III operations to include MCO. While the TACP IC has insights into sustained combat operations related to PHIII and PHIV, we must pay credence to possible information gaps to the ISRLO in MCO. We must also ensure to be on the forward edge of TTP development to meet the changing needs of the TACP, USAF, and other joint supported units.

Various ambiguities exist, such as what specifically PHI and PHII operations will look like. The duties, roles, and responsibilities of the ISRLO will vary based on COCOM and unit. ISRLOs in EUCOM

have rapidly built connections and contracts with the beginning of the war in Ukraine. Existing NATO intelligence partnership checks have been cashed, both to facilitate information sharing and to allow easier TACP integration into host-nation bases and infrastructure. TTPs in the INDOPACOM AOR are under development by both CONUS and OCONUS units. ISRLOs have integrated with the USN in exercises such as RIMPAC and WARFIGHTER Exercises. Further testing is being conducted on the “TACP Afloat” concept, where ISRLOs and TACP embed on carriers and USN ships. The purpose is to strengthen joint partnerships, to test redundancy and flexibility in island and ocean warfare, and to practice fighting in a degraded environment. Compare both COCOMs to formalized support in the CENTCOM AOR, where ISRLOs have had ten years to develop TTPs, build relationships, and write numerous AARs on the subject.

---

**The importance of *where* and *whom* the ISRLO supports cannot be understated.**

---

Further examination is required to determine the deployability and interoperability of ISRLOs within the CIN construct. The importance of *where* and *whom* the ISRLO supports cannot be understated. This will determine the extent of manning and systems requirements an individual or team may deploy with. Finally, interoperability and communication with external agencies must be mentioned. ISRLOs will not only have to rely on air component ISR assets, but those from sister services. The ability to leverage USA (E-MIB, corps and division G-2s), USMC, and USN (carrier-based ISR) assets will make or break support of CFACC or CFMCC weights of effort. Conceptually, there may be an eventual scenario where the ISRLO must rely on NATO coalition ISR assets to support US Forces on the ground in a European country, or even work with the USN and USMC to help establish a mesh network to bridge PED and communications capabilities with USAF ISR supporting multiple ground units in the First and Second Island Chains. In contested and denied environments, ISRLOs may require increased understanding and proficiency of leveraging space-based assets, working together with the US Space Force and national organizations. Established contracts should be employed to capitalize on the flexibility, knowl-

edge, and personality of the ISRLO and maximize placement and access.

### 3. CAPITALIZING ON STRENGTHS AND AVOIDING WEAKNESSES

Finally, this article highlights strengths demonstrated by the ISRLO career field, while noting potential weaknesses to mitigate rather than succumbing to an achilles heel in the network. Ultimately, each initiative has an achilles heel, be it a screw, a router, the target acquisition radar or an individual.

---

**The strongest attributes of the ISRLO are oftentimes their personality, placement, and access.**

---

The ISRLO has several strengths that enable successful execution as the most-forward USAF intelligence entity, especially in an MCO. The strongest attributes of the ISRLO are oftentimes their personality, placement, and access. ACC and the TACP community emphasize self-sufficiency and outgoing personalities in the officers they furnish for the role of ISRLO.<sup>7</sup> Additionally, ISRLOs often come from diverse ISR operations backgrounds with years of experience in their respective fields before moving to the TACP. A fundamental truth instructed to the new liaisons is that credibility leads to freedom of action. This also allows the ISRLO to have unique accesses, whether out in the field through the GFC, JFMCC, or with regards to certain caveats and special accesses that wouldn't normally be afforded to standard USAF line officers or intelligence personalities in other branches.

ISRLOs can further use their experience as a high demand, low density (HDLD) human asset. Their inherent knowledge of ISR assets coupled with their breadth of various processes, capabilities, and ability to reach back to the greater IC make them a niche capability.<sup>8</sup> They're taught to leverage prior contacts through past battlefield circulations, assignments, and deployments. Their innate knowledge of IC processes and organizations, contacts, and codified DIRLAUTH in EUCOM, INDOPACOM, and CENTCOM to different air component squadrons and groups maximizes their flexibility on the forward edge of the battlefield.

ISRLOs are inherently trained as MCA due to proximity to the TACP. They're able to use their re-

siliency and flexibility to further mission accomplishment because of proficiency in fitness, frequencies (communications), firearms, field skills like first aid and land navigation and fortitude to overcome obstacles. This solidifies their unique ways of thinking, finding solutions, and approaching modern battlefield problems. They embrace Senior Enlisted Advisor to the Chairman Colon Lopez's words, are we the 'ready warriors' the Air Force expects us to be? Are we the capable force according to Air Force standards, and not to our personal arbitrary rules?

Conversely, ISRLOs have their weaknesses. Primarily, their flexibility and exclusivity oftentimes as the only USAF intelligence officer on a ground staff can result in command relationship problems. ISRLOs are often subject to misuse and micromanagement. This is exhibited both by aligned ground staff (long-term collection manager, EEI writing, staff briefer) and assigned air staff (USM, solely ULI support, restricting battlefield circulation). Furthermore, in reference to the USAF feeding and caring aspect, recent deployment experience to the European theater demonstrated that because intelligence personnel are not inherently tied into the TACP equipping system, many were unprepared for inclement weather.

Personalities come into play; the TACP community seeks those with balanced attributes. In some cases, ISRLOs can either be too aggressive or too timid. Bridges can be burned because of assertion, or ISRLOs can overextend themselves in their roles and responsibilities. Additionally, timid officers might not be outgoing enough to make the right personal connections or attend the right meetings to ensure their supported units know how to properly leverage ISR. This also extends into greater ACC and TACP intelligence leadership not being consulted on ISRLO employment/manning decisions. TACP senior intelligence officers have former ISRLO experience that can inform commanders on how and who to optimally employ the niche intelligence capabilities of the attached 14Ns and 1N0s.

Finally, ISRLOs are currently limited by experience and employment in permissive environments. The next fight will initially occur in a non-permissive domain, where communications and security will consistently change.<sup>9</sup> The presence of an air defense bubble with SAMs and IADS also presents a unique problem set. A degraded/denied environment may prevent effective execution of collection operations manage-

ment (COM) over ISR assets (from SIPR and JWICS-based clients like mIRC, IDEX, BODHI, PRISM, and MIST). Air defense zones will also prevent effective collection via airborne ISR, one of the primary subject matter areas ISRLOs are trained and practiced on.

#### 4. CONCLUSION

ISRLOs are the USAF's offer to the joint community to answer the call for an embedded expeditionary contingency intelligence node, with the distinct ability to convey joint needs to the USAF, and vice versa. They are the forwardmost USAF intelligence liaison to the AOC/ISRD with access, placement, optimal personality, and a well-rounded knowledge of joint/coalition/SOF ISR operations to include COM/CRM/CMA, employment, layering, PED, tasking and further integration. The ISRLO program has been so successful that the USA has jumped on the niche bandwagon with their own version. The reconnaissance liaison officer (RLO) can integrate the DGS and CIN into USA intelligence efforts, especially where equities cannot be represented by the traditional BCD or ground liaison officer (GLO) construct.

---

Now is the optimal time to increase ISRLO integration outside traditional USA channels, to advertise and integrate our unique capabilities to our sister services like the USMC and USN.

---

As a military and a service, we find ourselves again in a great power competition as our adversaries quickly narrow the capability gap. Just as the USAF intelligence community and CIN must evolve to meet the needs of ACE, so must the ISRLO community. Now is the optimal time to increase ISRLO integration outside traditional USA channels, to advertise and integrate our unique capabilities to our sister services like the USMC and USN. AF decisionmakers should encourage ISRLO flexibility and maximize employment opportunities outside of normal unit-level intelligence and TACP functions. These opportunities include the following:

- Capitalize on TDYs or extended trips with MAGTFs or to carrier strike groups.
- Integrate early and often with joint coalition forces during exercises and training rotations (UL-

CHI FREEDOM series, RIMPAC, AGILE SERPENT, USMC Weapons and Tactics Integration).

- Foster unique ways of thinking by sourcing ISRLOs and allowing them to participate in TTP development and refinement internally and external to the TACP enterprise.

These ideas coupled with increasing integration and feedback of ISRLO support to customers means more feedback and data for our USAF decisionmakers. The ISRLO is the perfect lynchpin to help break the service-centric mentality and ego inherent within certain USAF institutions. The words of USA Future's Command's PROJECT CONVERGENCE bears scrutiny to our case, "We must maintain overmatch at all costs." The ISRLO is the USAF intelligence liaison who ensures the USAF's contribution to overmatch within current and future conflicts.

**Major Melissa Sidwell-Bowron (USAF) is the Senior Intelligence Officer for the 8th Airborne Corps, Pope Army Airfield, NC.**

**Captain Matthew Winot is the Assistant Director of Operations of the 505th Command and Control Wing Detachment 1, Fort Leavenworth, KS.**

---

#### END NOTES.

---

<sup>1</sup> Mark Welsh. "Global Vigilance, Global Reach, Global Power for America." U.S. Air Force. (2014). [https://www.af.mil/Portals/1/images/airpower/GV\\_GR\\_GP\\_300DPI.pdf](https://www.af.mil/Portals/1/images/airpower/GV_GR_GP_300DPI.pdf).

<sup>2</sup> Summer Myatt. "Maj Gen Aaron Prupas, Joseph Rouge, Col Joseph O'Callaghan Talk Commercial GEOINT & Data-Centric Warfare in ExecutiveBiz Events Panel Discussion." (2022). <https://blog.executivebiz.com/2022/02/aaron-prupas-joseph-rouge-joe-ocallaghan-talk-commercial-geoint-in-ebiz-panel/>.

<sup>3</sup> John Long. Intelligence at the Edge: Dual Qualify Intelligence, Surveillance, and Reconnaissance Officers as Special Warfare's Tactical Air Control Party Officers. Air University (AU). (2022). Wild Blue Yonder

<sup>4</sup> "THE JOINT AIR GROUND INTEGRATION CENTER". ALSA MTTPs. (April 2019).

<sup>5</sup> Ibid.

<sup>6</sup> Benjamin Murphy & Damon Wells. "Applying Multi-Domain Effects to Operation Inherent Resolve, Infantry," (Fall 2021). [https://www.benning.army.mil/infantry/magazine/issues/2021/Fall/pdf/6\\_wells.pdf](https://www.benning.army.mil/infantry/magazine/issues/2021/Fall/pdf/6_wells.pdf).

<sup>7</sup> John Long. Intelligence at the Edge: Dual Qualify Intelligence, Surveillance, and Reconnaissance Officers as Special Warfare's Tactical Air Control Party Officers. Air University (AU). Wild Blue Yonder.

<sup>8</sup> Ibid.

<sup>9</sup> Miranda Priebe et al., "Multiple Dilemmas: Challenges and Options for All-Domain Command and control." RAND Corporation (2020). [https://www.rand.org/content/dam/rand/pubs/research\\_reports/RR300/RR381-1/RAND\\_RRA381-1.pdf](https://www.rand.org/content/dam/rand/pubs/research_reports/RR300/RR381-1/RAND_RRA381-1.pdf).

# 5G AND EDGE COMPUTING: THE FUTURE OF THE DOD AND JADC2

By Capt Michael G. Molinari, USAF

## INTRODUCTION

In December 2020, the Secretary of Defense published the “Department of Defense 5G Strategy Implementation Plan.” Within it, the Department of Defense (DoD) describes the importance of integrating 5G and edge computing into military operations, primarily for its higher performance, data-driven applications, and machine-to-machine communication. The strategy provides a baseline roadmap for development, experimentation, and prototyping 5G capabilities while ensuring the DoD will facilitate the advancement and adoption of 5G technology.<sup>1</sup> This plan stresses the importance and emerging capabilities of the technology as well as on-going efforts with endless possibilities for implementation. However, 5G and edge computing can achieve much more. It is key to the military’s concept of Joint All-Domain Command and Control (JADC2) by greatly improving areas of command and control (C2), logistics, future weapon capabilities, and implementation into large scale combat operations.

As the National Defense Strategy guides the joint force towards an environment of great power competition and defending the nation against near-peer adversaries, the concept of JADC2 has become the cornerstone to unifying networks, sensors, and weapon systems to distribute information across services, commands, decision makers and warfighters.<sup>2</sup> JADC2 facilitates the unification of efforts across all domains to exploit the advantages of joint and partner nation capabilities, providing mission commanders an ability to rapidly develop, execute, or transition between kill chains to overwhelm adversary defenses and present the enemy with multiple dilemmas.<sup>3</sup> Figure 1 shows the JADC2 Placemat and how all domains must mesh into a ‘Warfighting Network’ that fuels the decision cycle.

Additionally, the Air Force has undertaken the concept of agile combat employment (ACE) to counter threats and mitigate challenges in the Pacific theater. Our nation has moved into the far realm of great power competition and commanders need the capability to make near instantaneous decisions based

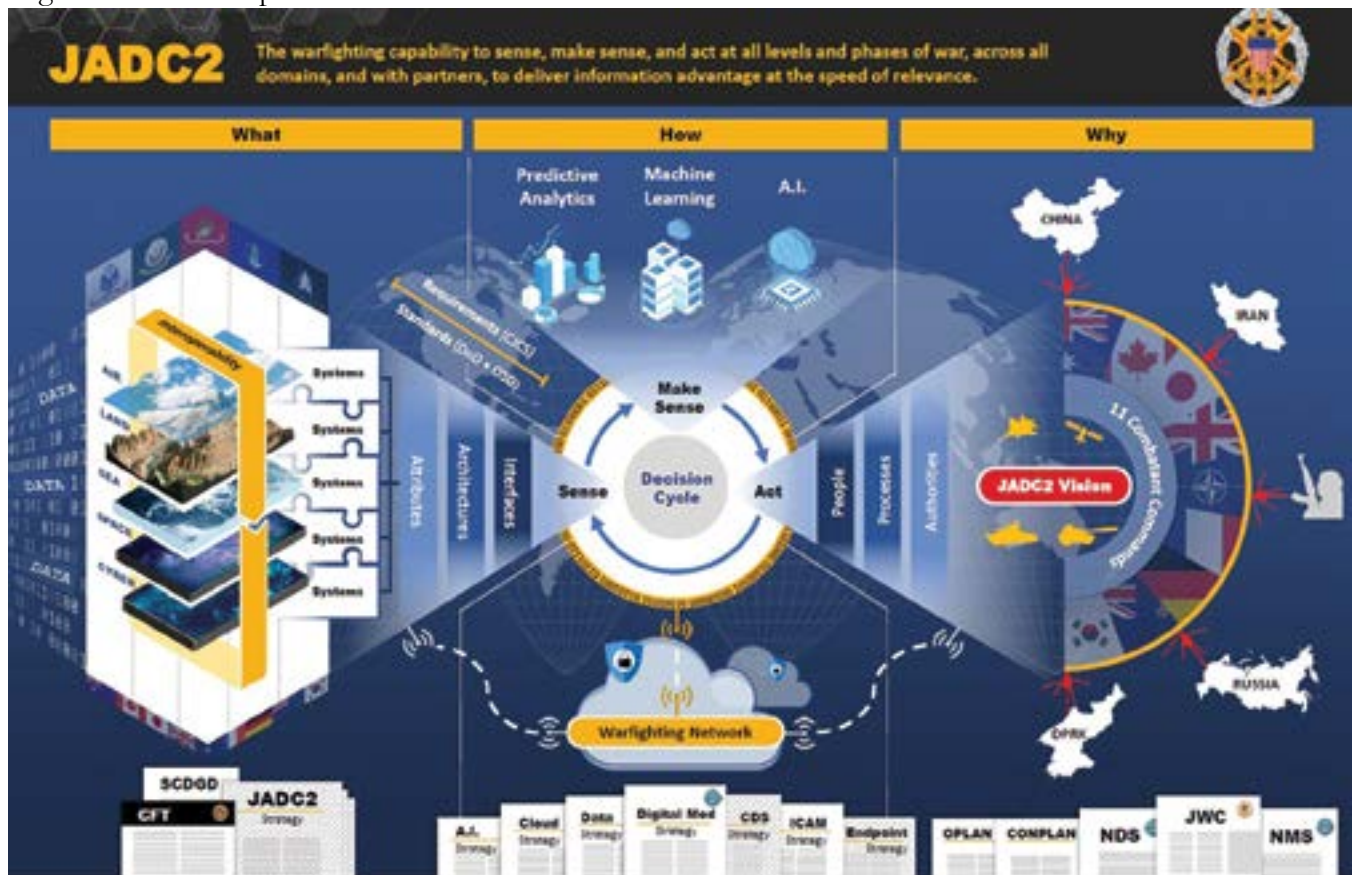


Figure 1: JADC2 Placemat.<sup>4</sup>



---

**More importantly, warfighting information and targeting data must be seamlessly shared between disparate individual platforms as well as entire units.**

---

on empirical data in real time. More importantly, warfighting information and targeting data must be seamlessly shared between disparate individual platforms as well as entire units. We have begun to develop the solutions needed to achieve interoperability across disparate systems and waveforms through the development by warfighters at the tactical edge of the fight; indeed, where this innovation is most in need.<sup>5</sup>

Systems such as the Automated Tactical Targeting and Counter-Fire Kill-Chain System has the capability to link disparate sensors and shooters and autonomously provide near-instantaneous targetable data. What these developing systems lack, however, is a scalable integrated 5G network that is coupled with edge computing at the forefront of the battlefield. Not only will this network allow for the immediate sharing of information of all units on the network, but it will also allow for immediate data processing between frontline fighters without requiring the data to be relocated back to an operations center for decision makers to republish it. With authority delegated down the chain of command, decentralized execution will become seamless.

## **5G AND EDGE COMPUTING**

Currently, the military relies heavily on disparate C2 systems such as Link-16, Blue Force Tracker, Riverjack Tracker, and Situational Awareness Data Link. Additionally, we have begun developing capabilities to bridge these systems using software like Sierra Nevada's Tactical Radio Application Extension (TraX), which bridges information across domains and waveforms through its ability to understand and communicate across multiple military standard communications protocols.<sup>6</sup> While TraX helps systems "talk," it requires the software to be linked into each network to create a common operating picture and share data from assets on disparate networks. What is then required is a forward capability of putting everyone on the same network. TraX is just the beginning of what this technology is capable of.

5G is the next generation of cellular networks with speeds 100 times faster than 4G networks. It is a network capable of creating an Internet of Things (IoT) as it provides 99.999% reliability, end-to-end latency of 5ms, peak data rate of 10 Gb/s, mobility of 500km, energy efficient and can sustain a mobile data volume of 10 Tb/s/km<sup>2</sup>.<sup>7</sup> An IoT itself is a collective network of connected devices or systems and the technology that facilitates communication between them and the cloud as well as between the devices themselves. With a 5G network, the DoD will be capable of managing and operating a massive IoT network providing unit autonomy, end user computing, autonomous systems, and faster latency speeds.

Through a 5G network, access to data from video, voice, sensors, targeting, reconnaissance, and even the sights on infantry weapons will be easy, and instantaneous for anyone who needs it.<sup>8</sup> A soldier at the front lines could be multi-broadcasting what their sight picture sees ahead of them to forces behind them, autonomously, and in real-time. To get to this capability, the DoD must find new ways to bring about data streaming edge computing solutions or build a network that provides more geographically distributed access. The goal is to allow the military to use edge computing without needing to reimagine their existing infrastructure. 5G with an edge computing system will bring the network connectivity up to speed with 5G and delivers near-instant communication.<sup>9</sup> Therefore, it is important that the DoD incorporates a 5G network that is supported by edge computing technology to create a new network capable of being scalable into its massive infrastructure.

---

**...it is important that the DoD incorporates a 5G network that is supported by edge computing technology to create a new network capable of being scalable into its massive infrastructure.**

---

This incredible network capability coupled with multi-access edge computing (MEC) provides endless technological possibilities to connect forces and instantaneously share time-sensitive data and information. MEC enables cloud servers to run closer to endpoints, reducing latency and speeding local processing (Figure 2 shows the difference between a traditional cloud structure and a MEC network).<sup>10</sup>

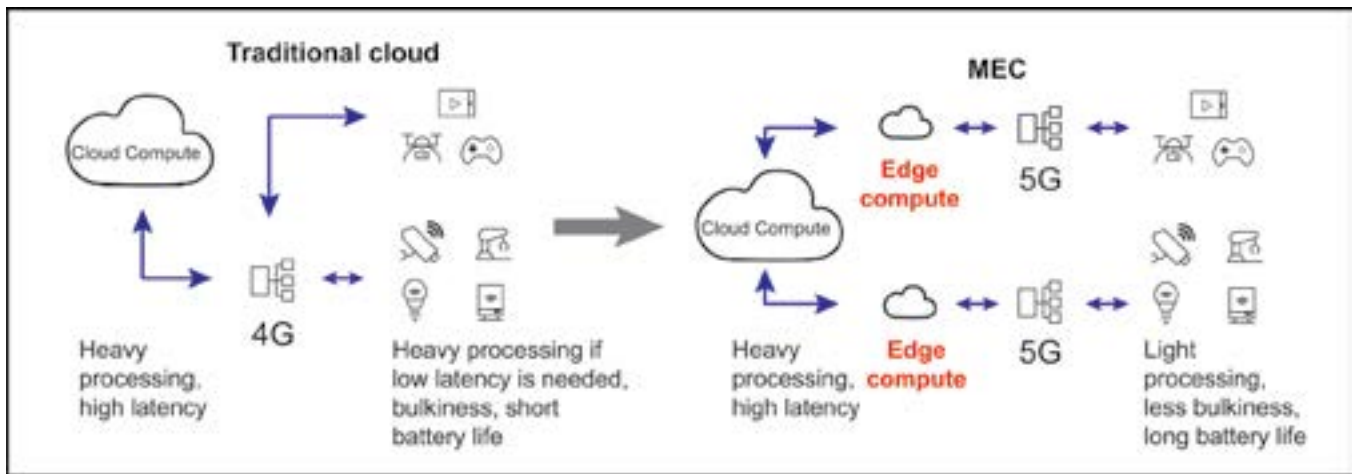


Figure 2: Traditional cloud network vs multi-access edge computing (MEC).

This provides the ability to support many more time sensitive applications and process data immediately with the end users at the forefront of the battlefield. The decentralized architecture of edge computing brings technological resources closer to where data is generated, reducing response time lags. Edge computing, when combined with 5G's large bandwidth, super-fast speeds, and significantly lower latency, is expected to enable the military to realize the full potential of innovations like artificial intelligence (AI), IoT, Massive Machine Type Communications (mMTC), Ultra-Reliable and Low Latency Communications (URLLC), immersive reality, and automation.<sup>11</sup>

## JOINT ALL-DOMAIN COMMAND AND CONTROL

Solving the conceptual problem of JADC2 has been on the forefront of military innovation. Nearly anything tied to developing or supporting the concept can get approved for funding and research. Everyone is looking at how individual pieces of technology can come together to support JADC2. While this is a large portion of developing the concept that is the future of military C2, we need to expand our innovation from just individual “stove piped” capabilities to rebuilding the network. The true significance of 5G can be seen in its effect on the future war network. A greater number of less costly, more connected, and more robust systems capable of operating in a rapidly changing combat scenario would support this network. Furthermore, 5G would combine fragmented networks into a single network, allowing soldiers to be more aware of their position and make better decisions. Positive effects will also be felt at the logistics and maintenance levels.<sup>12</sup> Once the network is developed, our individual technology and software can be reprogrammed to integrate within it.

To achieve this will be a massive step that will require the military to create a new network infrastructure. Partnerships with private networks such as Verizon and T-Mobile, could provide a foundation for a 5G network, while developing innovative systems that have the capability of pushing this network anywhere in the world. Mobile 5G towers can be established at forward bases while airborne C2 platforms such as the E-3 AWACS, P-3 Orion, RC-135 Rivet Joint, or new platforms, could provide airborne network extension or relay, similar to the already established Battlefield Airborne Communications Node (BACN). The extension capabilities are like that of Link-16 where users that are beyond line of sight with each other can still communicate through relays in between them.

Once a network is established, all forward sensors can be meshed and communicate with one another. The network will create an IoT through all connected users and advanced AI will prioritize and list massive incoming data from the front lines to decision makers in the rear. The process would be seamless and near simultaneous. Once connected, rear operation centers will have access to immense battlefield situational awareness, from the locations of full units to the video feed of a front line unmanned aerial vehicle (UAV), or even the sight picture of an M1 Abrams tank. Counterfire radar will automatically send targeting data to aircraft, and aircraft can publish targets they see that populate in ground units closest to them. Forward observers can mark targets while immediately pushing data to loitering munitions that are flying autonomously within their own airspace. Aircraft will be able to easily self-deconflict through proximity sensors to other aircraft. Sensors installed into artillery surface fires can create no fly areas with-

in airspace as pilots will be able to see individual munitions flying through the air. 5G and edge computing can create a network of mMTC and URLLC.

No matter the branch, unit, or system, 5G will enable everything to “talk” to each other. Systems such as TraX will only be needed with incompatible 5G systems. TraX could then convert incoming radio frequencies from different platforms and translate them into a 5G capable message, just as it can take a Blue Force Tracker location and publish it on Link-16. This capability to link sensors seamlessly and autonomously to shooters will drastically reduce both the military targeting and decision-making process from minutes, down to mere seconds. The joint force commander will have complete situational awareness of all their assets and units. Navy destroyers will have the capability to communicate with Army forward observers, and Air Force units will be able to communicate with Marine artillery overseen by the same joint operations center. Forward reconnaissance aircraft will have the capability to locate deep targets and pass targeting data to enroute multiple launch rocket systems (MLRS). Once the MLRS arrive at an ACE airfield, they can immediately fire at the target. This is the near future capability of JADC2 on a 5G network.

## **AGILE COMBAT EMPLOYMENT**

In support of JADC2, the Air Force is experimenting with resilient C2 based around nomadic and mobile distributed C2 vehicles interconnected by 5G networks.<sup>13</sup> This mobile C2 capability was tested and proven capable in providing commanders with a solution to the JADC2 concept. A key requirement is to receive and transmit data from any military source, regardless of platform. The multi-domain battle management team (MBMT) developed and tested by the 1st Joint Special Operations Air Component (1st JSOAC) is a proven plug-and-play mobile C2 system that can integrate disparate networks and create an IoT that allows separate platforms to “see” and communicate with each other. Additionally, it creates a common operating picture for commanders that otherwise wouldn’t include every asset and have longer latency times that can affect decision makers. By integrating this mobile C2 system into a 5G network coupled with edge computing, the DoD would have a powerful JADC2 capability that can extend their reach anywhere on the battlefield while agile enough

to execute within threat timelines and increase survivability through mobility and a small footprint.

The Air Force’s ACE strategy is the next hurdle in C2. ACE is a proactive and reactive operational scheme of maneuver executed within threat timelines to increase survivability while generating combat power.<sup>14</sup> ACE is an operational concept that supports JADC2 but will require the military to fully reexamine our enabling systems for C2, logistics, and offensive and defensive capabilities. It shifts operations from centralized physical infrastructures and bases to a network of smaller, dispersed locations. Centralized command, distributed control, and decentralized execution provide the framework for the C2 of ACE.<sup>15</sup> This C2 framework is highly achievable through an integrated 5G network that could be established at each dispersed location.

---

**Centralized command, distributed control, and decentralized execution provide the framework for the C2 of ACE.<sup>15</sup>**

---

Through a 5G network, commanders could produce tailorable force packages and maneuver or reroute them from one basing location to another while simultaneously tasking the required logistical support to the same location. For example, if a commander wants 4 bomber aircraft and 6 strike aircraft, the mission order is sent over the 5G network and is received by every unit’s system, although only visible to those tasked. Within the network, those aircraft systems have a paired logistics package that is required wherever they go. Those packages are simultaneously ordered to the same location and 5G smart warehouse technology automates the maintenance and equipment support required. Transportation aircraft tied to the 5G network would constantly broadcast their location, cargo space, routes, and transit times. Simultaneously with the previous steps, the equipment and support needed are then allocated to the best suited mode of transportation to get to the forward basing location of the force package.

## **IMPACT ON LOGISTICS**

A required capability development of ACE and potentially overlooked complex problem with

the concept is the ability to develop, support, and sustain, scalable logistics packages for rapidly deployable force packages across dispersed locations. Dwight D. Eisenhower said, “You will not find it difficult to prove that battles, campaigns, and even wars have been won or lost primarily because of logistics.” ACE will be a massive challenge and stress on the military’s current logistics systems. Transformed and automated logistics will meet the demands of the ACE concept. Aside from prepositioning packages and leveraging commercial means, the military must develop tailorable logistics packages that are assigned to their supported force package. As dispersed sites grow in number across a wider operational area, sustainment plans and systems should also be capable of scaling sustainment operations to match.<sup>16</sup> Once a 5G network is established, the logistics to support a fast-moving force package over several locations will be nearly autonomous.

The first step in achieving this goal is establishing a 5G network within the military’s sustainment warehouses. Although edge computing and 5G are not as widely used in logistics and supply chain as they could be, it will be a part of successful organization’s future infrastructure as they provide greater computing power, performance, and reliability to support areas like warehouse automation and automated material handling. This automation includes tracking and tracing of assets to avoid data blind spots in the supply chain and the elimination of system downtime to avoid losses and failures.<sup>17</sup> Private usage has already shown that 5G in manufacturing has enabled advanced remote industrial robotics, remotely controlled factory operations with less energy consumption, and real-time digital plant management to identify capacity, track production, and optimize operations.<sup>18</sup> This same manufacturing capability can be transferred into the complex world of military logistics.

The Marine Corps is already experimenting with 5G smart warehouse technologies for vehicle storage and maintenance, a capability that could be integrated into the ACE concept.<sup>19</sup> According to the DoD, the current 5G warehouse experimentation is focusing on efficiency improvements within warehouse operations, including receipt, storage, inventory control and tracking, issuance, and delivery.<sup>20</sup> Through the IoT and the capabilities of mMTC and URLLC, JADC2 could be supported through a fully autonomous logistics system. mMTC and URLLC frame the

network for autonomous vehicles, smart cities, and industrial automation, all of which can be utilized in the DoD’s logistics network.<sup>21</sup> Once commanders understand what type of force package is required to meet their objectives and where, the order is published to the network for those assets to move into position.

The movement of a specific force package would trigger a logistics and supply package in real-time through machine-to-machine communication based solely on the issued orders and planned flight path input into a lead pilot’s avionics. The package then just needs approval at the centralized command level, but the complexities are complete, and the mission order is automatically received by logistic teams and supply systems upon approval. Within the network, those assets will have data identifiers that have a shared logistics requirement list. If items on the list are not already available at the gaining location, the logistics network kicks into action. If more items are required for sustainment, 5G warehouses are automatically notified, autonomous vehicles within them begin palletizing items, and the shipment process starts. Within minutes of orders being published, the required materials to support a new force package are being processed and enroute to the new location. If individual warehouses or units do not have the supply to support, messages are automatically sent within the system to adjacent units that can provide them. The possibilities of leveraging this technology within our logistics system are endless.

---

**JADC2, 5G and edge computing will provide extreme advantages in the development and employment of future weapon technologies.**

---

## **FUTURE WEAPON CAPABILITIES**

In addition to the advancement and capabilities of JADC2, 5G and edge computing will provide extreme advantages in the development and employment of future weapon technologies. 5G and edge computing will advance surveillance and situational awareness technologies. UAVs or drones can livestream photos and videos and use AI to create digital 3D maps in near real-time, enhancing situational awareness and allowing leaders to make more informed decisions. Commanders can use platforms

that gather data from IoT sensors in the field and use AI to process the data into actionable insights to inform decision making.<sup>22</sup> All of which can be meshed with network enabled weapons to bring effects on the battlefield nearly immediately.

The Air Force's new B-21 long-range bomber is one of the first assets to operate within a "family of systems" that would accompany the aircraft during operations. Although little is exactly known about what that entails, it could include autonomous collaborative platforms such as drones that fly alongside and support the aircraft.<sup>23</sup> 5G sensors and edge computing would allow for the system to be fully autonomous and deconflict within itself and with outside obstacles. Another potential capability is to have unmanned escort in defense of the aircraft with armed drones or loitering munitions. Loitering munitions are autonomous platforms that operate similar to drones and can fly for extended periods of time with the sole purpose of finding and striking an enemy target. They can be ground launched or onboard the supported aircraft and launched when needed. The Air Force is continuing to invest in this capability referred to as "Collaborative Combat Aircraft."<sup>24</sup>

In addition to collaborative combat aircraft, with mMTC and URLLC, the military can take advantage of a massive autonomous near-instantaneous strike capability through network enabled munitions. These long-range munitions will have extended loitering time and be able to autonomously fly to an airspace coordination area (ACA) near the forward edge of the battlefield while talking to other munitions within that ACA to remain deconflicted in transit. From this ACA, they will constantly be receiving targeting data from forward sensors, soldiers, drones, radar, etc. within the network. Network enabled weapons will allow air or surface launch through multiple types of platforms and go immediately to strike a target or to its designated loiter area for future engagements.

Planned within the division and brigade airspace, a Network Enabled Loitering Munition ACA will provide an immediate kinetic response to ground threats. Airborne assets carrying these munitions from adjacent area of operations could also send their weapons to bordering loiter areas for use of neighboring units. The 5G autonomy of the weapon will also automatically deconflict with other cross-

boundary munitions, to include surface fires. Artillery shells will have small sensors installed that provide the shell's location in the network and allow for the simultaneous use of surface and airborne fire support with a greatly reduced risk of fratricide.

Once a forward target is identified by a sensor, the data is immediately published to the 5G network. A forward controller with an end user device, coupled with targeting software and TraX, will immediately see the list of targets populating on their map and immediately utilize an available loitering munition. Once a priority target is identified, the controller approves the use of a loitering munition to depart its ACA. A message that the munition is targeting the correct area is pushed to the controller, and the final order to engage is made with the push of a button. The target is destroyed, and the entire process happens within seconds of identifying the target (Figure 3 further details this process).

---

**Collaborative combat aircraft and network enabled loitering munitions are just the beginning of the endless possibilities of weapons that can be brought to the battlefield.**

---

Collaborative combat aircraft and network enabled loitering munitions are just the beginning of the endless possibilities of weapons that can be brought to the battlefield. The future battlefield network will become a living entity that is hard to jam through its vastness and thousands of interconnected platforms that provide network extension. The future of modern warfare will require decisions to be made within seconds instead of hours or minutes and to achieve such ability within C2, decentralized and nearly autonomous execution is required. The military's IoT will become its greatest advantage over its adversaries and create a joint fires capability that illustrates the path forward in bridging the connectivity gap between sensors and shooters on disparate data-link architectures. As the application of this nascent capability continues to refine and grow, it will begin to incorporate more sensors, and more weapon systems.

## **CONCLUSION**

To advance the capabilities of JADC2, ACE, autonomous logistics, and future weapon capabilities, the

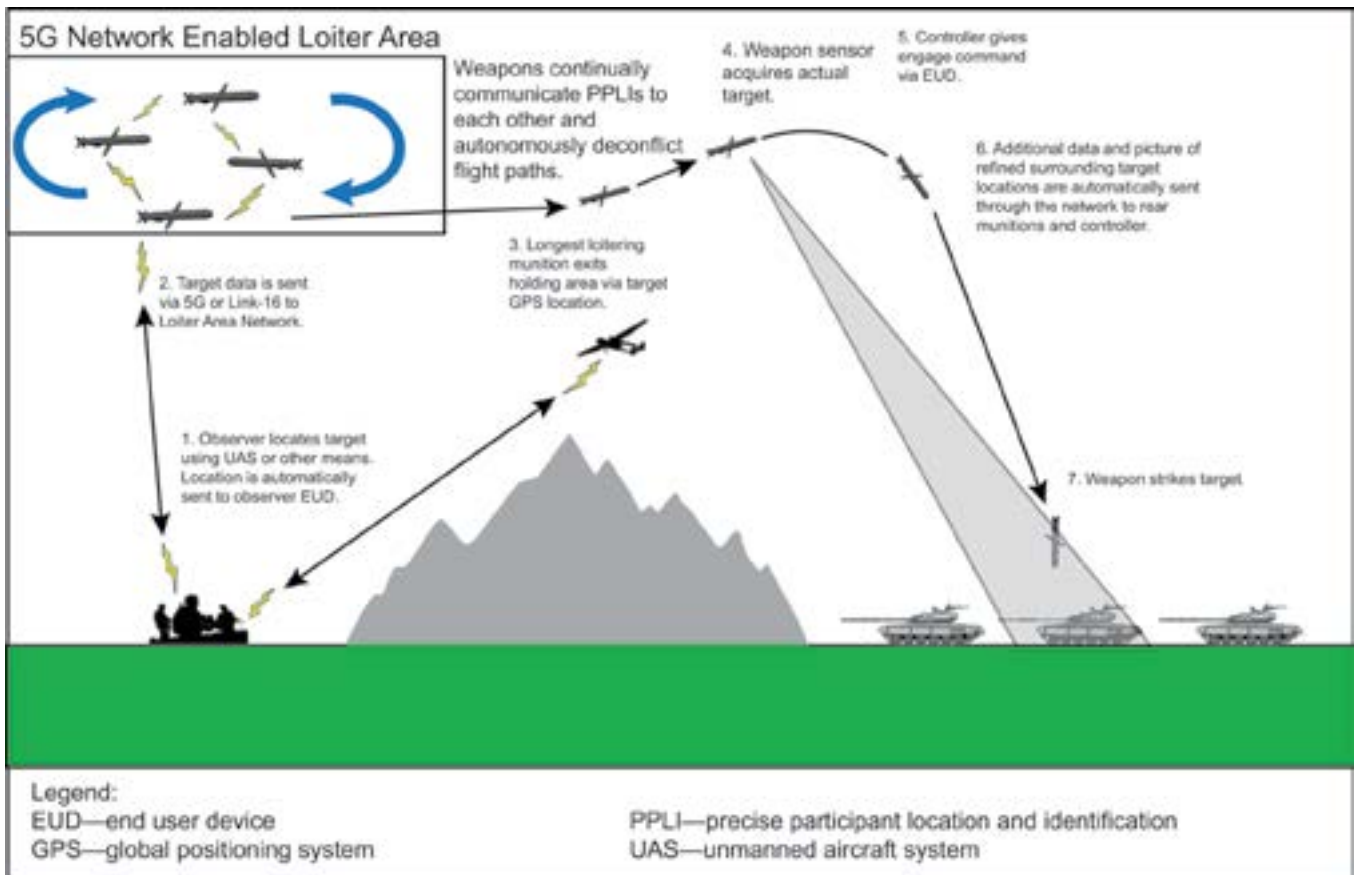


Figure 3: Implementation of 5G Network-Enabled Loitering Munitions Concept.

military must begin developing the capability of deploying systems to create forward 5G networks. The military faces even stronger technological challenges because of the need to deploy 5G capabilities on the leading edge of the battlefield, where little, if any, 5G infrastructure exists, and where intentional radio frequency jamming or other kinds of interference from enemies is likely.<sup>25</sup> Partnership with private industry is vital to all aspects of implementing a 5G network into the DoD framework. Engaging with global industry leaders including 5G microelectronics manufacturers, telecommunications companies, and application developers will be integral to creating a new 5G network forward and in austere locations.<sup>26</sup> Once the capability to stand up a 5G network anywhere in the world is achieved, the possibilities the network provides will give immense strategic and operational advantage over any current adversary.

The DoD has adopted a partly parallel development process where some (or all) of the development activities at least partially overlap.<sup>27</sup> This means that while each branch of the military innovates towards the same goal, they are designing the process and systems while simultaneously developing the concept. This increases the difficulty of cross-coor-

dination between the branches during innovation and has increased costs as multiple units spend resources in developing the same systems. To effectively implement a new concept such as JADC2 and integrate emerging technology, the DoD must first reorganize its developmental process and reduce research overlap and costs. Development at the unit or even branch level can create capability or organizational biases and shortfalls as they are not thinking enough about the “big picture.” This new concept of development will be the first step towards grasping the full capability of 5G and edge computing.

**Captain Molinari is a Joint Fires Planner with the 1st Joint Special Operations Command, Fort Liberty, North Carolina.**

**Editorial Note:** As the joint and service doctrine communities continue to refine and exercise JADC2, ALSSA publications such as Theater Air Ground System, Airspace Control, and Dynamic Targeting will incorporate the necessary revisions to tactics, techniques, and procedures to assist improving interoperability. Contact ALSSA or visit our website for additional information and updates on upcoming joint working groups.

---

## END NOTES

---

<sup>1</sup> “Department of Defense 5G Strategy Implementation Plan.” Office of the Secretary of Defense, (15 December 2020): 2.

<sup>2</sup> Molinari, Michael, & Kruger, Pablo, “The Future of Air-Ground Integration: Linking Sensor to Shooter in the Deep Fight.” Air Land Sea Application Center, (1 July 2021): <https://www.alssa.mil/News/Article/2667778/the-future-of-air-ground-integration-linking-sensor-to-shooter-in-the-deep-fight/>.

<sup>3</sup> Air Force Doctrine Note 21-1, “Agile Combat Employment.” Curtis E. Lemay Center, (23 August 2022): 8.

<sup>4</sup> “Summary of the Joint All-Domain Command and Control (JADC2) Strategy,” U.S. Department of Defense, (March 2022): 3.

<sup>5</sup> Ibid.

<sup>6</sup> Ibid.

<sup>7</sup> Ong, Dennis, “LTS-Emerging Technologies.” Drexel University, (10 January 2022), MIS 642-001, Lecture.

<sup>8</sup> Keller, John, “What 5G Means to the Military.” Military and Aerospace Electronics, (2 December 2020): <https://www.militaryaerospace.com/rf-analog/article/14188341/military-5g-communications>.

<sup>9</sup> Roe, David, “Why Edge Computing and 5G Development Should Happen Together.” Simpler Media Group, Inc., (27 October 2020): <https://www.cmswire.com/information-management/why-edge-computing-and-5g-development-should-happen-together/>.

<sup>10</sup> Ibid

<sup>11</sup> “5G Systems Are Critical for the Use of Hypersonic Weapons.” ASD Media BV, (9 July 2021): <https://www.asdnews.com/news/defense/2021/07/09/5g-systems-are-critical-use-hypersonic-weapons>.

<sup>12</sup> “5G Systems Are Critical for the Use of Hypersonic Weapons.” ASD Media BV, (9 July 2021): <https://www.asdnews.com/news/defense/2021/07/09/5g-systems-are-critical-use-hypersonic-weapons>.

<sup>13</sup> “Department of Defense 5G Strategy Implementation Plan.” Office of the Secretary of Defense, (15 December 2020): 4.

<sup>14</sup> Air Force Doctrine Note 21-1, “Agile Combat Employment.” Curtis E. Lemay Center, (23 August 2022): 1.

<sup>15</sup> Ibid, 7.

<sup>16</sup> Ibid, 11.

<sup>17</sup> Jordan, Timothy. Email Correspondence, (7 March 2023), Interview.

<sup>18</sup> Ong, Dennis, “LTS-Emerging Technologies.” Drexel University, (10 January 2022), MIS 642-001, Lecture.

<sup>19</sup> “Department of Defense 5G Strategy Implementation Plan.” Office of the Secretary of Defense, (15 December 2020): 4.

<sup>20</sup> “DOD’s Inaugural Foray Into 5G Experimentation on Track.” U.S. Department of Defense, (5 January 2021): <https://www.defense.gov/News/News-Stories/Article/Article/2462765/dods-inaugural-foray-into-5g-experimentation-on-track/>.

<sup>21</sup> Li, Derek, “Scale 5G with Edge Computing.” Red Hat Inc., (3 May 2021): <https://www.redhat.com/en/blog/scale-5g-edge-computing>.

<sup>22</sup> Nichols, Greg, “Digital Fortress: 5G is a Weapon in National Defense.” ZDNET, 21 October 2020: <https://www.zdnet.com/article/digital-fortress-5g-a-weapon-in-national-defense/>.

<sup>23</sup> Hadley, Greg, “What Could Be Part of the B-21 ‘Family of Systems’? A New Report Offers Some Insight.” Air & Space Forces Association, (8 December 2022): <https://www.airandspaceforces.com/what-could-be-part-of-the-b-21-family-of-systems-new-report-offers-some-insight/>.

<sup>24</sup> Tirpak, John A., “Air Force Touts Unity of Effort in Push Toward New Collaborative Combat Aircraft.” Air & Space Forces Association, (17 November 2022): <https://www.airandspaceforces.com/air-force-touts-unity-of-effort-in-push-toward-new-ccas-collaborative-combat-aircraft/>.

<sup>25</sup> Keller, John, “What 5G Means to the Military.” Military and Aerospace Electronics, (2 December 2020): <https://www.militaryaerospace.com/rf-analog/article/14188341/military-5g-communications>.

<sup>26</sup> “Department of Defense 5G Strategy Implementation Plan.” Office of the Secretary of Defense, (15 December 2020): 15.

<sup>27</sup> Schilling, Melissa A. “Strategic Management of Technological Innovation,” McGraw Hill, New York, NY, 2023, pp. 262.

# CURRENT ALSSA MTTP PUBLICATIONS

[ALSSAINFO@army.mil](mailto:ALSSAINFO@army.mil)

TITLE	DATE	PUB #	DESCRIPTION/STATUS
<b>ACC</b> <i>Multi-Service Tactics, Techniques, and Procedures for Air Control Communication</i> <b>Public Release</b>	02 SEP 21	ATP 3-52.4 MCRP 3-20F.10 NTTP 6-02.9 AFTTP 3-2.8	Description: This publication establishes communications TTP for TAC C2 to manage air operations and control airspace and aircraft. It establishes TTP for force packaging and direct air support coordination, air-to-air communication, intercept, threat warning, threat surface-to-air warning, and air-to-surface communication. <b>Status: Revision</b>
<b>ADVISING</b> <i>Multi-Service Tactics, Techniques, and Procedures for Advising Foreign Forces</i> <b>Distribution Restricted</b>	15 JUN 23	ATP 3-07.10 MCRP 3-33.8A NTTP 3-07.5 AFTTP 3-2.76	Description: This publication provides units and personnel working with or advising foreign security forces with viable TTP to plan, train for, and carry out advising missions at any level and in any region or theater. This MTTP provides guidance that will help to enhance the activities of some advisor functions and improve multi-Service coordination. <b>Status: Current</b>
<b>AIR-TO-SURFACE RADAR SYSTEM EMPLOYMENT</b> <i>Multi-Service Tactics, Techniques, and Procedures for Air-to-Surface Radar System Employment</i> <b>Distribution Restricted</b>	22 SEP 23	ATP 3-55.6 MCRP 2-10A.4 NTTP 3-55.13 AFTTP 3-2.2	Description: This publication covers theater-level, air-to-surface radar systems and discusses system capabilities and limitations performing airborne command and control; wide area surveillance for near-real-time targeting and target development; and processing, exploiting, and disseminating collected target data. <b>Status: Current</b>
<b>AIRFIELD OPENING</b> <i>Multi-Service Tactics, Techniques, and Procedures for Airfield Opening</i> <b>Approved for Public Release</b>	27 OCT 18	ATP 3-17.2 MCRP 3-20B.1 NTTP 3-02.18 AFTTP 3-2.68	Description: This publication supports operational commanders and staffs by establishing TTP for airfield opening. This publication provides guidance for operational commanders and staffs on opening and transferring an airfield. It contains information on Service capabilities, planning considerations, airfield assessment and surveys, opening the airfield, and transitioning the airfield in all operational environments. <b>Status: Revision</b>
<b>AIRSPACE CONTROL</b> <i>Multi-Service Tactics, Techniques, and Procedures for Airspace Control</i> <b>Distribution Restricted</b>	21 JUN 23	ATP 3-52.1 MCRP 3-20F.4 NTTP 3-56.4 AFTTP 3-2.78	Description: This MTTP publication is a tactical-level document which synchronizes and integrates airspace C2 functions and serves as a single-source reference for planners and commanders at all levels. <b>Status: Current</b>
<b>AMD</b> <i>Multi-Service Tactics, Techniques, and Procedures for Air and Missile Defense</i> <b>Distribution Restricted</b>	07 APR 23	ATP 3-01.15 MCTP 10-10B NTTP 3-01.8 AFTTP 3-2.31	Description: This publication includes considerations for planning, coordinating, integrating, and employing joint air and missile defense systems. The publication also includes planning considerations for BMD, counter-UAS system missions, and combat-ID of air assets or threats. <b>Status: Current</b>
<b>AOMSW</b> <i>Multi-Service Tactics, Techniques, and Procedures for Air Operations in Maritime Surface Warfare</i> <b>Distribution Restricted</b>	18 DEC 20	ATP 3-04.18 MCRP 3-20.4 NTTP 3-20.8 AFTTP 3-2.74	Description: This publication consolidates the Services' best TTP for missions involving air assets conducting maritime surface warfare (SUW). The objective is to enable seamless integration of joint air assets conducting maritime SUW. This publication lays the foundation for integrating forces in either preplanned or dynamic scenarios. <b>Status: Revision</b>
<b>AVIATION URBAN OPERATIONS</b> <i>Multi-Service Tactics, Techniques, and Procedures for Aviation Urban Operations</i> <b>Distribution Restricted</b>	01 FEB 22	ATP 3-06.1 MCRP 3-20.4 NTTP 3-01.04 AFTTP 3-2.29	Description: This publication complements established doctrine and provides a single-source reference to assist aviation and ground personnel in planning and executing tactical aviation support to urban operations. It promotes an understanding of the complexities of urban terrain, incorporating lessons learned. <b>Status: Current</b>
<b>BIOMETRICS</b> <i>Multi-Service Tactics, Techniques, and Procedures for Tactical Employment of Biometrics in Support of Operations</i> <b>Distribution Restricted</b>	30 APR 20	ATP 2-22.85 MCRP 10-10F.1 NTTP 3-07.16 AFTTP 3-2.85	Description: This publication provides fundamental TTP for planning, integrating, and employing biometrics capabilities at the tactical level in support of operations. It also provides TTP on the integration and employment of this data in operations at the tactical level for targeting, force protection, and supporting operations throughout the intelligence cycle. <b>Status: Current</b>



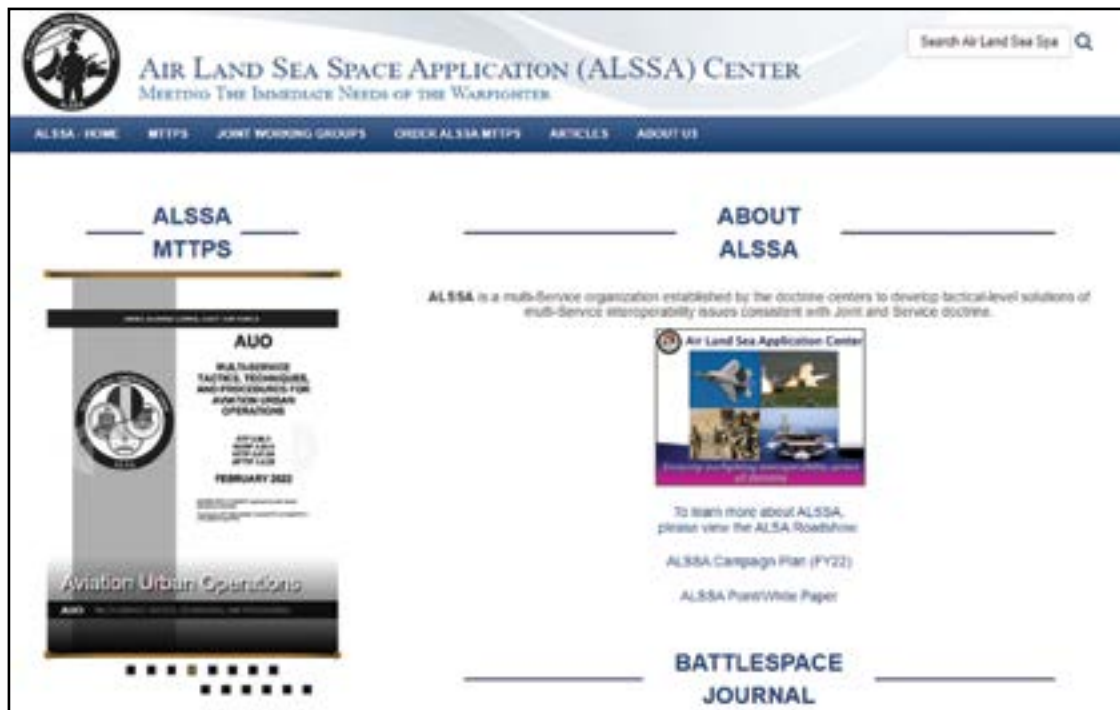
TITLE	DATE	PUB #	DESCRIPTION/STATUS
<b>BREVITY (Change 1)</b> <i>Multi-Service Brevity Codes</i> <b>Approved for Public Release</b>	07 MAR 23	ATP 1-02.1 MCRP 3-30B.1 NTTP 6-02.1 AFTTP 3-2.5	Description: This publication defines and standardizes multi-Service brevity codes agreed upon by each US Service branch. A brevity code provides no additional communications security. Brevity codes only serve to shorten transmissions. This publication does not include service-specific brevity codes nor is it synonymous with NATO APP-7. Updates to this publication have been shared with the NATO Standardization Office for inclusion or modification into Allied Communications Publications. <b>Status: Current</b>
<b>CF-SOF</b> <i>Multi-Service Tactics, Techniques, and Procedures for Conventional Forces and Special Operations Forces Integration, and Interoperability, and Interdependence</i> <b>Distribution Restricted</b>	25 JAN 22	FM 6-05 MCRP 3-30.4 NTTP 3-05.19 AFTTP 3-2.73 USSOCOM Pub 3-33	Description: This publication provides joint force operational and tactical commanders and staffs with planning guidance concerning missions, requirements, and capabilities of CF and SOF and TTP to effectively integrate operations across the competition continuum. <b>Status: Current</b>
<b>DEFENSE SUPPORT OF CIVIL AUTHORITIES (DSCA)</b> <i>Multi-Service Tactics, Techniques, and Procedures for Defense Support of Civil Authorities</i> <b>Approved for Public Release</b>	11 FEB 21	ATP 3-28.1 MCRP 3-30.6 NTTP 3-57.2 AFTTP 3-2.67 CGTTP 3-57.1	Description: DSCA sets forth MTTP, at the tactical level, to assist the military planner, commander, and individual Service forces in employing military resources in response to domestic emergencies, in accordance with US law. <b>Status: Current</b>
<b>DYNAMIC TARGETING</b> <i>Multi-Service Tactics, Techniques, and Procedures for Dynamic Targeting</i> <b>Distribution Restricted</b>	05 JAN 22	ATP 3-60.1 MCRP 3-31.5 NTTP 3-60.1 AFTTP 3-2.3	Description: This publication provides the JFC, operational staff, and components MTTP to coordinate, de-conflict, synchronize, and prosecute dynamic targets in any AOR. It includes lessons learned, and multinational and other government agency considerations. <b>Status: Current</b>
<b>EO</b> <i>Multi-Service Tactics, Techniques, and Procedures for Explosive Ordnance</i> <b>Distribution Restricted</b>	12 MAR 20	ATP 4-32.2 MCRP 10-10D.1 NTTP 3-02.4.1 AFTTP 3-2.12	Description: This publication provides commanders and their units guidelines and strategies for planning and operating in an explosive ordnance environment while minimizing the impact of explosive ordnance on friendly operations. <b>Status: Revision</b>
<b>FIGHTER INTEGRATION</b> <i>Multi-Service Tactics, Techniques, and Procedures for Fighter Integration</i> <b>Classified SECRET</b>	09 JUN 23	MCRP 3-20.7 NTTP 3-22.6 AFTTP 3-2.89	Description: This publication is a single-source set of integration standards intended to enhance air operations involving legacy aircraft and fifth generation fighters. <b>Status: Current</b>
<b>FORENSICS</b> <i>Multi-Service Service Tactics, Techniques, and Procedures for Expeditionary Forensics</i> <b>Distribution Restricted</b>	30 Oct 20	ATP 3-39.21 MCRP 10-10F.5 NTTP 3-07.8 AFTTP 3-2.7 CGTTP 3-93.10	Description: This publication ensures successful planning, integration, and employment of expeditionary forensic capabilities at the tactical level. The TTP details the six forensic functions that occur during, or in support of, tactical operations. It is designed for tactical level commanders, staffs, small unit leaders, and collectors. <b>Status: Revision</b>
<b>ISR OPTIMIZATION</b> <i>Multi-Service Tactics, Techniques, and Procedures for Intelligence, Surveillance, and Reconnaissance Optimization</i> <b>Distribution Restricted</b>	3 SEP 19	ATP 3-55.3 MCRP 2-10A.8 NTTP 2-01.3 AFTTP 3-2.88	Description: This publications highlights key information to optimize ISR during the planning, execution, assessment phases and the PED process. This publication is useful to commanders, staff members, and new users desiring to know more about the ISR process. <b>Status: Revision</b>
<b>JFIRE</b> <i>Multi-Service Tactics, Techniques, and Procedures for the Joint Application of Firepower</i> <b>Distribution Restricted</b>	18 OCT19	ATP 3-09.32 MCRP 3-31.6 NTTP 3-09.2 AFTTP 3-2.6	Description: This is a pocket-sized guide of procedures for calls for fire, CAS, and naval gunfire. It provides tactics for joint operations between attack helicopters and fixed-wing aircraft performing integrated battlefield operations. <b>Status: Revision</b>
<b>JSEAD</b> <i>Multi-Service Tactics, Techniques, and Procedures for the Suppression of Enemy Air Defenses in a Joint Environment</i> <b>Distribution Restricted</b>	09 JUN 22	ATP 3-01.4 MCRP 3-31.3 NTTP 3-01.42 AFTTP 3-2.28	Description: This publication contributes to Service interoperability by providing the JTF and subordinate commanders, their staffs, and SEAD operators a single reference. <b>Status: Current</b>
<b>KILL BOX</b> <i>Multi-Service Tactics, Techniques, and Procedures for Kill Box Employment</i> <b>Distribution Restricted</b>	07 OCT 22	ATP 3-09.34 MCRP 3-31.4 NTTP 3-09.2.1 AFTTP 3-2.59	Description: This MTTP publication outlines multi-Service kill box planning procedures, coordination requirements, employment methods, and C2 responsibilities. <b>Status: Current</b>

TITLE	DATE	PUB #	DESCRIPTION/STATUS
<b>MILITARY DIVING OPERATIONS (MDO)</b> <i>Multi-Service Service Tactics, Techniques, and Procedures for Military Diving Operations</i> <b>Approved for Public Release</b>	16 JUN 23	ATP 3-34.84 MCRP 3-35.9A NTTP 3-07.7 AFTTP 3-2.75 CGTTP 3-95.17	Description: This publication is a single-source guide to ensure effective planning and integration of multi-Service diving operations. It provides combatant command, joint force, and operational staffs a comprehensive resource for planning military diving operations, including considerations for each Service's capabilities, limitations, and employment. <b>Status: Current</b>
<b>NONLETHAL WEAPONS (NLW)</b> <i>Multi-Service Service Tactics, Techniques, and Procedures for the Tactical Employment of Nonlethal Weapons</i> <b>Distribution Restricted</b>	29 MAY 20	ATP 3-22.40 MCTP 10-10A NTTP 3-07.3.2 AFTTP 3-2.45 CGTTP 3-93.2	Description: This publication discusses the policy and parameters governing nonlethal weapons (NLW). This publication increases commander and subordinate awareness for nonlethal weapons planning, capabilities, and employment. <b>Status: Revision</b>
<b>OP ASSESSMENT</b> <i>Multi-Service Tactics, Techniques, and Procedures for Operation Assessment</i> <b>Approved for Public Release</b>	07 FEB 20	ATP 5-0.3 MCRP 5-10.1 NTTP 5-01.3 AFTTP 3-2.87	Description: This publication serves as a commander and staff guide for integrating assessments into the planning and operations processes for operations conducted at any point along the range of military operations. It provides operation assessment how-to techniques and procedures which complement current joint and Service doctrine. <b>Status: Project Assessment</b>
<b>PEACE OPS</b> <i>Multi-Service Tactics, Techniques, and Procedures for Conducting Peace Operations</i> <b>Approved for Public Release</b>	2 MAY 19	ATP 3-07.31 MCTP 3-03B AFTTP 3-2.40	Description: This publication offers a basic understanding of joint and multinational PO, an overview of the nature and fundamentals of PO, and detailed discussion of selected military tasks associated with PO. <b>Status: Current</b> <b>Ownership of this MTTP and responsibility for future revisions has been transferred to the Peacekeeping and Stability Operations Institute</b>
<b>PR</b> <i>Multi-Service Tactics, Techniques, and Procedures for Personnel Recovery</i> <b>Distribution Restricted</b>	20 OCT 22	ATP 3-50.10 MCRP 3-05.3 NTTP 3-57.6 AFTTP 3-2.90	Description: This MTTP publication for personnel recovery is a single source, descriptive, reference guide for staffs and planners executing the military option of personnel recovery using joint capabilities. <b>Status: Current</b>
<b>SCAR</b> <i>Multi-Service Tactics, Techniques, and Procedures for Strike Coordination and Reconnaissance</i> <b>Distribution Restricted</b>	31 JAN 18	ATP 3-60.2 MCRP 3-20D.1 NTTP 3-03.4.3 AFTTP 3-2.72	Description: This publication provides strike coordination and reconnaissance MTTP to the military Services for conducting air interdiction against targets of opportunity. <b>Status: Current</b>
<b>SURVIVAL, EVASION, AND RECOVERY</b> <i>Multi-Service Tactics, Techniques, and Procedures for Survival, Evasion, and Recovery</i> <b>Distribution Restricted</b>	05 JUL 23	ATP 3-50.3 MCRP 3-05.1 NTTP 3-50.3 AFTTP 3-2.26	Description: This is a weather-proof, pocket-sized, quick-reference guide of basic information to assist Service members in a survival situation regardless of geographic location. <b>Status: Current</b>
<b>TACTICAL CONVOY OPERATIONS</b> <i>Multi-Service Tactics, Techniques, and Procedures for Tactical Convoy Operations</i> <b>Distribution Restricted</b>	26 MAR 21	ATP 4-01.45 MCRP 4-11.3H NTTP 4-01.6 AFTTP 3-2.58	Description: This is a quick-reference guide for convoy commanders operating in support of units tasked with sustainment operations. It includes TTP for troop-leading procedures, gun-truck employment, countering IEDs, and battle drills. <b>Status: Revision</b>
<b>TACTICAL RADIOS</b> <i>Multi-Service Tactics, Techniques, and Procedures for Tactical Radios</i> <b>Distribution Restricted</b>	14 JUL 21	ATP 6-02.72 MCRP 3-30B.3 NTTP 6-02.2 AFTTP 3-2.18	Description: This publication is a single source, descriptive reference guide to ensure tactical level operators and planners have a comprehensive resource for planning, employing, creating, and operating radio networks (nets) in a joint Service environment. Highlighted in this MTTP are tactical radios operating in the HF, VHF, and UHF spectrums. <b>Status: Revision</b>
<b>TAGS</b> <i>Multi-Service Tactics, Techniques, and Procedures for the Theater Air-Ground System</i> <b>Approved for Public Release</b>	21 MAY 20	ATP 3-52.2 MCRP 3-20.1 NTTP 3-56.2 AFTTP 3-2.17	Description: This publication describes how each of the Service component's systems operate within the Theater Air Ground System (TAGS) which is a conglomeration of systems. For this publication, TAGS refers to the organizations, personnel, equipment, and procedures that participate in planning and executing air-ground operations. <b>Status: Revision</b>

---

## ACCESS TO ALSSA PRODUCTS

---



**ALSSA Public Website**

<https://www.alssa.mil>

**Facebook**

<https://www.facebook.com/ALSSA.Center>

**ALSSA SIPR Website**

<https://intelshare.intelink.sgov.gov/sites/alsa>

**Twitter**

[https://twitter.com/ALSSA\\_Center](https://twitter.com/ALSSA_Center)

---

## DOCTRINE CENTER LINKS

---

**Army - <https://usacac.army.mil/organizations/mccoe/cadd>**

**Marine Corps - <https://www.mccdc.marines.mil/>**

**Navy - <https://nwdc.navy.mil/>**

**Air Force - <https://www.airuniversity.af.edu/LeMay/>**

**Space Force - <https://www.starcom.spaceforce.mil/About-Us/STARCOM-Deltas/Space-Delta-10-Doctrine-Wargaming/>**

ALSSA CENTER

ATTN: BATTLESPACE JOURNAL

114 ANDREWS STREET

JOINT BASE LANGLEY-EUSTIS, VA

23665-2785

OFFICIAL BUSINESS

Air Land Sea Space  
Application Center



<http://www.facebook.com/ALSSA.Center>



[http://www.twitter.com/ALSSA\\_Center](http://www.twitter.com/ALSSA_Center)



Scan Me

