COMMANDER AND STAFF GUIDE TO

MULTINATIONAL INTEROPERABILITY

CENTER FOR ARMY LESSONS LEARNED

CALL

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Commander and Staff Guide to Multinational Interoperability

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Foreword

This guide is for commanders and staff who are training for, or operating in a multinational environment. The primary focus is on aiding U.S. Army units to better plan, prepare, execute, and assess multinational operations through improved shared understanding, mutual trust and confidence, and unity of effort with our mission partners. This guide addresses three key areas to provide improved multinational interoperability: introducing a common understanding of interoperability; exploring an interoperability framework encompassing the human, procedural, and technical domain solutions to improved interoperability; and showing how leaders can integrate "planning for interoperability" within the operations process. It includes examples that highlight key interoperability considerations and outcomes across the plan, prepare, execute, and assess phases of an operation.

The Army and joint communities are dedicated to providing the warfighter with an effective concept and technical solution for improved interoperability, as documented in their respective Mission Partner Environment (MPE) concept of operations (CONOPS). The Army MPE CONOPS, published in September 2019, provides desired capabilities, employment considerations, and examples of MPE supported mission threads across Army warfighting functions. At its heart, the MPE provides collaborative tools (i.e., email, text, Voice over Internet Protocol, and file-sharing capabilities), information sharing (i.e., common operational picture and intelligence products), and support to digitally enabled processes between mission partners (i.e., call for fire, requests for sustainment support, and requests for air support). However, as repeatedly demonstrated during multinational training exercises, without appropriate human and procedural solutions, a functional technical solution does not guarantee effective interoperability. In addition, without sufficient consideration of how a unit will achieve interoperability, units consistently fail to fully or effectively leverage the potential capability of available technical solutions. This guide is intended to show how the integration of interoperability considerations into existing U.S. doctrine and processes can help the commander and staff address human and procedural interoperability challenges.

As stated by MG Douglas C. Crissman, Director, Mission Command Center of Excellence, in his foreword to the Army MPE CONOPS, "MPE capabilities must be integrated into the Army Mission Command Network to facilitate operations with our mission partners on a 'releasable' network with common services (collaboration tools, network operations, data management, and cyber defense) and warfighting applications. We must also address gaps and shortfalls within the human and procedural domains that limit interoperability, informed by interoperability lessons learned and best practices within doctrine, organization, training, leader development, and policy domains. These solutions must drive necessary cultural shifts, development of interoperable processes, and inclusion of partner considerations in the operations process." This guide is one step toward addressing current human and procedural domain gaps and shortfalls that limit interoperability.

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The Secretary of the Army has determined that the publication of this periodical is necessary in the transaction of the public business as required by law of the Department.

Unless otherwise stated, whenever the masculine or feminine gender is used, both are intended.

Note: Any publications (other than CALL publications) referenced in this product, such as ARs, ADPs, ATPs, FMs, and TMs, must be obtained through your pinpoint distribution system.

Introduction

During the Cold War, the Army was larger and focused on forward-deployment. For years, interoperability was underappreciated and regarded as optional. Deconflicted operations with the North Atlantic Treaty Organization (NATO) and other allies was seen as sufficient, with boundaries between national forces separating operations at the division and corps echelons. The Army was able to utilize technological workarounds and ad hoc liaison assignments to compensate for human and procedural shortcomings when operating in a coalition environment. Today's Army is significantly smaller and primarily U.S. based; and when combined with the nature of multi-domain operations—air, land, sea, space, and cyber—requires the Army to be prepared for challenges unlike anything our current force has experienced. Since Operation Desert Storm in 1991, the U.S. has primarily conducted military operations as part of a multinational force (MNF). The Army must train today to fight alongside, and integrate with, our multinational partners.

> Interoperability between MNFs during operations allows partners to produce greater combat power by leveraging relative strengths while mitigating relative weaknesses.

According to Joint Publication (JP) 3-16, *Multinational Operations*, 01 MAR 2019, "… multinational operations are conducted by forces of two or more nations, usually undertaken within the structure of a coalition or alliance." Interoperability is defined by JP 3-0, *Joint Operations,* 22 OCT 2019, as "The ability to act together coherently, effectively, and efficiently to achieve tactical, operational, and strategic objectives."

JP 3-16 defines the current doctrinal tenets of multinational operations as "… respect, rapport, knowledge of partners, patience, mission focus, team building, trust, and confidence. Although these tenets cannot guarantee success, ignoring them may lead to mission failure due to a lack of unity of effort. National and organizational norms of culture, language, and communication affect MNF interoperability."

BACKGROUND

In the "Summary of the 2018 National Defense Strategy," the Chairman of the Joint Chiefs of Staff stated, "We will strengthen and evolve our alliances and partnerships into an extended network capable of deterring or decisively acting to meet the shared challenges of our time. We will focus on three elements for achieving a capable alliance and partnership network:

- Uphold a foundation of mutual respect, responsibility, priorities, and accountability.
- Expand regional consultative mechanisms and collaborative planning.
- Deepen interoperability. Each ally and partner is unique. Combined forces able to act together coherently and effectively to achieve military objectives requires interoperability. Interoperability is a priority for operational concepts, modular force elements, communications, information sharing, and equipment. In consultation with Congress and the Department of State, the Department of Defense (DOD) will prioritize requests for U.S. military equipment sales, accelerating foreign partner modernization and ability to integrate with U.S. forces. We will train to high-end combat missions in our alliance, bilateral, and multinational exercises."[1]

In response to this strategic guidance, and additional senior Army leader guidance, the Army conducted several multinational interoperability (MNI) exercises during fiscal year (FY) 18 and FY19, with more planned for FY20 and beyond. Some of the key multinational exercises are shown in Figure 1.

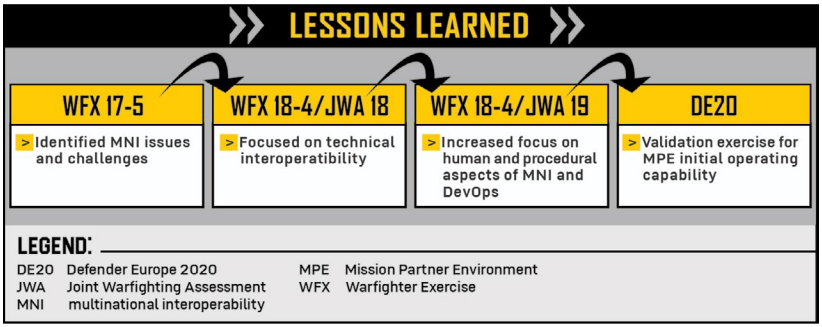


Figure 1. Maturing multinational interoperability through Army exercises

Overall, results from FY18 and FY19 demonstrated tremendous technical progress implementing a Mission Partner Environment (MPE) in the form of a mission partner network. This enabled effective common collaborative services and data sharing to build and display a common coalition-wide operational picture. It also enabled effective execution of critical tactical tasks as a mission partner team. However, the technical successes at these exercises were tempered by observed human and procedural gaps and shortfalls, which had an impact on overall MNI.

A consistent theme from these exercises was that, although the Army demonstrated a functional technical solution for interoperability, the Army must also address observed human and procedural gaps and shortfalls. Specifically, the Army must develop doctrine, guidelines, and related training products to support unit understanding regarding how to achieve interoperability. To decrease risk and increase usability, emerging interoperability doctrine, and guidelines should nest within existing operations processes. This will effectively organize Army forces in a way that can support multinational operations, and inform MNI training development and implementation for professional military education (PME) and unit collective training. Units that are required to lead or participate in multinational operations must understand the imperatives and requirements when planning for interoperability, to include—

- Considering MNI throughout the planning process.
- Identifying and integrating mission partners early in planning and preparation.
- Standing up MNI coordinating organizations (e.g., Mission Partner Coordination Center, Coalition Network Operations and Security Center, and the common operational picture [COP] Technical Assurance Cell [CTAC]) as required, to specifically deal with the unique complexities of multinational operations.
- Developing and rehearsing common tactics, techniques, and procedures (TTP) and standard operating procedures (SOPs) across warfighting functions (WfFs), with emphasis on command and control, intelligence, fires, and sustainment.
- Selecting relevant standards and TTP from existing agreements (e.g., American, British, Canadian, Australian, and New Zealand [ABCANZ] Armies' Program, NATO, and Multinational Planning Augmentation Team [MPAT]) as a baseline for specific operational environments, mission partner capabilities and limitations, and missions.

- Collaboratively developing and rehearsing a coalition information management (IM)/knowledge management (KM) plan with an associated battle rhythm.
- Collaboratively conducting MPE technical planning (e.g., architecture planning, implementation, testing, and validation, with the associated joining, membership, and exiting instructions [JMEI]).
- Coordinating, implementing, and assessing a comprehensive liaison plan.
- Collaboratively developing coalition rules of engagement (ROE).
- Developing and training appropriate technical, procedural, and human solutions for effective identification, friend or foe (IFF).

PURPOSE

This guide primarily addresses MNI at operational through tactical echelons, or, in the ABCANZ lexicon, at the "framework nation headquarters." This guide is focused on the additional activities required to achieve the desired levels of interoperability with multinational unified action partners (UAPs), to include key relationships and integration points between achieving interoperability and commander and staff activities. The desired endstate of this guide is improved U.S. Army MNI, demonstrated through successful tactical task execution.

> First and foremost, this guide is for the unit leaders participating in MNI exercises. It should provide a framework to plan, prepare, execute, and assess multinational operations with a focus on identified human and procedural gaps and shortfalls.

This handbook builds on the interoperability concepts and lexicon introduced by the *Army Mission Command Interoperability White Paper*, 09 MAY 2018, and recent revisions to joint and Army doctrine. The concepts and procedures in this guide may stimulate feedback and recommendations for future Army doctrine informing how to achieve interoperability, supplementing the current Field Manual (FM) 3-16, *The Army in Multinational Operations*, 08 APR 2014, and its focus on what is required to achieve interoperability.

Although this handbook is focused on improving Army interoperability with allies and coalition mission partners, the concepts and framework are applicable to most interoperability challenges (i.e., intra-Army, joint, interagency, nongovernmental organizations, private sector, etc.). In nearly all cases, applying a deliberate decision-making process to gain shared

understanding, determine interoperability requirements, then plan and implement solutions across human, procedural, and technical dimensions will significantly improve a unit's ability to interoperate with all UAPs.

THE MILITARY PROBLEM

The Army lacks explicit linkage between current MNI doctrine, mission command concepts, and related command and control doctrine and processes (e.g., the operations process). The lack of linkage to existing processes inhibits the consideration and effective integration of interoperability into unit mission planning and preparation for multinational operations.

There is, however, no lack of guidance, lessons learned, best practices, and multinational agreements to shape and inform interoperability efforts. The Center for Army Lessons Learned (CALL) has collected and published no less than nine handbooks and guides related to interoperability since 2015. There are also many multilateral team efforts dedicated to the analysis and development of interoperable standards, TTP, and agreements to support MNI. These include the MPAT; NATO-developed standardization agreements (STANAGs); ABCANZ Armies' Program; Multilateral Interoperability Programme (MIP); Multinational Strategy and Operations Group (MSOG; Coalition Interoperability Assurance and Validation (CIAV); and Artillery Systems Cooperation Activities (ASCA) program. (See Appendix D for high-level definitions of these programs.)

These programs provide a wealth of agreed-to standards, SOPs, TTP, and policies to support the planning, preparation, and execution of multinational operations. For example, CIAV provides capability and limitation reports and operational impacts based on mission-based interoperability assessments with mission partners. These are used to resolve process, training, and technical capability gaps supporting one or more coalition mission threads. Unfortunately, the results and products from these programs are not well publicized and with notable exceptions (e.g., ABCANZ support to Joint Modernization Command [JMC] in planning, preparation, execution, and assessment of joint warfighting assessment [JWA] exercises), have not been referenced or analyzed to support unit planning and preparation for recent multinational exercises.

One aspect of the interoperability challenge is the current scarcity of related, authoritative, and collective training products, and the dearth of MNI instruction in most Army PME courses. Major contributors to the human and procedural gaps and shortfalls identified during recent MNI exercises include—

- A lack of training standards (limited collective training and evaluation outlines to support interoperability related training).

- Unfamiliarity with and lack of user training on technical systems and tools.
- Lack of KM planning, structure, and/or control.
- Insufficient shared knowledge and understanding to conduct multi-domain operations.
- Culture of operating on a U.S.-only Secret Network and "need to know" rather than Secret//Releasable (S//REL) MPE mission network and "write for release" philosophy.
- Limited awareness of available multinational programs, standards, and agreements.
- Inconsistent leader understanding of key considerations for multinational operations.
- Missing doctrinal concepts to address the additional complexity of multinational operations.

UNDERSTANDING INTEROPERABILITY

At its core, interoperability is intended to increase the effectiveness of U.S. Army and joint forces, along with mission partners, in execution of their assigned mission. By integrating the six principles of unified land operations—mission command, develop the situation through action, combined arms, adherence to the law of war, establish and maintain security, and create multiple dilemmas for the enemy—Army commanders increase the probability of mission success. In most situations, U.S. Army operations must integrate UAPs while applying each of these principles. Doing so requires mutual trust and confidence, shared understanding, and unity of effort enabled by interoperability solutions across human, procedural, and technical dimensions.

Figure 2 displays relationships among interoperability enablers and associated doctrine, organization, training, materiel, leadership and education, personnel, facilities, and policy (DOTMLPF-P) solutions, outcomes, and endstate. The Army MPE concept of operations (CONOPS) provides a common lexicon, definitions, and initial measures that can be used to develop quantitative thresholds for each level of interoperability, guide the development of interoperability capabilities, and assess performance.

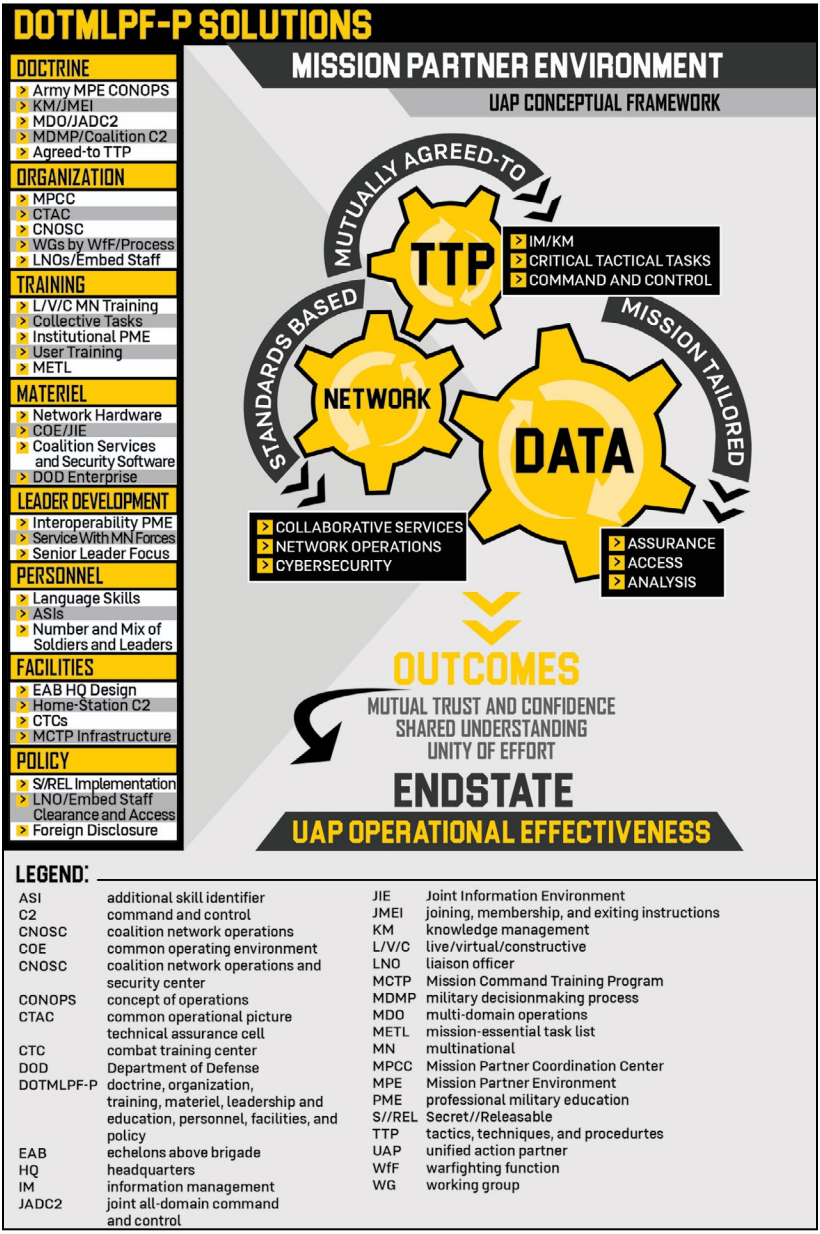


Figure 2. Interoperability concepts and relationships

The *Army Mission Command Interoperability White Paper* introduced a multilayered approach to meeting interoperability challenges, informally known as the Rosetta Stone Concept. The white paper states that, "Interoperability is a multilayered challenge that must be addressed comprehensively in order to enable effective solution development that enables Army required capabilities, while balancing resource constraints."[2]

It postulates that "Analysis by WfF, oriented on Army operational, modernization, and interoperability priorities, and synchronized across all WfFs, will enable the Army to make focused, risk-informed investments in UAP interoperability capability that will effectively complement future force development and enable the Army's ability to fight and win in the future." Figure 3 illustrates the layers of interoperability challenges and provides a framework for defining the desired state, by partner and by echelon, for Army interoperability.

This multilayered approach is primarily intended to support interoperability requirements determination and capability development. However, when combined with other operational factors, such as the operational environment and threat, this concept may also aid the operational planner in understanding and developing courses of action for a multinational operation. For example, during mission analysis, the planner may consider the various factors to help determine what units require specific levels of interoperability with a given mission partner. Appendix A provides additional definitions and examples across interoperability solution dimensions (human, procedural, and technical) and desired levels of interoperability.

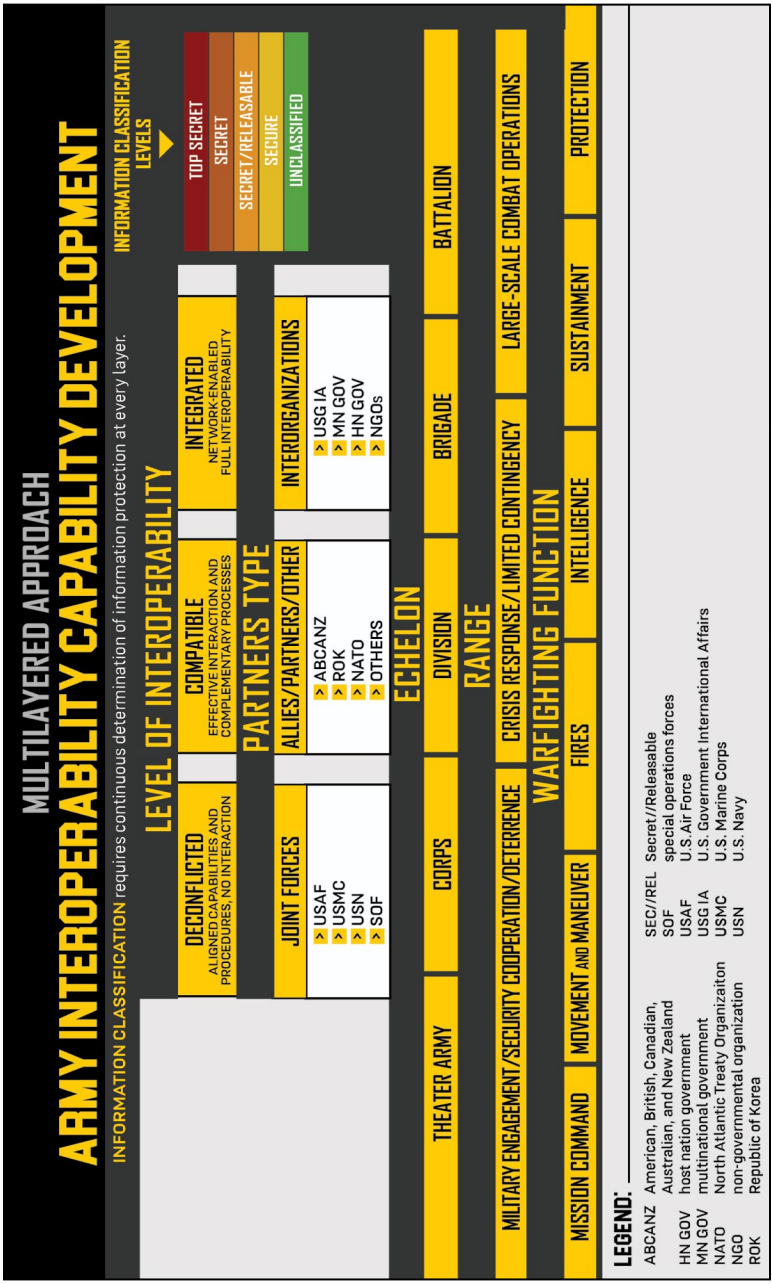


Figure 3. Interoperability factors within the Rosetta Stone concept[3]

KEY TERMS AND REFERENCES

Interoperability Concept Terms

Interoperability concept terms and definitions associated with interoperability framework in this handbook are derived from multiple sources, to include FM 3-16 and other relevant multinational agreements and programs.

UAP Conceptual Framework. Operations with joint, multinational, and other mission partners add a layer of complexity to planning, preparation, execution, and assessment of military operations. The UAP conceptual framework includes the establishment of appropriate structures (e.g., the Mission Partner Coordination Center); processes to guide the planning, coordination, and assessment of mission partner operations; and specialized tools and capabilities to address mission partner complexities. The maturing MPE concept serves as the operational framework for Army forces conducting operations with joint, multinational, and other mission partners.

Common Data. Digital data drives most command and control and WfF processes. To effectively share data, mission partners must be able to translate or adhere to common data standards. External tools and processes, such as virtual data centers and the U.S. Army Intelligence and Security Command Cloud Initiative, may provide alternative approaches to achieve virtual common data and interoperability.

Common Network. The Army must adhere to Joint Information Environment (JIE) standards in modernizing the mission command network. The Army must build the capability to host multinational and interorganizational partners and federate partner networks into the tactical network architecture. A common network with UAPs is the foundation for establishing and maintaining a COP and digital collaboration capability, critical enablers for shared understanding, and unity of effort.

Common TTP. At echelon, mission partners and U.S. forces must develop, rehearse, and execute common TTP across WfFs. When the Army participates in multinational operations, U.S. commanders should follow the multinational doctrine and procedures that have been ratified by the U.S., or evaluate and follow the multinational command's doctrine and procedures where applicable and consistent with U.S. law, policy, and guidance. Training on enabling systems is critical. During recent MNI exercises, participants noted that training should emphasize the application of the system, instead of strict system knowledge (button-ology), enabling the user to quickly learn the system and better apply it to his WfF.

Common Information Management and Knowledge Management. IM/KM procedures are critical to maximizing the effectiveness of technological solutions for collaboration services and achieving a COP with mission partners. Deliberate planning of IM/KM procedures for the Command Post Computing Environment (CPCE) can improve CPCE performance over the network and improve command post situational awareness. IM/KM procedures to support UAP interoperability must be developed collaboratively with the respective partners and in conjunction with the available technical and materiel solutions. ABCANZ standards are technically aligned with NATO standards and provide an excellent starting point for planning operations. In recent MNI exercises, participants have expressed concern with the large number of layers that can be built in CPCE with little added value, especially when poorly organized and improperly or unclearly titled. These layers consumed significant CPCE server processing and storage space. KM officers (KMOs) develop non-unit-specific digital SOP annexes for each echelon. These annexes serve as the basis for KM plans in a multinational operation, and can be quickly tailored for a specific MPE and provided to partners, enabling best-practice TTP for employment of MPE and related information systems. These annexes include, at a minimum a robust KM program to exploit mission command information system (such as CPCE) capabilities, standardized artifact names, information flow by process, and file system and locations for artifacts and information stored at echelon during operations.

Mutual Trust and Confidence. Commanders of an MNF maintain awareness and consideration for their mission partners in the decision-making process, to include political objectives, mission, patience, sensitivity to the needs of other force members, a willingness to compromise or come to a consensus when necessary, and mutual confidence. This mutual confidence stems from tangible actions and entities and intangible human factors. Mutual trust is shared, reciprocal confidence among commanders, subordinates, and partners. Effective commanders build cohesive mission partner teams in an environment of mutual trust and confidence.

Shared Understanding. A defining challenge for commanders and staffs is creating shared understanding of their operational environment and their operation's purpose, problems, and approaches to solving those problems. Shared understanding and purpose form the basis for unity of effort and trust. Commanders and staffs actively build and maintain shared understanding within the force and with UAPs by maintaining collaboration and dialogue throughout the operations process.

Unity of Effort. The fundamental challenge in multinational operations is the effective integration and synchronization of available assets toward the achievement of common objectives. This goal may be achieved through unity of effort despite disparate (and occasionally incompatible) capabilities, ROE, equipment, and procedures. Unified action synchronizes, coordinates, and integrates mission partners in an attempt to achieve unity of effort.

Interoperable Forces

This guide identifies several key terms and definitions for interoperable forces in order to improve shared understanding and promote a common lexicon.

Coalition Versus Combined. A coalition force is an ad hoc arrangement between two or more nations for common action,[4] while a combined force is a term identifying two or more forces or agencies of two or more allies operating together.[5] A force could be coalition and combined if it contains both non-allied and allied national forces in common action. Operation Desert Storm is an example of a coalition and combined operation. Consistent with the MPAT SOP, this guide uses the term coalition/combined task force (CTF) to describe an MNF executing a military mission at the operational level during a MNF effort.[6]

Unified Action Partner Versus Mission Partner. UAP is from the Army perspective and includes joint forces, multinational partners, interagency, and nongovernmental organizations—that is, organizations and agencies outside of the U.S. Army with which the Army must coordinate.[7] The term mission partner is from the joint perspective for any partners not in the U.S. military with which the U.S. military conducts coordination.[8] UAP is used in this guide primarily in reference to Army doctrine or policy, while mission partner is used in context to the MPE or related joint considerations.

Command Structures. Command relationships and structure for an MNF may have significant impact on how and to what degree mission partners are able to achieve interoperability. Significant differences exist between integrated, multinational, lead nation, and parallel command structures in terms of interoperability. Interoperability requirements and ambition are presumably higher when fighting in an integrated command structure. Meanwhile, less integrated, more complex command structures, such as parallel command, introduce additional interoperability and coordination risks. (See Chapter 2 of JP 3-16 for a detailed examination of likely MNF command structures and interoperability implications.)

Interoperability References, Unified Action Partner Library

The interoperability community of interest has developed a significant body of knowledge across the breadth of interoperability challenges, emerging solutions, lessons learned, best practices, multilateral agreed-to standards, and guides, which aid interoperability policy, training, engagement, planning, and execution. To avoid redundancy across the Army, the Mission Command Center of Excellence (MCCoE) UAP branch maintains an interoperability library as a comprehensive source for all topics allies and partners. The library contains references, documents, briefings, studies, and lessons learned from U.S. joint activities, the U.S. Army, U.S. combatant commands, NATO, ABCANZ, RAND Corporation, and other governmental, analytic, and international organizations. Over 300 current and relevant interoperability documents are located on the MCCoE, Capability Development Integration Directorate SharePoint site at https://cacmdc.army.mil/mccoe/HQ/TCM_MC_CP_ADMIN/Interoperability/SitePages/Home.aspx (common access card [CAC] login required).

Documents are structured by topic areas (e.g., exercises, integrated COP, interorganizational, joint, lessons learned, MPE, MIP, multinational network solutions, operational evaluations, other references, regulations, and requirements), which are searchable and sortable using standard SharePoint tools. See Figure 4 for a screenshot of the CAC Sharepoint library homepage.

Figure 4. CAC Sharepoint Interoperability Library

CAC holders may also access the Central Army Registry at https://rdl.train.army.mil/catalog/dashboard (CAC login required) to search for additional interoperability-related references, training, and evaluation outlines, doctrinal publications, and lessons learned.

In order to support Army and joint collaborative investigation into interoperability, the UAP branch established a milBook within the DOD milSuite site at https://www.milsuite.mil/book/groups/mccoe-tcm-mccp-uap-branch-multinational-interoperability-community (CAC login required). This milBook includes activities, references, and collaborative tools available to the greater U.S. military interoperability community of interest. Figure 5 is a screenshot of the MilSuite interoperability website homepage.

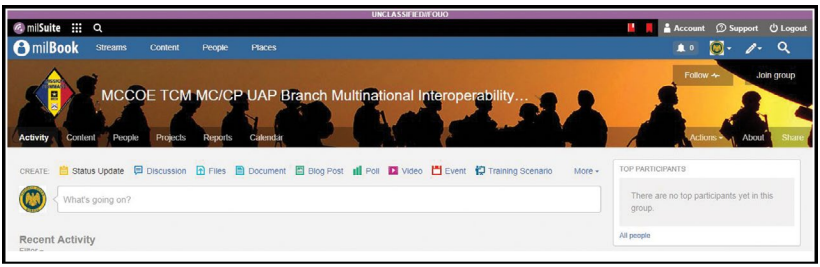


Figure 5. MilSuite Interoperability site

For mission partners, academia, and other non-DOD contributors, the UAP branch has also developed a page on the All Partners Access Network (APAN), with the goal of mirroring the milBook functions to include a library of unclassified, unlimited distribution interoperability reference documents and collaborative capabilities. Figure 6 is a screenshot of the APAN interoperability library page. This site is located at https://wss.apan.org/army/mccoeuapbi/default.aspx (APAN login required).

Figure 6. APAN Interoperability Library

All of the references identified in this guide are available in the UAP interoperability library. Please contact the MCCoE UAP branch with any questions, feedback, or recommended additions to the interoperability library.

Unit Interoperability Library
Recommended Reading

To prepare for multinational training and operations, the following products are highly recommended references for leaders at brigade level and echelons above:

- ABCANZ Publication 332, *Coalition Operations Handbook Edition 6*, 30 AUG 2017
- MPAT, *Multinational Force Standing Operating Procedures Version 3.3*, 15 NOV 2019
- NATO Federated Mission Networking (FMN) Secretariat, *FMN Vision Version 3.1*, 15 MAR 2018

These references are available at the Combined Arms Center SharePoint Interoperability Library.

Endnotes

1. Chairman of the Joint Chiefs of Staff, Summary of the 2018 National Defense Strategy, 17 JAN 2018.

2. Mission Command Center of Excellence (MCCoE), *Army Mission Command Interoperability White Paper*, 9 MAY 2018.

3. Ibid.

4. NATO Allied Administrative Publication [AAP]-39, N*ATO Handbook of Land Operations Terminology*, 04 DEC 2015.

5. JP 3-16, *Multinational Operations*, 01 MAR 2019.

6. MPAT, *Multinational Force Standing Operating Procedures Version 3.3*, 15 NOV 2019.

7. Army Doctrine Publication (ADP) 3-0, *Operations,* 31 JUL 2019.

8. DoD Instruction 8110.01, *MPE Information Sharing Capability Implementation for the DoD*, 25 NOV 2014.

CHAPTER 1

INTEROPERABILITY FRAMEWORK

Operations conducted by a multinational force (MNF) require coordination among all entities. Coordination occurs in all phases of the operation from planning and deployment to redeployment. MNF commanders and their staff involve their multinational partners as much as needed. Exchanging information among multinational formations must occur as soon as possible.

Field Manual (FM) 3-16,
The Army in Multinational Operations,
08 APR 2014

The interoperability framework is formed by three dimensions: procedural (e.g., doctrine and procedures), human (e.g., language and training, Mission Partner Coordination Center [MPCC]), and technical (e.g., hardware and systems). This handbook primarily addresses multinational interoperability at operational through tactical echelons. The human dimension addresses the structure of organizations, which are created to address the additional complexity of multinational operations. The technical dimension addresses the tools that enable improved information sharing and situational understanding between multinational partners.

Multinational Operations and the Operations Process

Multinational operations present challenges and demands throughout the operations process. These include cultural and language issues, interoperability challenges, national caveats on the use of respective forces, the sharing of information and intelligence, and rules of engagement. Establishing standard operating procedures (SOPs) and liaison with multinational partners is critical to effective command and control. When conducting the operations process within a multinational training or operational setting, Army commanders should be familiar with and employ multinational doctrine and standards ratified by the U.S. For example, Allied Tactical Publication 3.2.2, *Command and Control of Land Forces,* applies to Army forces during the conduct of North Atlantic Treaty Organization (NATO) operations.

Army Doctrine Publication (ADP) 5-0,
The Operations Process,
31 JUL 2019

As stated in ADP 5-0, "Multinational operations are driven by common agreement among the participating alliance or coalition partners. While each nation has its own interests and often participates within the limitations of national caveats, all nations bring value to an operation." Multinational operations present challenges and demands that U.S. leaders resolve through the operations process. There is no single solution or technology that can be used to overcome these challenges and achieve interoperability. An effective combination of human, procedural, and technical solutions that works for one operation may not be appropriate for a different mission, echelon, or mix of mission partners. However, by considering and accounting for the different interoperability factors, and applying existing doctrine during multinational operations, Army forces can build the mutual trust and confidence, shared understanding, and unity of effort that is necessary to effectively execute operations with multinational partners.

Incorporating and integrating the three dimensions of the interoperability framework into the existing processes, staff organizations, and digital tools reduces confusion, minimizes learning curve effects, and improves the overall effectiveness of multinational operations.

Key considerations and outcomes from this approach to interoperability include—

- Identifying and integrating mission partners early in planning and preparation.
- Coordinating and implementing a comprehensive liaison plan early.
- The standup of multinational interoperability (MNI) coordinating organizations (e.g., MPCC) as appropriate, based on mission analysis.
- Selecting relevant standards and tactics, techniques, and procedures (TTP) from existing bi- or multilateral agreements (e.g., American, British, Canadian, Australian, and New Zealand [ABCANZ], NATO, and Multinational Planning Augmentation Team [MPAT]) to serve as a baseline to be tailored for the specific operational environment, mission partner capabilities and limitations, and mission.
- Developing and training collaborative coalition rules of engagement (ROE).
- Executing collaborative Mission Partner Environment (MPE) technical planning and development (i.e., mission network architecture with associated joining, membership, and exiting instructions [JMEI], common operational picture [COP], and common services).

- Developing and rehearsing common TTP and SOPs across the warfighting functions (WfFs) (emphasis is currently on command and control, intelligence fusion, fires, and sustainment).
- Developing and rehearsing a coalition information management (IM)/ knowledge management (KM) plan.
- Determining coherent releasability disclosure policy.

The MPE technical solutions demonstrated during fiscal year (FY)18 and FY19 multinational exercises resulted in effective coalition networks and common services, and enabled an accurate and timely coalition COP. However, the near exclusive focus on developing and demonstrating these technical solutions highlighted gaps and shortfalls in required human and procedural interoperability solutions. These shortcomings inhibited effective and efficient multinational operations. During FY18 and FY19 exercises, units failed to account for the additional complexity of interoperability, especially during planning, with cascading effects during preparation and execution. For example, during FY18 exercises, without a common coalition-wide KM plan, units omitted staff rehearsals during preparation and were challenged during execution by seemingly routine tasks, such as status reporting and requesting support. While most of the command and control, intelligence, and fires functions were accomplished on a Secret// Releasable (S//REL) network during FY19 exercises, shared understanding among unified action partners (UAPs) was insufficient for conducting multi-domain operations.

PROCEDURAL

To ensure effective planning for interoperability integrated with operational planning, units conducting operations with multinational UAPs must integrate interoperability into the operations process. This integration is shown at a high level in Figure 1-1. Detailed considerations on planning, preparing, executing, and assessing are included in Chapter 2 of this guide.

Applying the operations process to multinational operations is not a new idea. Both the MPAT MNF SOP and the ABCANZ Headquarters Handbook, October 2016, advocate using the operations process in multinational operations. However, adding interoperability framework to the operations process, to address the complexities of multinational operations, is an emerging notion intended to enhance interoperability.

Figure 1-1. Interoperability integrated into the operations process

Integrating the three dimensions of the interoperability framework within the operations process has several advantages:

- The operations process is already trained and well-understood by U.S. Army leaders and allies.
- Integration aids the identification, planning, and development of required common products, processes, and tools, which support interoperability and coalition command and control.
- The early inclusion of mission partners sets the conditions (mutual trust and confidence, shared understanding, and unity of effort) for successful execution of the commander's plan and unit mission.
- The continuous assessment enables early identification and correction of interoperability gaps and shortfalls.

HUMAN

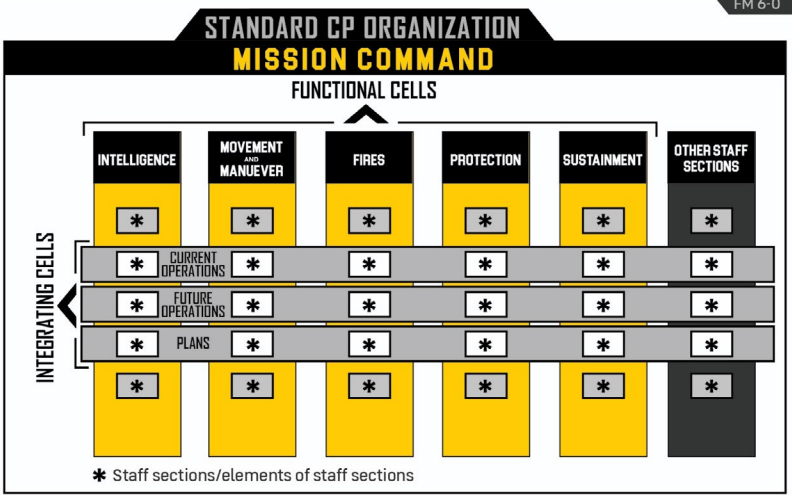
Ad hoc structures are created to specifically address the additional complexity of multinational operations, which is a subset of the second dimension of the interoperability framework. Joint Publication (JP) 3-16, *Multinational Operations,* 01 MAR 2019, recommends creating a multinational coordination center (MNCC) as a means for increasing MNF coordination. "It is a proven means of integrating the participating nations' military forces into the multinational planning and operations processes, enhancing coordination and cooperation, and supporting an open and full interaction within the MNF structure… Additional coordination centers may be established to coordinate multinational logistics, functional areas, and media affairs."

To ensure desired integration of mission partners into the operations process, the U.S. lead unit commander establishes a MPCC after receiving the mission early in the planning phase of a multinational operation. The structure of the MPCC depends on the number of mission partners, desired levels of interoperability, time available, etc. Mission partners are invited to participate in the MPCC to assist with collaborative mission analysis and plan development. As shown in Figure 1-2, this collaborative structure is based on the integrating cell concept from a U.S. command post, in this case, integrating across WfFs, specialty functions, and mission partners.

THE STANDARD CP includes functional cells aligned to WfFs and other capabilities/staff functions, along with integrating cells (e.g., current operations, future operations, and plans cells).

ADDITIONAL STRUCTURES, such as an air targeting working group or joint air ground integration cell, are established to coordinate, prioritize, plan and assess the employment of specific capabilities (e.g., fixed-and rotary-wing aviation, information operations, intelligence fusion, etc.)

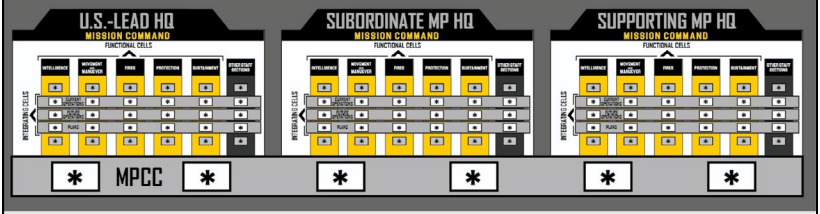
FM 6-0



ADDRESSING THE COMPLEXITIES OF MULTINATIONAL OPERATIONS

MULTINATIONAL OPERATIONS require that the CP adds another integrating cell (e.g., MPCC) with membership across the unit's mission partners. Based on the interoperability requirements, the CP may also create planning teams, working groups, boards, and cells that are subordinate to the MPCC.

THESE WORK TO COORDINATE planning, preparation, execution, and assessment of mission partner operations, (i.e., MPE working groups, TTP planning teams by WfF, liaison cells to coordinate and monitor liaison missions, ROE planning teams, etc.)



LEGEND:

CP	command post	MPE	mission partner environment
HQ	headquarters	ROE	rules of engagment
FM	field manual	TTP	tactics, techniques, and procedures
MP	mission partner	WfF	warfighting function
MPCC	Mission Partner Coordination Center		

Figure 1-2. Mission partner coordinating structure.[1]

The MPCC recommends establishing additional subordinate structures after mission analysis to ensure effective and coordinated planning, preparation, execution, and assessment of multinational operations across WfFs and specialty functions. Figure 1-3 provides examples of additional interoperability working groups and planning teams, with likely associated tasks and responsibilities. The MPCC makes these recommendations based on interoperability requirements identified during mission analysis.

To prepare for future multinational operations, unit commanders may establish multinational operations coordinators—additional duties for select personnel across functional and specialty staff sections—and appoint a multinational operations director from unit senior leadership. These staff members train in advance of multinational operations and develop the unit multinational operations SOP, so that upon receipt of a multinational mission they are prepared to serve on the MPCC and lead coordination efforts between the unit and their mission partners.

Not all units participating in a multinational operation or MPE will require additional structure. Structure requirements are identified during mission analysis, and are based on command relationships and target levels of interoperability. For example, during Warfighter Exercise (WFX) 18-4, 4th Infantry Division (4ID) shared a flank with 3rd Division United Kingdom (3UK). During their mission analysis, 4ID planners identified several potential friction points requiring coordination with 3UK, to include maintaining maneuver synchronization, handoff of enemy prisoners and displaced persons, developing secure communications to support planning and preparation, and cross-boundary fire support. The 4ID commander and staff officers coordinated with their 3UK counterparts to develop effective procedural and technical solutions, without need for additional structure.

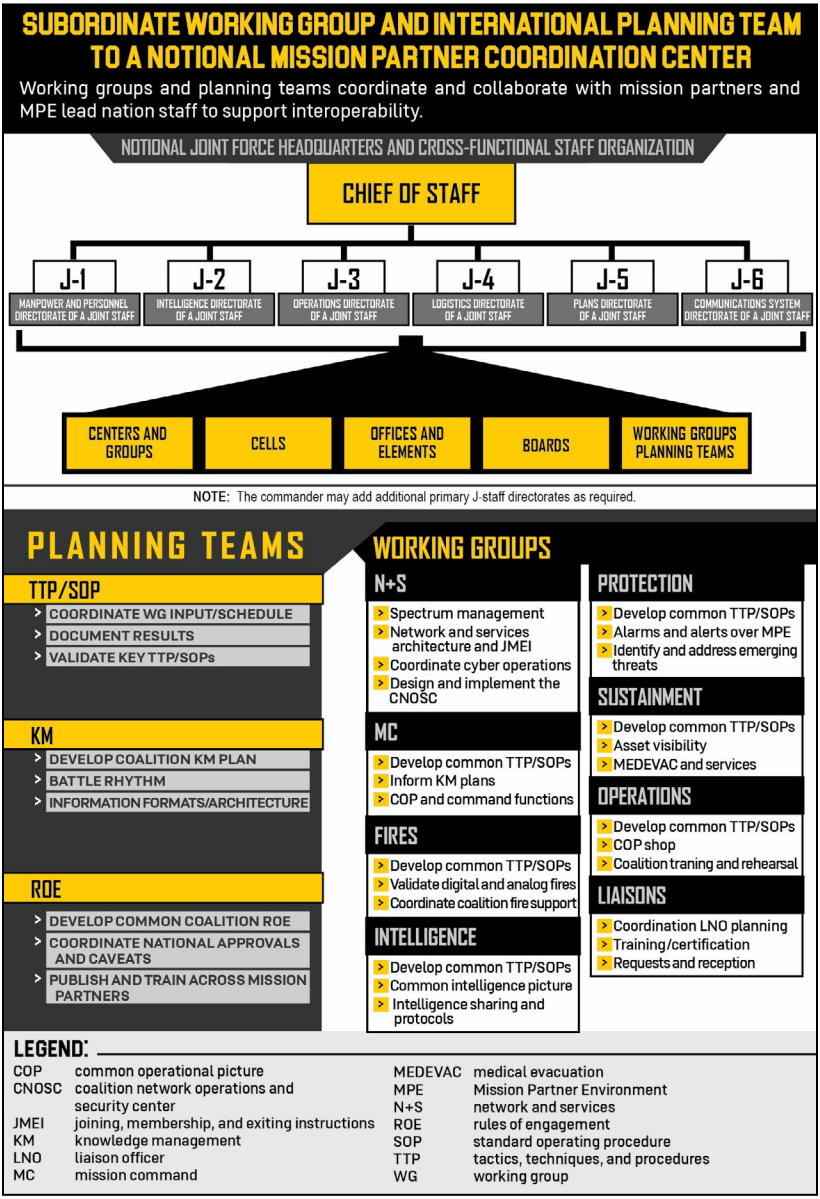


Figure 1-3. Example working groups and planning teams

In general, the MPCC charter is meant to ensure effective interoperability through collaborative planning, coordinated preparation, integrated execution, and continuous assessment of operations between mission partners. The lead nation should provide a senior officer (e.g., deputy commanding general or chief of staff at a division or higher echelon) to chair the MPCC. Remaining members should be trusted agents or action officers that have been designated by each of the operations' mission partners. The MPCC ensures information, analysis, plans, and assessments are integrated with the applicable staff elements and across mission partners during all phases of the operation to ensure MPCC products and activities support coalition operations.

TECHNICAL

Emerging technical solutions enable improved information sharing and situational understanding between mission partners. These tools are usually based on, or incorporate products from, ongoing multilateral interoperability efforts, such as the Multilateral Interoperability Programme (MIP). MIP is a consortium of 29 NATO and non-NATO nations that meet quarterly to define interoperability specifications for the exchange of a COP and other operational information to support echelons from corps to battalion. Although not an exhaustive list, Appendix C has some current key technical solutions that are under development in support of Army interoperability.

SUMMARY

The interoperability framework and solutions proposed in this guide address the human and procedural interoperability gaps and shortfalls observed during FY18 and FY19 MNI exercises. To achieve desired levels of interoperability across mission partners and WfFs, units should apply the appropriate procedures and establish the necessary organizations and structures based on interoperability requirements. This should be done with consideration to the available technical solutions and be dependent on mission specifics, such as mission partners, time available, organic assets, external resources available, Army priorities, etc.

Endnote

1. FM 6-0, *Commander and Staff Organization and Operations*, 05 MAY 2014

CHAPTER 2

THE OPERATIONS PROCESS

> The operations process, while simple in concept, is dynamic in execution. Commanders must organize and train their staffs and subordinates as an integrated team to simultaneously plan, prepare, execute, and assess operations. Multinational operations present challenges and demands throughout the operations process.
>
> Army Doctrine Publication (ADP) 5-0
> *The Operations Process*
> 31 JUL 2019

The operations process framework consists of planning, preparing, executing, and continuously assessing the operation. Commanders, staffs, unified action partners (UAPs), and subordinate headquarters (HQ) employ the operations process to organize efforts, integrate warfighting functions (WfFs) across multiple domains, and synchronize forces to accomplish the mission. The operations process is used to drive the conceptual and detailed planning that is necessary to understand the operational environment; to visualize and describe the operation's operational approach; to make and articulate decisions; and to direct, lead, and continually assess operations. The activities of the operations process are not discrete, they overlap and recur as circumstances demand.

The following sections examine each piece of the operations process framework to identify the who, what, and why of the key interoperability activities. Two use cases are employed to provide examples. These theoretical examples are based on results from a range of multinational exercises.

Use Cases

These use cases are grounded in potential, near- to mid-term conflicts, and are utilized to illustrate the main points of this guide. These use cases focus on interoperability, and therefore contain only the essential operational information to give context to the interoperability activities presented across the operations process.

Use Case 1. The U.S. X Corps received a warning order (WARNORD) to be prepared to conduct large-scale combat operations in a mature theater no earlier than 90 days from mission receipt. X Corps will serve as a coalition/combined task force (CTF) HQ, with one U.S. division (8th Infantry Division [8ID] with three armored brigade combat teams, one Stryker brigade combat team [SBCT], aviation brigade, fires brigade, etc.) and one UK division (7th Armored Division [7AD] with three armored infantry brigades, etc.). X Corps will conduct tactical tasks as part of a larger coalition ground force, and subordinate to a U.S.-led combined joint forces land component command. U.S. X Corps, 8ID, and the additional support units will deploy from the continental U.S., and the UK 7AD will deploy from its base in Wales. Movement is to begin no earlier than 30 days from notification. Entry into the designated area of operations (AO) is not expected to be opposed; however, X Corps must be prepared for combat operations within 10 days after arrival in theater. Due to current materiel and policy constraints, X Corps is tasked to develop and implement its own Mission Partner Environment (MPE) mission network, common services, common operational picture (COP), and data-sharing capabilities.

Use Case 2. The 7th Cavalry Regiment (7th CAV) is a forward-deployed unit intended to deter regional aggression and provide a rapid U.S. response in case deterrence fails. Rising tensions in the region cause the President to order the deployment of the regiment into a neighboring, non-allied nation (Atropia) at the request of that nation's civilian leadership. While other allied and non-allied military forces may eventually respond to Atropia's request for military support, there will likely be no United Nations (UN) mandate or alliance agreement (at least initially) to guide command relationships or trigger agreed-to standards. Through the U.S. Army Europe Command (USAREUR), 7th CAV is ordered to conduct ground operations to defend Atropian territory from aggression. Self-defense is authorized at all times, but no U.S. forces may cross the currently recognized international boundary. Direct coordination with Atropian defense forces is also authorized.

When conducting the operations process within a multinational training or operational setting, Army commanders should be familiar with and employ multinational doctrine and standards ratified by the U.S. For example, Allied Tactical Publication 3.2.2, *Command and Control of Allied Land Forces,* 15 DEC 2016, applies to Army forces during the conduct of North Atlantic Treaty Organization (NATO) operations. See Field Manual (FM) 3-16, T*he Army in Multinational Operations,* 08 APR 2014, for a detailed discussion on multinational operations.

PLAN

> Planning is the art and science of understanding a situation, envisioning a desired future, and laying out effective ways of bringing that future about.
>
> ADP 5-0

Planning for interoperability begins with the receipt of mission, which directs the unit to conduct an operation with one or more UAP, and it continues throughout the remaining steps of the military decisionmaking process (MDMP). Interoperability adds a complexity to the operations process that the commander and staff must address and integrate into the activities associated with the planning, preparation, execution, and assessment of a given mission or operation.

Commanders and staffs integrate the WfFs and synchronize the force to adapt to changing circumstances throughout the operations process. During planning, the MDMP integrates the commander and staff in a series of steps to produce a plan or order.

Figure 2-1 on the following pages shows the MDMP process, to specifically highlight the key interoperability planning inputs and outputs.

Figure 2-1. MDMP with interoperability considerations[1]

INTEROPERABILITY PLANNING KEY INPUTS	KEY INPUTS	STEPS	KEY OUTPUTS	INTEROPERABILITY PLANNING KEY OUTPUTS
▪ BY MISSION PARTNER, ADDITIONAL CAPABILITIES AND CAPACITY REQUIRED BY OPERATIONAL COA ▪ MISSION PARTNER FEEDBACK ON INITIAL COMMON PLANS	▪ UPDATED RUNNING ESTIMATES ▪ REVISED PLANNING GUIDANCE ▪ COA STATEMENTS AND SKETCHES ▪ UPDATED ASSUMPTIONS	STEP 4 COA ANALYSIS	▪ REFINED COAS ▪ POTENTIAL DECISION POINTS ▪ WARGAME RESULTS ▪ INITIAL ASSESSMENT MEASURES ▪ UPDATED ASSUMPTIONS	▪ INTEROPERABILITY ASSESSMENT FOR EACH OPERATIONAL COA ▪ REFINED COMMON PLANS ▪ MISSION PARTNER SUPPORT REQUIREMENTS, BY OPERATIONAL COA ▪ REFINED INTEROPERABILITY ASSESSMENT PLAN ▪ REFINED FORCE LIAISON, TRAINING, AND REHEARSAL PLANS
▪ MISSION PARTNER FEEDBACK ON OPERATIONAL COAS ▪ MISSION PARTNER FEEDBACK ON REFINED COMMON PLANS, ASSESSMENT PLAN, AND LIAISON, TRAINING, AND REHEARSAL PLANS	▪ UPDATED RUNNING ESTIMATES ▪ REFINED COAS ▪ EVALUATION CRITERIA ▪ WARGAME RESULTS ▪ UPDATED ASSUMPTIONS	STEP 5 COA COMPARISON	▪ EVALUATED COAS ▪ RECOMMENDED COAS ▪ UPDATED RUNNING ESTIMATES ▪ UPDATED ASSUMPTIONS	▪ EVALUATED AND RECOMMENDED COAS WITH MISSION PARTNER INPUT ▪ UPDATED COMMON PLANS, ASSESSMENT PLAN, LIAISON, TRAINING, AND REHEARSAL PLANS
▪ EVALUATED AND RECOMMENDED COAS WITH MISSION PARTNER INPUT ▪ UPDATED COMMON PLANS, ASSESSMENT PLAN, LIAISON, TRAINING, AND REHEARSAL PLANS	▪ UPDATED RUNNING ESTIMATES ▪ EVALUATED COAS ▪ RECOMMENDED COAS ▪ UPDATED ASSUMPTIONS	STEP 6 COA APPROVAL	▪ COMMANDER APPROVED COA AND ANY MODIFICATIONS ▪ REFINED COMMANDER'S INTENT, CCIRS, AND EEFIS ▪ UPDATED ASSUMPTIONS	▪ MISSION PARTNER CONSIDERATIONS, SPECIFIED TASKS, AND COORDINATING INSTRUCTIONS ▪ APPROVED COMMON PLANS, INTEROPERABILITY ASSESSMENT PLAN, LIAISON, TRAINING AND REHEARSAL PLANS
▪ MISSION PARTNER CONSIDERATIONS, SPECIFIED TASKS, AND COORDINATING INSTRUCTIONS ▪ APPROVED COMMON PLANS, INTEROPERABILITY ASSESSMENT PLAN, LIAISON, TRAINING, AND REHEARSAL PLANS	▪ COMMANDER APPROVED COA AND ANY MODIFICATIONS ▪ REFINED COMMANDER'S INTENT, CCIRS, AND EEFIS ▪ UPDATED ASSUMPTIONS	STEP 7 ORDERS PRODUCTION, DISSEMINATION, AND TRANSITION	▪ APPROVED OPERATION PLAN OR ORDER ▪ SUBORDINATES UNDERSTAND THE PLAN OR ORDER	▪ COMPLETE PLANS OR ORDERS FOR KM, ROE, MPE NETWORK JMEI AND ASSOCIATED DATA, SECURITY, AND SERVICES PLANS, COMMON TTP, ASSESSMENT, AND LIAISON, TRAINING, AND REHEARSAL PLANS ▪ WAIVERS, ACCREDITATIONS, AND AUTHORITIES REQUESTED OR APPROVED

WARNORD

LEGEND:

CCIR	commander's critical information requirement
CID	combat identification
COA	course of action
DLD	digital liaison detachment
EEFI	essential elements of friendly information
IER	information exchange requirement
IFF	identification, friend or foe
IPB	intelligence preparation of the battlespace
JMEI	joining, membership, and exiting instructions
KM	knowledge management
MPCC	Mission Partner Coordination Center
MPE	Mission Partner Environment
PMESII	political, military, economic, social, information, and infrastructure
ROE	rules of engagement
TTP	tactics, techniques, and procedures

RECEIPT OF MISSION

> Commanders initiate the MDMP upon receipt or in anticipation of a mission. This step alerts all participants of the pending planning requirements, enabling them to determine the amount of time available for planning and preparation and decide on a planning approach, including guidance on using Army design methodology and how to abbreviate the MDMP, if required. When commanders identify a new mission, commanders and staffs perform the actions and produce the expected key outputs.
>
> FM 6-0

Planning for interoperability begins with the receipt of a mission directing the unit to conduct an operation with one or more UAP. The commander and staff review and analyze the received plans and orders to determine the unit's mission partners, task organization, command structure, and command relationships between the unit and its mission partners. Based on the identified mission partners and relationships, the commander must decide whether to establish additional ad hoc structures (e.g., a Mission Partner Coordination Center [MPCC]) to support interoperability, or rely on direct coordination between unit and mission partner staff elements to conduct the required interoperability planning and preparation. Additional factors considered in this decision include—

- Previous training and operational experience with mission partners (recent experience, mission types, leader turnover, etc.).
- Time available for establishing coordination, planning, and preparation.
- Desired interoperability level(s) by WfF at echelon.
- Complexity of operations and the operational environment.

Based on the available information, the commander and staff conduct initial coordination with the identified mission partners. They should conduct the following—

- Exchange unit and staff element point-of-contact information, and coordinate planning the battle rhythm.
- Coordinate and initiate staff and liaison officer exchanges.
- Coordinate and develop initial secure communications (i.e., network for planning, shared repository for information sharing during planning, etc.). (The Enterprise MPE is intended to facilitate this type of operational planning and information sharing.)

- Identify and share mission analysis information requirements (i.e., information needed to conduct effective mission analysis with mission partners). This includes national data such as force capabilities, limitations, caveats, and identification, friend or foe (IFF) and combat identification (CID) information.

Figure 2-2. Receipt of mission

Receipt of Mission Outputs

The unit issues a WARNORD to subordinate units and mission partners based on the received plan or order. This WARNORD communicates the higher HQs mission, the initial plan for communications during planning, task organization, and mission partner relationships. The unit initiates contact, information sharing, and exchange of liaisons with its mission partners. The commander, supported by staff recommendations, decides to establish an ad hoc structure to support mission partner interoperability, or directs applicable staff elements to coordinate directly with their mission partner counterparts to address specific, limited interoperability requirements.

The receipt of mission step is normally focused on alerting participants to pending planning requirements, developing a "plan to plan." Without mission partners, identification of mission and task organizations would not occur until the mission analysis step. However, in order to include mission partners in the planning process (which is essential to effective interoperability), the commander and staff must identify and initiate communications with their identified mission partners as soon as possible after mission receipt, and include them in developing the overall "plan to plan."

Use Case 1. Upon mission receipt, the X Corps commander directs the corps chief of staff (COS) to establish and lead an MPCC, and initiate coordination with both subordinate U.S. and UK divisions, to include the immediate exchange of staff officers from fires, G-6, G-3/5, G-2, and G-4 sections. X Corps also begins coordination and liaison exchanges with Joint Task Force-West (JTF-W), its superior HQ for the operation regarding operational planning; existing common plans (JTF-W rules of engagement [ROE], knowledge management [KM] plan, standard operating procedures [SOPs], etc.); and reception, staging, onward movement, and integration (RSOI) upon arrival. The commander also identifies several requests for information (RFIs) to inform mission analysis, to include—

- What are UK national caveats and ROE considerations?
- What is the UK division force structure, equipment list, capabilities, and limitations across WfFs?
- Is the UK division equipped and prepared to execute coalition fires with Artillery Systems Cooperation Activities (ASCA)?

X Corps issues a WARNORD to initiate deployment, operational, and interoperability planning. This WARNORD includes orders to immediately develop secure digital communications and file sharing capability between X Corps and subordinate units, to include 7AD (UK), using the Enterprise MPE. The commander includes guidance to achieve Level 3 (Integrated) interoperability between X Corps and the UK 7AD, and at a minimum Level 2 (Compatible) interoperability between the U.S. 8ID and UK 7AD.

Use Case 2. 7th CAV identifies the national forces from Atropia as their mission partner, but initially without a specific command relationship, AO, or operational mission. 7th CAV has an existing operation plan for this contingency, which the commander initiates to direct movement and support of the unit's deployment to an assembly area in the western portion of Atropia. The commander and regimental staff coordinate the required permissions and clearances to begin movement. In order to directly and quickly address the mission's operational ambiguity, the 7th CAV commander conducts direct coordination with the Atropian Minister of Defense and the ground forces commander. Based on this coordination, 7th CAV is asked to conduct an area defense along a 60 kilometer (km) stretch of the eastern Atropian border identified by the Atropian G-2 as, "having the most likely routes the enemy will take to achieve their stated objectives [liberate like-ethnicities and seize key natural resources], based on the terrain, road networks, and previous enemy operational patterns." The 7th CAV commander agrees to this mission, with an Atropian promise to provide "whatever the regiment needs" following mission analysis. 7th CAV exchanges liaison officers with the Atropian Ground Forces Command and 1st Atropian Mechanized Division (1AMD), the unit responsible for defending behind the 7th CAV. The commander issues a WARNORD providing available operational information and RFIs for staff and subordinates, to include—

- What additional U.S. and Atropian support is required to accomplish the mission?
- How do we integrate intelligence collection and fusion with the Atropian intelligence system and processes?
- How do we integrate U.S. and Atropian fires against enemy ground forces in Atropian territory; against enemy air defense, artillery, missile, and rocket assets firing into Atropian airspace/territory; and against enemy unmanned aircraft systems (UASs) in Atropian airspace?

Receipt of Mission Checklist

☐ Determine the unit's mission partners and task organization, command structure, and command relationships between the unit and mission partners.

☐ The commander decides to establish additional ad hoc structure (e.g., an MPCC) to support interoperability, or rely on direct coordination between unit and mission partner staff elements to conduct required interoperability planning and preparation.

☐ The unit conducts initial coordination and staff/liaison exchanges with mission partners.

☐ The unit identifies mission analysis information requirements and shares these requirements with subordinates and mission partners.

☐ The unit issues a WARNORD to subordinates and mission partners.

MISSION ANALYSIS

> Commanders (supported by their staffs and informed by subordinate and adjacent commanders and by other partners) gather, analyze, and synthesize information to orient themselves on the current conditions of the operational environment. The commander and staff conduct mission analysis to better understand the situation and problem, and identify what the command must accomplish, when and where it must be done, and most importantly why—the purpose of the operation.
>
> FM 6-0

As noted in Joint Publication (JP) 3-16, *Multinational Operations*, 01 MAR 2019, mission analysis is "… one of the most important tasks in planning multinational operations and should result in a revised mission statement, commander's intent, and planning guidance." The intention of interoperability within mission analysis is to determine the requirements that are necessary to achieve the desired levels of interoperability between the unit and its mission partners across WfFs, using the available human, procedural, and technical solutions. Critical information to determine interoperability requirements may include—

- What are the relevant, agreed-to standards between the U.S. and its mission partners (e.g., network, to include joining, membership, and exiting instructions [JMEI]; data; tactics, techniques, and procedures [TTP]; and KM)? Do any agreements conflict with one another based on the force composition (e.g., North Atlantic Treaty Organization [NATO] versus non-NATO)?
- If there are no current agreements in place, what existing standards (American, British, Canadian, Australian, and New Zealand [ABCANZ] agreements, NATO standardization agreements [STANAGs], or Multinational Planning Augmentation Team [MPAT] SOPs) can be used as a baseline for tailoring the specific circumstances (e.g., specific mission partners and available digital technologies)?
- For each mission partner, what are their force capabilities, limitations, national caveats (constraints on mission type, munitions, or relationships), IFF, and CID profiles (descriptions and current pictures of mission partner vehicles, uniforms, weapons, insignia, etc.)?

- What are the U.S. and mission partner laws, policies, regulations, and higher guidance that can impact developing and implementing interoperability solutions?
- What are the available human, procedural, and technical solutions to achieve interoperability?

The MPCC and staff elements integrate their mission analysis with operational planners who ensure operational needs drive interoperability requirements. For example, if a mission partner is reliant on the U.S. for long-range artillery support and counter-battery fires, then the MPCC must identify the requirement for integrated fires with that mission partner and determine potential solutions to meet this requirement. Planners must prioritize the interoperability requirements that the unit must meet in order to support the desired levels of interoperability across WfFs.

Based on the identified interoperability requirements, functional and special staff develop lists of interoperability information exchange requirements (IERs) (i.e., the necessary inputs and outputs to support interoperability processes). Both KM and network planners include these IERs in course of action (COA) development and analysis to ensure their products (KM plan, network architecture, and common services) support sharing IERs that are critical to achieving the desired levels of interoperability. Unit foreign disclosure officers (FDOs) review interoperability IERs for disclosure requirements, and plan FDO support based on disclosure policy. An example of a potential interoperability IER and disclosure review comments are shown in Appendix B.

In addition, as part of mission analysis, the MPCC may recommend the stand-up of additional working groups, planning teams, boards, or committees for commander approval. These would be used to address specific interoperability planning, process, and WfF requirements.

The MPCC reviews and analyzes the higher HQ order to identify the provided interoperability plans and guidance (i.e., a force KM plan, theater ROE, or higher HQ network communications plan). If required plans are not available from higher HQ; lack required details; or fail to account for mission partner capabilities, limitations, or caveats, then the MPCC must coordinate with the mission partners to produce or refine required plans.

The MPCC identifies and communicates external resource requirements. External resources to support interoperability might include—

- Digital liaison detachments (DLDs) to provide Level 2 (Compatible) interoperability with disadvantaged mission partners.
- Translators, foreign area officers, FDOs, and functional area staff and liaison officer augmentation.
- Network and communications hardware (network extension packages, hard drives, servers, etc.) to enable development and operation of the expeditionary MPE for the current named mission. (See the Army MPE concept of operations [CONOPS] for a detailed discussion of the Expeditionary MPE.)
- Network and communications hardware, software, and support personnel to enable DLD operations with a disadvantaged partner, provide network communications capability to a disadvantaged partner, or increase U.S. forces information processing and transport capability and/or capacity based on operational requirements.
- Additional functional support (i.e., sustainment; medical; artillery; engineering; air defense; chemical, biological, radiological, and nuclear [CBRN] defense; or other mission critical capabilities or increased capacity) based on mission partner limitations and the operational environment.

The MPCC assists the applicable unit staff elements in the identification, request, and scheduling for waivers, accreditation, and authorization to operate requirements in training and rehearsal requirements, in strategic and operational transportation, and in other interoperability-related preparations.

During mission analysis, the commander, supported by the MPCC and operational planners, identifies any required or desired changes to the mix of mission partners, the command structure and authorities, or the task organization that will improve interoperability, improve the force's warfighting capabilities, and/or reduce external resource requirements. The unit initiates coordination and approval for these changes with their higher HQ and mission partner national command authorities.

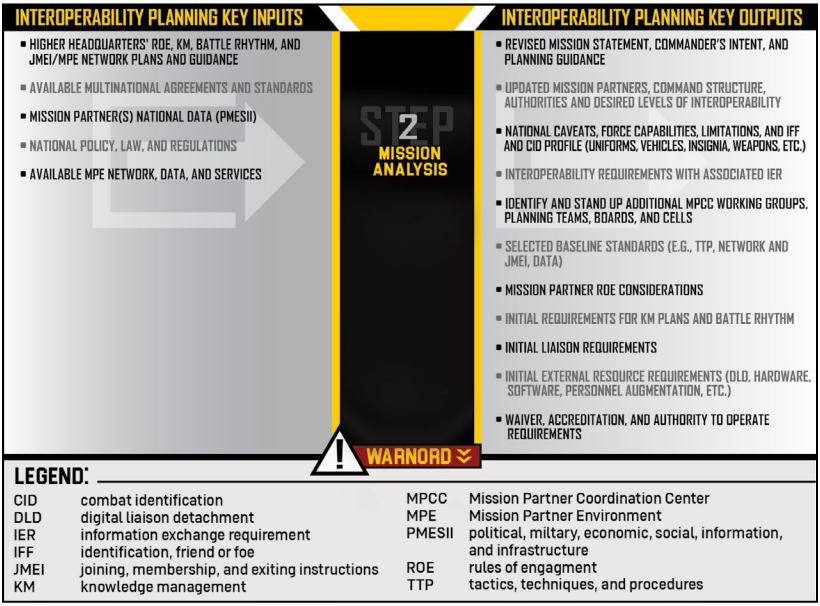


Figure 2-3. Mission analysis

Mission Analysis Outputs.

The unit issues a WARNORD enabling the commander, staff, and mission partners to share understanding regarding interoperability planning requirements; national force capabilities, limitations, and caveats; selected baseline standards and agreements to be used in developing the MPE; relevant enabling and inhibiting laws, regulations, and policy; and the coalition force's organization and responsibilities to address interoperability requirements.

Use Case 1. X Corps staff identify the relevant ABCANZ standards to guide network and common services planning, JMEI, KM planning, and common TTP/SOP development. The U.S. and UK staffs exchange capability and limitation information to inform operational planning, along with picture files of current equipment, uniforms, and vehicles to aid in IFF/CID training. UK national caveats are identified and inform operational planning and revisions to the JTF-W-provided ROE. The MPCC incorporates JTF-W and UK input into KM, intelligence, fires, protection, and sustainment planning. The MPCC aggregates subordinate and staff external resource requirements, to include—

- DLD to support UK 7AD, augmented to support continuous operations and two command posts (CPs) simultaneously.
- Joint and Army staff augmentation to support a corps joint operations center, a joint air-ground integration center (JAGIC), a coalition network operations and security center (CNOSC), a COP Technical Assurance Cell (CTAC), and additional joint terminal attack controllers (JTACs) to support 7AD.
- An infantry brigade combat team (IBCT), to provide dedicated consolidation area defense (corps and division support area defense, point defense of critical soft capabilities, and other area security tasks).
- Additional CBRN units (i.e., reconnaissance and decontamination).
- Additional mission partner support (e.g., displaced person [DP] support, traffic control, enemy prisoner of war [EPW] movement and detention).

Subordinate units, functional, and specialty staff provide the knowledge management officer (KMO) and the MPCC with its draft processes, to include associated information exchange requirements to guide KM, network architecture, and common services planning. X Corps publishes a WARNORD that includes updated interoperability planning guidance.

Use Case 2. Given the lack of pre-existing agreements and time constraints, 7th CAV coordinates with Atropian defense forces for the use of U.S. TTP/SOPs, communications standards, and KM products. In coordination with Atropian civil, legal, and military staff, 7th CAV collaboratively develops ROE to protect non combatants and avoid violation of existing boundaries, but enable effective response to enemy forces entering or firing into Atropian territory.

The commander prioritizes developing and rehearsing critical TTP to include—

- Rapid acquisition and engagement of enemy air defense, rocket, missile, and long-range artillery.
- Rapid identification and neutralization of enemy UASs in Atropian airspace.
- Passage of lines (i.e.,1AMD moving forward to complete destruction of enemy and restore border, and/or 7th CAV moving rearward to avoid decisive engagement).
- Deception operations (i.e., establish false CPs, networks, defensive positions, and obstacles).
- Protection TTP against enemy "fire attacks" (i.e., eliminate the enemy UAS then rapid ground force repositioning cued by enemy rocket artillery movement into firing positions).

In order to accomplish its mission, 7th CAV requests the following U.S. and Atropian support—

- An Atropian tank battalion subordinate to 7th CAV, to provide additional lethality to the forward defense.
- Two DLDs with an FDO and network support augmentation; one located with the Atropian defense force HQ and another with 1AMD.
- Joint augmentation, to establish an Air Support Operations Center (ASOC), with 12 total JTACs, and commitment of 80 plus close air support (CAS) and interdiction sorties per day after hostilities are initiated, with additional suppression of enemy air defense (SEAD) and air superiority sorties per U.S. Air Force (USAF) planning estimates.
- Army staff augmentees, to provide additional technical and functional liaison with the Atropian defense force HQ and 1AMD.
- Enterprise-level cyber augmentation, with capabilities to provide cyber defense and offensive options.

7th CAV publishes a WARNORD with refined operational planning guidance to support COA development, and interoperability guidance to support coordination and execution of required TTP.

Mission Analysis Checklist

- ☐ Determine the relevant agreed-to standards between U.S. and mission partners.
- ☐ If no common standards, determine a baseline standard to tailor to the specific circumstances.
- ☐ Determine the force capabilities, limitations, and national caveats of each mission partner to enable shared understanding and unity of effort.
- ☐ Determine the laws, policies, regulations and higher guidance, with impact on interoperability solutions.
- ☐ Examine higher HQ order for interoperability guidance (i.e., force KM plans, theater ROE, network architecture, COP data standards, etc.).
- ☐ Identify mission-critical interoperability requirements with associated IER for use in KM and network planning.
- ☐ Determine external resource requirements (i.e., DLDs, translators, network hardware, etc.).
- ☐ Identify changes to mission partner mix, command structure, authorities, and task organization to improve interoperability.
- ☐ Publish a WARNORD with updated interoperability requirements, identified standards, and other interoperability guidance as input to COA development.

COURSE OF ACTION DEVELOPMENT

> A COA is a broad potential solution to an identified problem. The COA development step generates options for subsequent analysis and comparison that satisfy the commander's intent and planning guidance. During COA development, planners use the problem statement, mission statement, commander's intent, planning guidance, and various knowledge products developed during mission analysis.
>
> FM 6-0

The MPCC, staff elements, and working groups and planning teams conduct interoperability COA development to meet the identified planning requirements that were determined during mission analysis. This COA development is closely tied to operational COA development, with interoperability considerations included in operational COAs, and as evaluation criteria in the next two planning phases (COA analysis and

comparison). Based on the results of mission analysis, interoperability COA development is focused on revising and completing existing plans, or developing additional required plans and products to meet identified mission-critical interoperability requirements and associated IERs (i.e., KM plans, ROE, common TTP by WfF, and a network and communications plan to support a coalition COP, common services, and other information sharing).

In conjunction with KM planning, the MPC coordinates the development of an interoperability assessment plan with key measures to inform an interoperability running estimate, to summarize information products to brief the unit commander and mission partners, and as a feedback process to invite staff and mission partner assessments and recommendations to improve interoperability across WfFs. COA development also includes developing timelines and plans for preparation activities, such as individual training (ROE, IFF and CID, system operator training), staff training (SOPs, TTP, KM, etc.), rehearsal of concept (ROC) drills, and staff exercises and rehearsals.

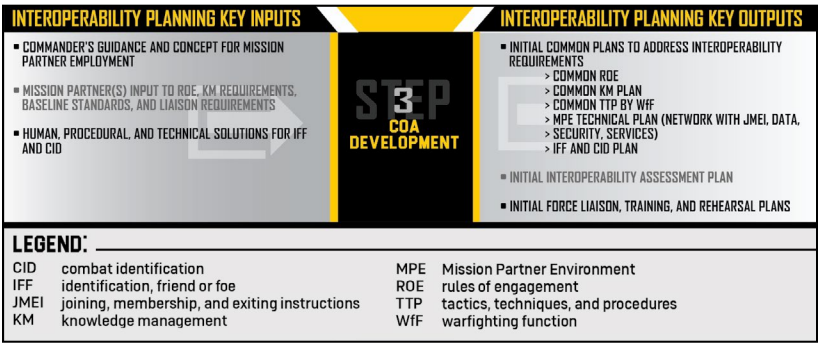


Figure 2-4. COA development

Course of Action Development Outputs

The unit coordinates with mission partners to draft required plans and orders, to include assessment plans, training plans, and rehearsal schedules to ensure mutual trust and confidence, shared understanding, and unity of effort across the coalition and throughout the operation.

Use Case 1. Corps staff support the MPCC in developing the initial common plans. U.S. and UK planners recommend several visual recognition solutions to support positive friendly force identification that are visible to day, infrared, and thermal sights. The MPCC develops the appropriate assessment criteria and measures based on mission-critical interoperability requirements (i.e., selected TTP from fires, intelligence, maneuver, protection, and sustainment WfFs), and drafts the initial liaison, training, and collective rehearsal plans with a consolidated schedule tied to unit deployment timelines. X Corps establishes a CNOSC and CTAC. The CNOSC coordinates with U.S. and UK network developers to begin implementation of the MPE technical plan.

Use Case 2. 7th CAV planners revise operational plans based on integrating 1AMD-attached tank companies with each squadron. 7th CAV staff integrate operational and interoperability assessment measures focused on critical TTP. U.S. planners develop RSOI and support plans for the arrival of DLDs and additional liaison officers to speed integration with their supported CPs and staff elements. The 7th CAV training officer collaborates with Atropian planners to develop training and rehearsal plans to support the execution of critical TTP.

Course of Action Development Checklist

- ☐ Revise the existing or draft additional plans to facilitate interoperability, as required.
- ☐ Develop an interoperability assessment plan with key measures and a focus on mission critical interoperability requirements.
- ☐ Develop initial liaison, training, and rehearsal plans.

COURSE OF ACTION ANALYSIS

COA analysis enables commanders and staffs to identify difficulties or coordination problems as well as probable consequences of planned actions for each COA being considered. It helps them think through the tentative plan. COA analysis may require commanders and staffs to revisit parts of a COA as discrepancies arise. COA analysis not only appraises the quality of each COA, but it also uncovers potential execution problems, decisions, and contingencies. In addition, COA analysis influences how commanders and staffs understand a problem and may require the planning process to restart.

FM 6-0

During COA analysis, the MPCC, staff elements, working groups, and planning teams review operational COA for interoperability implications, strengths, and weaknesses. They provide input into the wargaming of operational COAs. They also determine the relative preferences of these COAs, based on the interoperability considerations and insights that were developed during COA analysis. The review and wargame focus on the mission-critical interoperability requirements that were identified during mission analysis and include the analysis of factors such as feasibility, suitability, complexity, and risk for each operational COA. Planners also identify any unique mission partner support requirements by operational COA, based on specific mission partner tactical tasks and scheme of maneuver compared to organic capabilities and limitations.

Concurrent with operational COA review, interoperability planners revise and refine the common plans drafted during COA development, based on mission partner feedback of the draft plans, operational COA considerations, and updated commander's guidance.

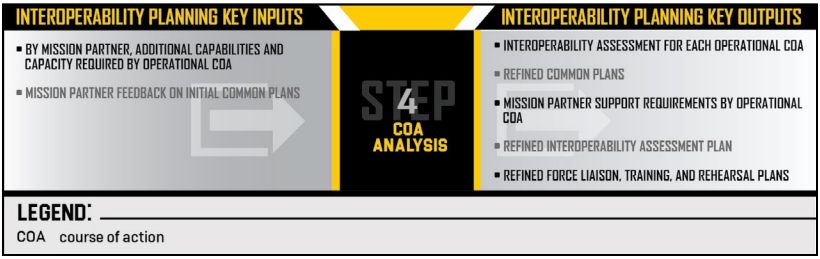


Figure 2-5. COA analysis

Course of Action Analysis Outputs

Planners provide interoperability implications and mission partner support requirements for each operational COA, focused on mission-critical interoperability requirements. Common plans are revised and updated to address mission partner concerns and updated commander's guidance.

Use Case 1. Corps staff support the MPCC in assessing each operational COA against mission-critical interoperability requirements, and in identifying mission partner support requirements by COA. Interoperability strengths and weaknesses that are identified by COA analysis for each COA inform refinements to common plans, assessment plans, and training and rehearsal plans. Specific revisions include—

- X Corps deployment plans to prioritize the movement of corps and division CPs in order to complete and validate the MPE network in theater and meet operational timelines.
- Fire support planning and TTP, based on UK caveat (prohibiting Dual-Purpose Improved Conventional Munition [DPICM]).
- Addressing the gap in UK air support operations and the lack of air picture (e.g., no accurate or timely air tracks at 7AD CP) through liaison with ASOC and increased DLD capabilities.
- Integrating risk reduction events (e.g., MPE mission network testing) and staff rehearsals.

Use Case 2. 7th CAV planners assess the operational COA with consideration of the available joint support, Atropian ground force capabilities, time limitations, and interoperability capabilities and limitations. COA analysis helps the commander refine the COA evaluation criteria, with a focus on simplicity, coalition execution of critical TTP, risk, and estimated mission accomplishment. Analysis also helps refine the liaison plans, to improve information flow and execution of critical TTP, and identifies tactical communications requirements (i.e., primary, alternate, contingency, and emergency (PACE) plans, voice communications with 1AMD and the attached tank unit, and retransmission requirements to ensure digital communications between 7th CAV CPs and supporting DLDs).

Course of Action Analysis Checklist

- ☐ Analyze operational COA for interoperability implications, strengths, and weaknesses.
- ☐ Identify unique mission partner support requirements for each operational COA, based on assigned tasks and scheme of maneuver.
- ☐ Seek mission partner feedback on operational COA.
- ☐ Refine common plans (i.e., ROE, KM, interoperability assessment, liaison, etc.).

COURSE OF ACTION COMPARISON

> COA comparison is an objective process to evaluate COAs independently and against set evaluation criteria approved by the commander and staff. The goal is to identify the strengths and weaknesses of COAs, enable selecting a COA with the highest probability of success, and further developing it in an operation plan (OPLAN) or operation order (OPORD).
>
> FM 6-0

Based on the wargame results, mission partner input, and interoperability comparisons, planners provide input into the applicable COA evaluation criteria. Operational planners include interoperability as an evaluation criterion in multinational operations. This ensures mission-critical interoperability requirements, and their level of satisfaction by COA, are included in the commander's decision-making process. Results from the wargame and the comparison process inform updates to common plans; interoperability assessment plans; and liaison, training and rehearsal plans, mitigating risk and leveraging mission partner capabilities in the potential operational COA.

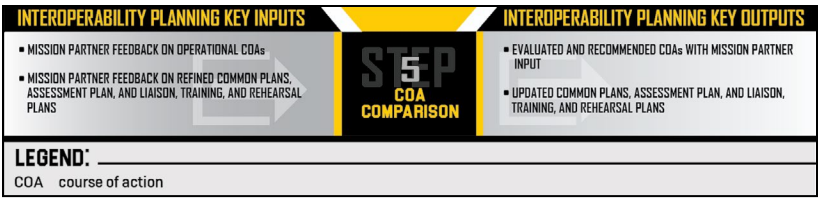


Figure 2-6. COA comparison

Course of Action Comparison Outputs

The unit staff develop and present the commander with a decision briefing that includes the recommended operational COA, including interoperability as an evaluation criterion. Planners update common plans to address the identified interoperability risks, and leverage mission partner capabilities across the COAs.

Use Case 1. X Corps staff integrated interoperability as an evaluation criteria during COA comparison, and included UK 7AD COA feedback in the selection process. The recommended COA included additional synchronization requirements between U.S. 8ID and UK 7AD, but reduced potential friction points. (There were fewer required passage of lines, with the two divisions on line, versus one division in lead, and the other to pass through after fighting through the enemy disruption zone.) It also decreased mission risk, with increased estimated combat power remaining after achieving X Corps objectives. The MPCC and staff updated the common plans based on the recommended COA. See Figure 2-7 for the X Corps recommended COA sketch.

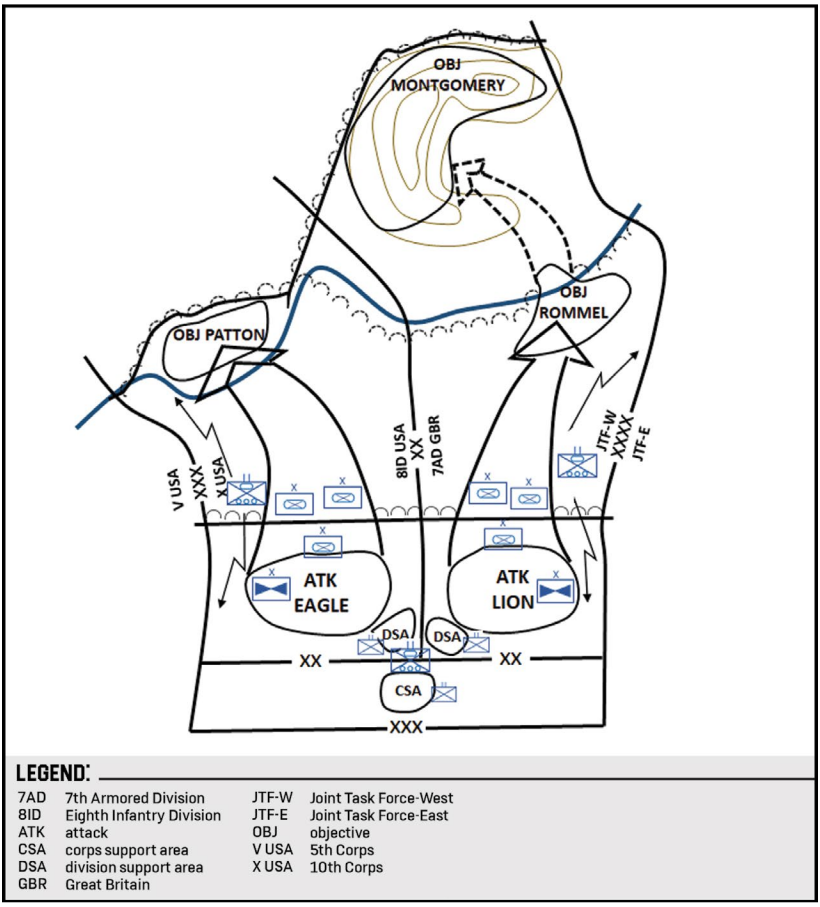


Figure 2-7. Recommended COA sketch X Corps attack

Use Case 2. 7th CAV staff compared operational COAs to determine the recommended COA. The 1AMD commander and staff provided feedback for each COA, based on their national biases, but with important additional information to aid the 7th CAV commander's decision-making process (e.g., the likely enemy response to each COA based on previous experience, additional sources of risk that might compromise the regiment's deception plan, and other considerations to factor into wargame results). The recommended COA provided the best support to executing critical TTP and restoring the current Atropia border in the case of hostilities, but with increased risk of decisive engagement and combat losses to the regiment. Regimental staff update liaison, training, rehearsal, and communications plans based on the recommended COA. See Figure 2-8 for the recommended 7th CAV COA sketch.

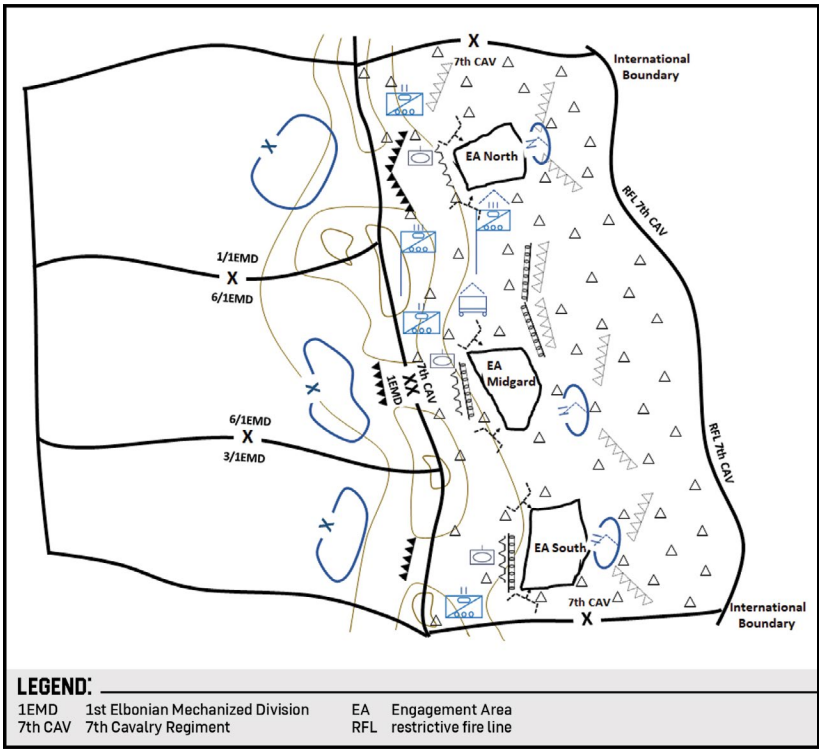


Figure 2-8. Recommended COA sketch, 7th Cavalry defense

Course of Action Comparison Checklist

- ☐ Seek mission partner input to COA comparison.
- ☐ Ensure interoperability is included in operational COA evaluation criteria.
- ☐ Revise common plans, interoperability assessment plans, and liaison, training, and rehearsal plans based on COA comparison results.

COURSE OF ACTION APPROVAL

> After the decision briefing, the commander selects the COA to best accomplish the mission. If the commander rejects all COAs, the staff starts COA development again. If the commander modifies a proposed COA or gives the staff an entirely different one, the staff wargames the new COA and presents the results to the commander with a recommendation.
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> FM 6-0

Based on the commander's decision and final planning guidance, the COS or executive officer (XO) coordinates with staff principals to assist the G-3 or S-3 in developing the plan or order. Based on the commander's planning guidance, the COS or XO dictates the type of order, sets and enforces time limits and development sequence, and determines staff section responsibilities for attachments within the order. Prior to the commander approving the plan or order, the staff ensures the plan or order is internally consistent, and is nested with the higher commander's intent. MPCC, staff elements, working groups, and planning teams provide input on final OPLANs and OPORDs (i.e., specified tasks to mission partners, coordinating instructions, sustainment, fire support, etc.) and complete and coordinate required attachments.

Figure 2-9. COA approval

Course of Action Approval Outputs

The unit issues a WARNORD based on the approved COA. In addition to operational information (e.g., AO, mission, commander's intent, CONOPS, and preparation and rehearsal instructions), the WARNORD contains draft common plans (especially those required to implement data and technical solutions) and updated commander's guidance for interoperability.

Use Case 1. The X Corps commander reviews and approves the recommended operational COA with minor adjustments to the proposed task organization to ensure required capabilities are available to both divisions. He also increases the security forces available to the corps and division support areas through the attachment of one Stryker battalion, in addition to the requested IBCT. The commander also reviews and approves associated common plans, the training and rehearsal plans, and deployment schedule as revised to prioritize early movement of the division and corps CPs. X Corps issues a WARNORD based on the approved COA and commander's updated guidance.

Use Case 2. The 7th CAV commander reviews and approves the recommended operational COA, and issues further guidance for final orders, training, and rehearsal:

- Rehearse the entire kill chain, from the detection of enemy fire assets moving into firing positions (cueing the destruction of enemy UAS followed by immediate survivability moves of mobile assets) to the detection of enemy fires and precision engagement and destruction of enemy firing units.
- Ensure the dismounted observation posts (OPs) have effective communication back to the fires center and down to Atropian supporting artillery and joint attack assets.
- Finally, rehearse the communications and counter attack plan to ensure the Atropian tanks and 7th CAV mounted units can work together effectively to complete the destruction of any enemy forces neutralized by fires, and secure the international boundary.

Course of Action Approval Checklist

☐ Provide interoperability input to ensure internally consistent planning, nested in the higher commander's intent.

☐ Ensure tasks to mission partners clearly stated and understood.

☐ Unit issue a WARNORD to subordinates and mission partners, with a draft of the common plans and updated commander's guidance for interoperability.

ORDERS PRODUCTION, DISSEMINATION, AND TRANSITION

> The staff prepares the order or plan by turning the selected COA into a clear, concise concept of operations and the required supporting information. The COA statement becomes the concept of operations for the plan. The COA sketch becomes the basis for the operation overlay. If time permits, the staff may conduct a more detailed wargame of the selected COA to more fully synchronize the operation and complete the plan. The staff writes the OPORD or OPLAN using the Army's operation order format.
>
> FM 6-0

During this step, the MPCC, staff elements, working groups, and planning teams complete interoperability planning activities, including—

- Finalizing and submitting requests for external resources to address interoperability requirements.
- Finalizing and submitting requests for waivers, required accreditations, authority to operate, etc.
- Completing and integrating common plans (e.g., ROE, KM, liaison, JMEI, etc.) as attachments.
- Coordinating and finalizing TTP and SOPs across mission partners (include as attachments).
- Coordinating and scheduling preparation activities (e.g., individual and collective training, MPE development, ROC drills and staff rehearsals, operator training, accreditation and certification activities, etc.) with subordinate units and mission partners (include training and rehearsal plans and schedules as attachments).

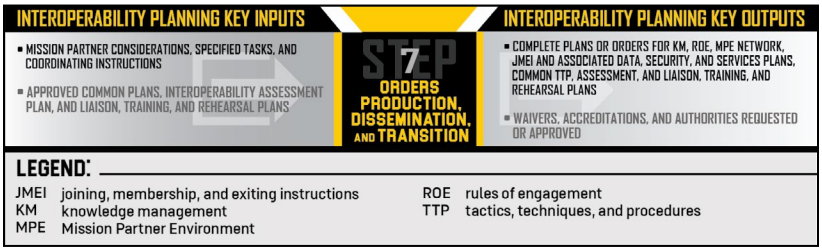

Figure 2-10. Orders Production, Dissemination, and Transition

Orders Production, Dissemination, and Transition Outputs

Common plans and schedules are completed and included as attachments in the final plan or order. Requests for external resources, waivers, accreditations, and authorities are acknowledged and either approved or in process.

Use Case 1. X Corps staff completes plans and orders based on the commander's approved COA and additional guidance. The corps G-6 submits the final MPE network architecture and associated JMEI, along with the development timeline and operational considerations, to network command for certification and authorization to operate. The MPCC submits policy waiver requests that were identified in mission analysis to the appropriate agencies. The staff completes the final orders with attachments and interoperability plans, then publishes to subordinate units (to include 7AD) and higher HQ. X Corps continues preparation activities.

Use Case 2. The 7th CAV commander confirms requests for DLDs, FDOs, and additional liaison support, along with requests for additional joint support (e.g., ASOC, JTACs, and on order joint CAS, interdiction, and SEAD sorties). 7th CAV and 1AMD staff complete plans and orders based on commander's approved COA and additional guidance. They publish orders and initiate movement from assembly area to forward and supporting positions. The staff also initiates the preparation activities that were prioritized to ensure readiness of critical TTP and effective coordination and liaison with joint and Atropian support.

Orders Production, Dissemination, and Transition Checklist

- ☐ Finalize and submit requests for external resources to address interoperability requirements.
- ☐ Finalize and submit requests for waivers, required accreditations, authority to operate, etc.
- ☐ Complete and integrate common plans (ROE, KM, liaison, JMEI, etc.) as attachments to order.
- ☐ Coordinate and finalize TTP and SOPs across mission partners and WfFs as attachments to order.
- ☐ Coordinate and schedule all preparation activities with subordinate units and mission partners; and include training and rehearsal plans and schedules as attachments to order.

☐ Translate and verify orders for each mission partner.

☐ Completed orders delivered and acknowledged by higher HQ, mission partners, and subordinate units.

SUMMARY

When conducting operations with multinational forces, deliberate planning for interoperability is critical to building and sustaining the necessary mutual trust and confidence, shared understanding, and unity of effort that enable effective operations and mission success. This includes:

- Coordinating and integrating mission partners early in the planning process (contributes to interoperability goals).
- Understanding and considering mission partner capabilities, limitations, and national caveats (improves operational planning and reduces friction during execution).
- Synchronizing planning for interoperability between the various planning teams and products (see Figure 2-11), and integrating with operational planning.
- Ensuring plans provide sufficient detail to guide effective mission partner preparation and continuous interoperability assessment, and achieving desired levels of interoperability during execution to support effective employment of capabilities across WfFs.

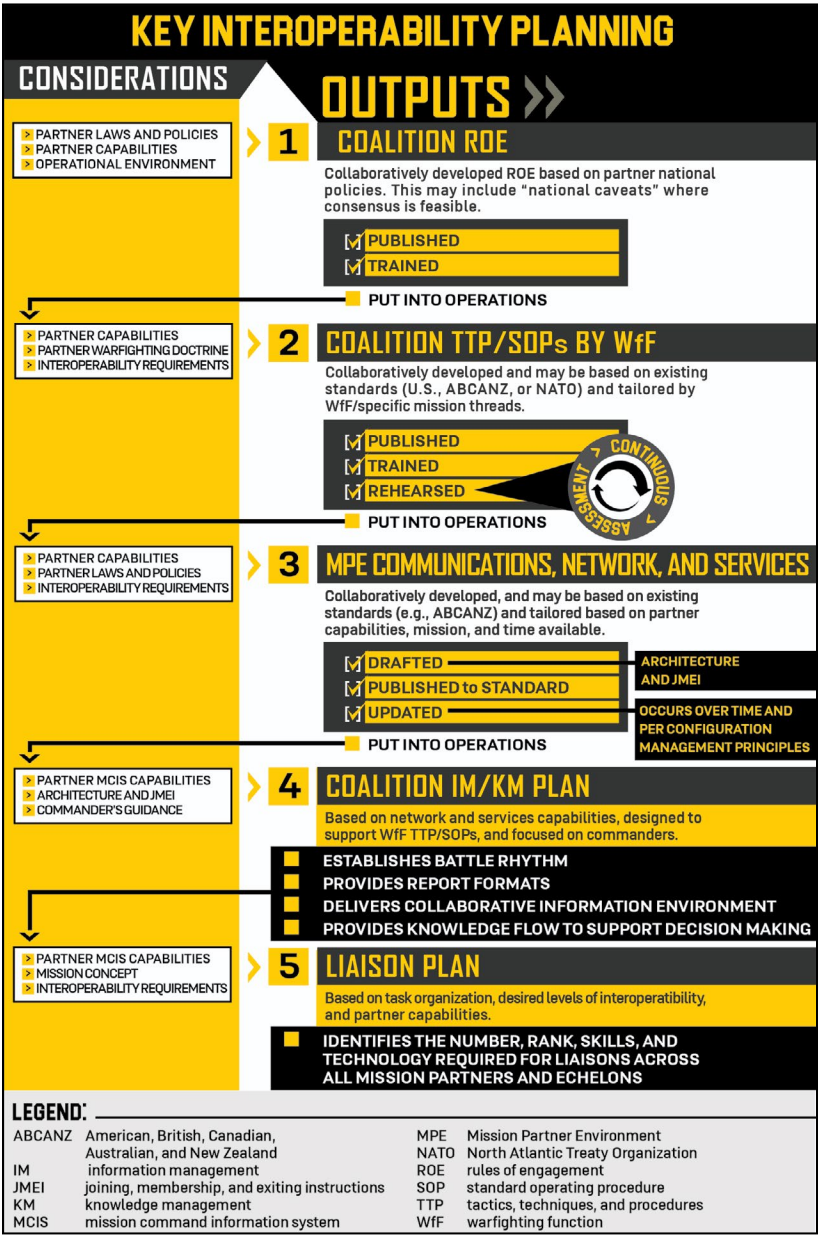

Figure 2-11. Example of interoperability planning considerations and outputs

PREPARE

> Preparation consists of those activities performed by units and Soldiers to improve their ability to execute an operation. Preparation creates conditions that improve friendly forces' opportunities for success and include activities such as rehearsals, training, and inspections.
>
> ADP 5-0

The unit prepares for multinational operations through the implementation of planned human, procedural, and technical dimension solutions. Preparation normally begins during planning and continues into execution by uncommitted units. Preparation helps the force transition from planning to execution. Like the other activities of the operations process, commanders drive preparation activities with a focus on leading and assessing. Team building is essential in multinational operations. Commanders ensure all units are treated and exposed equally, regardless of national background. All participants perceive missions as appropriate, achievable, and equitable in burden and risk sharing. Multinational partners should be included in planning. Their opinions about the type of mission assignment for their units are important. Planning staff must understand all national caveats. Commanders consider national caveats based on legal and policy constraints when assigning missions and tasks to members. All plans and operations should consider these caveats.

As part of preparation, commanders, units, and Soldiers conduct activities to help ensure the force is prepared for execution.[2] The bolded activities in the list below, from ADP 5-0, are critical to preparation for effective interoperability in multinational operations. While the unit may conduct many of these activities concurrently, some preparation activities must be scheduled in sequence (e.g., the unit conducts required individual training for new system operators prior to rehearsals with these systems). The unit determines specific preparation requirements, activity relationships, and schedules during planning.

- **Coordinate and establish liaison.**
- Initiate information collection.
- Initiate security operations.
- Initiate troop movement.
- **Complete task organization.**
- **Integrate new units and Soldiers.**
- **Train.**

- **Perform pre-operations checks and inspections.**
- Initiate sustainment preparations.
- **Initiate network preparations.**
- Manage terrain.
- Prepare terrain.
- Conduct confirmation briefs.
- **Conduct rehearsals.**
- Conduct plans-to-operations transitions.
- **Revise and refine the plan.**
- Supervise.

COORDINATE AND ESTABLISH LIAISON

> Units and organizations establish liaison in planning and preparation. Establishing liaison helps leaders internal and external to the HQ understand their unit's role in upcoming operations and prepare to perform that role.
>
> ADP 5-0

Liaisons. Liaison elements (e.g., embedded staff, exchanged staff, or liaison officers) receive required training, and deploy in accordance with the overall liaison plan. Liaisons provide functional expertise to assist mission partner commanders and staff during all phases of the operations process.

- The exchange of technical subject manner expert (SME) liaisons early in the preparation process increases MPE development effectiveness and efficiency.
- Functional SMEs aid in understanding critical procedural and SOP issues. For example, exchanging fires liaisons enables improved understanding of fire support processes and technologies and can be instrumental in identifying effective workarounds to information or procedural gaps.
- Effective liaisons improve mutual trust and confidence, aid in building and sustaining shared understanding, and enable unity of effort across WfFs between mission partners.

Digital Liaison Detachment. During preparations, any participating DLDs coordinate with the supported HQ to request any additional required equipment and to gain understanding of the mission, unit TTP and SOPs, and associated plans and orders. The DLD also begins coordination with the augmented HQ to ensure staffing and equipment meet required capabilities (e.g., robust staff to support 24-hour operations or sufficient vehicles to support rapid CP displacement). DLDs deploy to join the augmented HQ as early as practical to develop mutual trust and confidence with mission partner staff, train and rehearse with the unit, and initiate liaison activities prior to execution. For additional doctrinal guidance regarding the employment of DLDs, see Army Techniques Publication (ATP) 3-94.1, *Digital Liaison Detachment,* 28 DEC 2017.

Collaboration. During preparations, the unit sustains the mission partner collaboration initiated during planning. Prior to deployment, units conduct regularly scheduled meetings, working groups, commander's updates, etc. (video teleconferencing [VTC] or telephonic). Collaborative functional planning, training, and rehearsals, along with mutual trust and confidence, contribute to team building.

COMPLETE TASK ORGANIZATION

> During preparation, commanders complete task-organizing their force to obtain the right mix of capabilities to accomplish a specific mission … Task-organizing early allows affected units to become better integrated and more familiar with all elements involved. This is especially important with inherently time-consuming tasks, such as planning technical network support for the organization.
>
> ADP 5-0

The multinational force completes planned task organization based on the OPLAN and the mission partner capabilities and limitations that were identified during mission analysis. This task organization is completed within the limitations imposed by coalition command structure, authorities, and relationships. Even in a constrained command environment (e.g., parallel command structure with no agreed-to command authorities between national forces), U.S. forces can provide critical capabilities to mission partners through supporting and supported relationships.

For example, a mission partner force lacks combat engineer and indirect fire capabilities identified as critical in operational planning. The U.S. commander mitigates these gaps by placing U.S. engineer and field artillery units in direct support of that mission partner with the required digital tools, liaisons, linguists, and other interoperability support to enable integrated operations. Task organized supporting and supported units conduct network development, training, rehearsals, and other preparation activities based on planned relationships to ensure effective interoperability during execution.

INTEGRATE NEW SOLDIERS AND UNITS

> Commanders, command sergeants major, and staffs help assimilate new units into the force and new Soldiers into their units. They also prepare new units and Soldiers in performing their duties properly and integrating into an upcoming operation smoothly. Integration for new Soldiers includes training on unit SOPs and mission-essential tasks for the operation. It also means orienting new Soldiers on their places and roles in the force and during the operation.
>
> ADP 5-0

Each mission partner environment is unique. All units in the MPE include unit integration activities in the preparation phase of the operations process. Special emphasis is placed on coalition-wide TTP, SOPs, KM, ROE, and other relevant common plans and orders that impact unit operations.

TRAIN

> Training prepares forces and Soldiers to conduct operations according to doctrine, SOPs, and the unit's mission. Training develops the teamwork, trust, and mutual understanding that commanders need to exercise mission command and that forces need to achieve unity of effort.
>
> ADP 5-0

Identification, Friend or Foe and Combat Identification. All personnel receive training in the identification of the U.S., mission partner, indigenous, and enemy forces that contribute to force lethality and survivability. Training and testing should include uniforms and personal protection equipment, rank structure, combat and support vehicles, individual- and crew-served weapons, fixed- and rotary-wing aircraft, and unmanned systems. In addition, personnel are trained to recognize any agreed-to procedural or technical recognition solutions, such as vehicle markings, pyrotechnic displays, recognition panels, visual, infrared, and thermal chemical lights, transponders, and other cues to identify friendly from enemy forces.

Language and Culture. Language and culture training encompasses basic language skills, culture, and customs familiarization of mission partners and indigenous populations. Language and culture training are conducted during predeployment preparations as time permits by all deploying personnel.

Rules of Engagement. All deploying personnel receive training on the coalition ROE, along with any nation-specific caveats.

Operators. Soldiers receive required new equipment training (e.g., new command and control system and common services software fielded to support the MPE), and refresher training to ensure effective operation of existing systems and software.

Tactics, Techniques, and Procedures/Standard Operating Procedures. Commanders, staff, and operators receive training on relevant, agreed-to TTP and SOPs. This training is a critical prerequisite to rehearsals and shared understanding during execution.

PERFORM PRE-OPERATIONS CHECKS AND INSPECTIONS

> Unit preparation includes completing pre-operations checks and inspections. These checks ensure units, Soldiers, and systems are as fully capable and ready to execute the mission as time and resources permit. The inspections ensure the force has the resources necessary to accomplish the mission.
>
> ADP 5-0

In preparation for multinational operations, commanders and staff ensure subordinate units and mission partners have trained, rehearsed, and are prepared to execute operations at the desired level of interoperability. Examples include—

- Demonstrated performance of the mission network and common services, compared to planned performance.
- Demonstrated coalition COP quality.
- Rehearsal and collective training feedback on coalition TTP and SOP execution.
- Review of liaison plans to address gaps or reduce redundancies.

- Demonstrated KM effectiveness (e.g., reports and returns, running estimates, alerts and alarms, commander's critical information requirement [CCIR], commander updates, etc.).
- Soldier understanding of IFF and CID, ROE, language and culture, and other individual training requirements.

Commanders identify any remaining interoperability deficiencies or issues and take appropriate corrective actions.

INITIATE NETWORK PREPARATIONS

> During preparation, units must tailor the information network to meet the specific needs of each operation. This includes not only the communications, but also how the commander expects information to move between and be available for units and leaders in an AO.
>
> ADP 5-0

Joining, Membership, and Exiting Instructions. Participating U.S. and mission partner units collaboratively implement the network architecture and detailed standards provided in the JMEI. Secure communications with continuous coordination across mission partners (e.g., technical integration working group meetings), the exchange of technical SMEs, and pre-existing compatible hardware and software contribute to the network implementation process.

Cyber Defense. Network developers integrate, synchronize, and deconflict mission partner network monitoring, internal defense measures, and response actions and capabilities to ensure coalition network security (e.g., MPE or mission network or coalition wide-area network). Units establish a CNOSC, or similar organization, to conduct coalition network operations, security, and cyber defense.

Distribution of Standardized Equipment. For disadvantaged mission partners, or in order to provide compatible capabilities for specific critical functions, the lead nation may provide standardized equipment. For example, the U.S. might provide a network extension package to enable digital connectivity, or Tactical Local Area Network Encryption (TACLANE) devices to provide compatible network security.

Common Services. Network developers implement common core services to enable effective collaboration, information sharing and archiving, and knowledge development across mission partners. Common services contribute to mutual trust and confidence, shared understanding, and unity of effort in multinational operations.

Data Standards. Mission partners configure to meet coalition data standards, enabling common services, KM, and the coalition COP.

Testing and Risk Reduction. Network testing during preparation is key to effective coalition network performance during execution. Network developers conduct tests of components between mission partners, functions, and nodes to ensure the network correctly supports transport, data sharing, and computing processes. Risk reduction events focus on effective delivery of critical capabilities according to the network architecture, communications, and KM plans. These events may include testing, fault identification, troubleshooting, and correction for connectivity, COP, cyber-defense and network operations, coalition fires, and other select network-enabled capabilities and functions.

Information Management and Knowledge Management. IM/KM informs and is enabled by network capabilities, data standards, available common services, and commander's information requirements. KM planners leverage available network and common services to deliver and update routine information via a "commander's dashboard," allowing commander updates to focus on CCIR with associated decision-making, and sharing understanding between subordinates and staff. An example from 4th Infantry Division (4ID) during Warfighter Exercise (WFX) 18-4 is summarized in the following vignette.

4ID Knowledge Management Vignette

The 4ID commanding general directed his KMO to develop a SharePoint site specifically for WFX 18-4, with the intention of providing a collaborative environment for staff elements to maintain running estimates that would feed directly into a commanding general "dashboard" view of CCIR and current status information. This would eliminate the requirement for lengthy update briefings.

The focus of the 4ID KM plan was on the commander. Information and analysis from subordinates and staff were available to the commander via a "dashboard" view, giving the commander immediate access to the current COP, running estimates, updated briefing slides, and links to subordinate unit and staff section sub-sites. To support staff and WfF, the Ivy Portal SharePoint site also included an RFI process, announcements, documents, help desk, orders, staff/subordinate sub-sites, contacts/phone rosters, battle rhythm, and report formats. Dashboard concept is below.

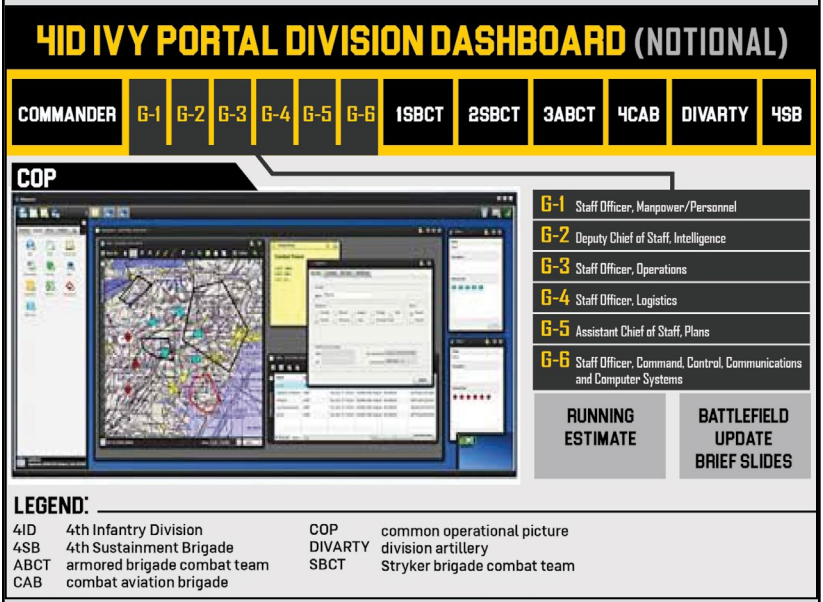

Figure 2-12. Ivy Portal SharePoint Division Dashboard

4ID Knowledge Management Vignette continued:

The 4ID site enabled collaboration between the 4ID staff elements, automatically updated the division commander's 'dashboard' (single view of the COP with tabs and links to staff running estimates and other key information), and significantly improved staff efficiency through single data entries populating their planned IM/KM products. In addition, by providing the commander with near-real time status and estimates by WfF, the commander was able to execute 'seven-minute drills' instead of lengthy update briefings. These drills, conducted as a map board exercise, focused on decision-making versus information sharing, which significantly reduced leader time requirements, improved staff and subordinate understanding of the overall situation, and served as a check on current digital information.

CONDUCT REHEARSALS

> A rehearsal is a session in which the commander and staff or unit practices expected actions to improve performance during execution. Commanders use rehearsals to ensure staffs and subordinates understand the concept of operations and commander's intent. Rehearsals also allow leaders to practice synchronizing operations at times and places critical to mission accomplishment … The extent of rehearsals depends on available time.
>
> ADP 5-0

The unit conducts rehearsal of concept drills, tactical exercises without troops, communications exercises, staff exercises, and other collective training with its mission partners to gain task proficiency and shared understanding of the scheme of maneuver and associated TTP and SOPs. Rehearsals may focus on—

- Specific mission threads (i.e., the fires process, actions against enemy UAS, or reacting to enemy chemical attacks).
- Leveraging technical solutions (i.e., developing and maintaining a COP, maintaining and sharing running estimates using common services, or sharing priority information requirement intelligence information).
- Critical tactical tasks (i.e., conducting a forward passage of lines, conducting an attack, or defending a battle position).

Mission partner rehearsals exercise KM plans, the liaison network, and other mission critical interoperability solutions across human, procedural, and technical dimensions. Results from rehearsals can inform plan refinements. For example, the repositioning of liaisons, improvements to common TTP, correction of network deficiencies, or enhancements to intelligence information sharing processes.

REVISE AND REFINE THE PLAN

> Revising and refining the plan is a key activity of preparation. During preparation, assumptions made during planning may be proven true or false. Intelligence analysis and reconnaissance may confirm or deny enemy actions or show changed conditions in the AO because of shaping operations … Rehearsals may identify coordination issues or other problems needing adjusted.
>
> ADP 5-0

Integration, training, and rehearsal with mission partners builds understanding of the operational environment, mission partner capabilities and limitations, and interoperability gaps and shortcomings. In addition to refining operational plans during preparation for multinational operations, the lead unit and its mission partners revise and refine plans based on this updated understanding.

SUMMARY

Commanders enable multinational operations through building partnerships and effective multinational teams. The mission command philosophy helps set the conditions for training and developing cohesive and effective teams. The first step in developing a team is building a shared understanding among team members. This gives the team a unified and focused purpose. In a team-focused climate, members understand the reason for each action, the capabilities of each member of the team, and each members' contribution effects on the overall success of the organization. Starting with mission receipt, mission partners contribute to planning, preparation, execution, and assessment as valued members of the coalition team. Mutual trust and confidence, shared understanding, and unity of effort result from this inclusion, collaborative participation, and equal and fair treatment. The more complex the interoperability requirements, the greater the importance of partnerships and team building to achieve mission success.

Preparation for interoperability focuses on developing and implementing the planned human, procedural, and technical dimension solutions required to achieve the desired levels of interoperability. Effective preparation aids mission partners in overcoming the learning curve effects that commanders and staff face, using new command and control technologies, WfF processes, and ad hoc teams organized between mission partners to leverage capabilities and mitigate weakness.

- The continued coordination and integration of mission partners in the preparation phase contributes to building effective partnerships and teams, mutual trust and confidence, shared understanding, and unity of effort.
- Commanders, staff, and Soldiers must train and rehearse to gain shared understanding of mission partner capabilities, limitations, and national caveats.
- Preparation identifies any remaining interoperability gaps or shortcomings, and the corrective actions are identified, implemented, and verified.
- Time is a critical factor for effective preparation. If time is insufficient to execute planned preparations, then the commander may need to modify the operational plan to reduce interoperability requirements.

Use Case 1. X Corps and subordinate units conduct home-station training, rehearsals, MPE network development, and deployment preparations in accordance with the published order. The MPCC conducts daily synchronization meetings to identify emerging interoperability issues and preparation challenges. The X Corps commander conducts updates twice weekly with his staff and subordinate commanders and staff to continue to build mutual trust and confidence, share understanding, and generate feedback regarding preparation activities, and to ensure unity of effort during preparation.

Corps, division, and other key CPs complete deployment ahead of the main body forces to complete MPE network development, conduct risk reduction events, validate and certify network performance, and execute staff rehearsals. Staff revise the running estimates and update operational plans based on the current situation in theater. The corps conducts RSOI operations as units arrive in theater and occupy initial assembly areas. Common and operational plans are revised based on updated information and the commander's evolving picture of the situation. They are used to address any issues identified during unit rehearsals. Within 10 days of final unit arrival in theater, X Corps reports ready for combat operations to JTF-W.

Use Case 2. 7th CAV integrates Atropian tank units and conducts combined arms rehearsals. Unit leaders conduct covert terrain walks of their areas of operation to—

- Confirm targeting plans with associated engagement areas and specific intelligence requirements and decision points.
- Select and confirm key positions and routes (i.e., dismounted OPs, actual and dummy CP locations, retransmission sites, artillery firing positions, mounted force hide positions, counterattack routes, etc.).
- Ensure shared understanding of the international boundary down to team leader level.

Supporting DLDs, USAF assets (e.g., ASOC, JTACs, etc.), liaisons, and translators arrive, conduct RSOI, deploy to assigned locations, train, and rehearse with focus on the commander's critical TTP. Planners revise fires and intelligence collection plans based on the terrain walk and updated commander's guidance. After a final check with 1AMD, 7th CAV initiates movement to forward positions and covert insertion of dismounted OPs. It also establishes dummy CPs with associated network traffic, dummy forward supply points, and then executes the engineering obstacle plan and fighting position development (both dummy and real). Units continue to rehearse key TTP, disguised as routine repositioning and patrolling activities. 7th CAV collects intelligence on enemy operational patterns (e.g., enemy UAS, fires unit locations, brigade battle group assembly areas, air defense and radar locations, etc.). It also executes information operations to deceive, misinform, and misdirect enemy picture of 7th CAV posture, locations, intentions, and morale. The Atropian Defense Force evacuates civilians from the 7th CAV AO to reduce the risk of civilian casualties, and reduce enemy intelligence collection capabilities. The USAF and Atropian air assets provide continuous updates regarding enemy movements and posture, providing the 7th CAV commander with early warnings of attempted enemy dismounted insertions, movement of artillery assets to forward firing positions, and deployment of lead battalion battle groups from assembly areas toward the international boundary.

Throughout preparations, the 7th CAV commander keeps the USAREUR commander informed of unit status and updated plans, enemy activity, and coordination conducted with the Atropian Defense Force and 1AMD.

Preparation Checklist

- ☐ Continue to coordinate and conduct liaison.
- ☐ Initiate information collection, security operations, and troop movement.
- ☐ Initiate sustainment preparations.
- ☐ Initiate network preparations and implement the network architecture.
- ☐ Coordinate with mission partners for JMEI implementation.
- ☐ Implement coalition measures for cyber defense.
- ☐ Analyze partner automation capabilities and consider distribution of standardized equipment.
- ☐ Complete plans and implement common services.
- ☐ Conduct network and common services tests and risk reduction events.
- ☐ Develop, train, and rehearse the KM plan.
- ☐ Conduct operational and process rehearsals with mission partners.
- ☐ Conduct plans-to-operations transitions.
- ☐ Refine the plan and complete task organization.
- ☐ Integrate new Soldiers and units.
- ☐ Train new systems, processes, CID, language and culture, and other required individual and collective training.
- ☐ Establish and train IFF and CID measures.
- ☐ Reaffirm ROE.
- ☐ Perform pre-operations checks and inspections.
- ☐ Continue to build partnerships and teams.

EXECUTE

> Execution is the act of putting a plan into action by applying combat power to accomplish the mission and adjusting operations based on changes in the situation. In execution, commanders, staffs, and subordinate commanders focus their efforts on translating decisions into actions.
>
> ADP 5-0

Effective execution is enabled by units seizing the initiative through action and commanders who accept prudent risk to exploit opportunities. The staff support the commander through building knowledge and shared understanding, enabling rapid decision making and synchronization.

> Effective interoperability planning and preparation reduces friction during execution and increases the likelihood for seamless operations with mission partners and across WfFs.

Effective interoperability supports effective execution. Effective interoperability—

- Enables information flow to support the commander's visualization and decision-making.
- Provides collaborative tools and processes to encourage staff synchronization, rapid planning, and implementation across mission partners.
- Improves subordinate decision making, and reduces reaction time through shared understanding of the commander's intention and mission across mission partners.
- Minimizes command and control risk, gaps, and shortcomings during the execution of multinational operations by effectively planning and preparing.

GUIDES TO EFFECTIVE MULTINATIONAL EXECUTION

Execution is a concerted effort to seize and retain the initiative, maintain momentum, and exploit success. Successful operations maintain the momentum generated by initiative and exploit successes within the commander's intent. Based on results from recent multinational exercises, guides to effective multinational execution include—

- Shared understanding regarding changes to graphic control measures (e.g., fire support coordination lines, unit boundaries, and coordination points). The CTF KM plan should provide the process and procedure,

and the CTF HQ should provide alerts to all mission partners for any changes to orders, plans, processes, or graphics (i.e., chat text messages, email notifications, and alerts in the appropriate running estimates and commander's updates).

- Common services, which enable improved information flow and shared understanding of the situation. Commander updates, while still based on the commander's preference, should focus on decision-making and shared understanding of the current and future situation rather than sharing routine information available in the staff running estimates or other easily accessed KM products.
- A single coalition CTAC (also known as a COP shop), with representatives from each mission partner and the ability and responsibility to monitor, correct, and report issues between the coalition COP (published over the MPE) and national COPs. This is an effective and efficient method for building and maintaining a quality coalition COP. The CTAC also provides the current status of the coalition COP in relation to their national picture, which increases mission partner trust and confidence during execution.

Use Case 1. X Corps receives a fragmentary order to execute offensive operations at H-hour, in accordance with JTF-W and unit plans. During execution, the X Corps staff provides chat and email alerts to subordinate commands regarding changes to graphic control measures, scheme of maneuver, or any other relevant changes to the plan or supporting processes. For example, JTF-W adds coordination points to both flank boundaries early during execution to ensure effective coordination and synchronization of maneuver forces. X Corps makes the appropriate changes to the operations overlay in the coalition COP, and sends alerts to both 8ID and 7AD with additional coordinating instructions. After initial objectives are secured, X Corps moves the fire support coordination line well forward of current division locations, makes the appropriate changes in graphics, and alerts subordinate units to this change. During the operation, X Corps receives warning that JTF-W is executing a joint special operations forces (SOF) search and destroy mission of a suspected chemical munitions stockpile well forward of the X Corps forward line of troops. X Corps places a temporary no-fire area around this mission area, and alerts subordinate units about the no-fire area. Once the joint SOF mission is complete and clear of the X Corps AO, the corps lifts the no fire area restriction and again notifies subordinate units.

In addition to the MPCC, which is responsible for interoperability assessments and running estimates, X Corps executes its mission with the multiple ad hoc organizations with associated responsibilities including—

- Coalition JAGIC, to ensure the effective and timely employment of coalition ground fires and joint air support.
- CTAC, to monitor, report, and correct any discrepancies between the national and coalition COP (e.g., graphics, friendly and enemy locations, air tracks, alerts, etc.).
- Coalition DP/EPW center, to collect DP and EPW information, guide movement and protection of DPs and EPWs, coordinate for external support (e.g., International Red Cross), and consolidate reports to submit to JTF-W.
- CNOSC, to monitor the network, correct network issues, and defend the network.
- A Consolidation Area Security Center, in response to higher than expected losses in the corps and division support areas during execution, tasked to integrate security force operations across the entire division and corps consolidation area. The X Corps commander established this to ensure protection for soft targets (e.g., CPs, artillery, sustainment, transport, etc.) and to effectively patrol to identify and destroy enemy irregular and special forces bypassed or inserted behind the maneuver brigades.

In general, previously planned and rehearsed TTP, along with common plans such as the KM plan and ROE, support operational processes and enable corps mission success.

Use Case 2. 7th CAV and 1AMD alert and update Atropian Defense Force HQ, USAREUR, and subordinate units to enemy movement, starting with the incursion of approximately 20 dismounted infantry squads across the international boundary. 7th CAV dismounted OPs monitor, report, and hand off observation of enemy squads, but do not engage, in accordance with the 7th CAV plan. As enemy squads work their way deeper into Atropia, enemy artillery units deploy into suspected firing positions and three separate battalion tactical groups (BTGs) begin to advance to the border along the three most likely enemy avenues of approach. Behind each advance guard BTG are (apparently) the remainder of their respective brigade battle groups.

Another two brigade groups are identified, but appear to be in reserve. The enemy initiates hostilities with dismounted attacks on several (dummy) mounted unit positions, and a massive artillery and rocket barrage against two dummy 7th CAV CPs and main (dummy) supply depot. This triggers friendly counter-TTP:

- U.S. mortars and artillery neutralize enemy dismounted attacks.
- U.S. forces destroy or neutralize all enemy UAS in Atropian airspace.
- U.S. mobile forces reposition to avoid planned enemy artillery fires.
- USAF, long-range Atropian artillery, and U.S. High-Mobility Artillery Rocket Systems conduct immediate counter battery fire, destroying 90 percent of enemy long-range artillery and over 75 percent of enemy rocket launchers.

The enemy BTGs cross the international boundary and remain unengaged, but are tracked in relay by 7th CAV dismounted OPs. 7th CAV mounted forces, supported by Atropian tanks, engage the BTGs within planned engagement areas, with priority of fires on enemy mobile air defense artillery, artillery, and command vehicles. U.S. CAS, attack helicopters, and Atropian heavy artillery simultaneously contribute to the destruction of the enemy advance guard battalions. The enemy commander declines to send the remainder of the BTGs across the border. U.S. dismounted OPs call fire on enemy units attempting to withdraw and assist mounted units in capturing over 1,000 EPW. 1AMD moves forward without incident to secure the border, as the remaining enemy forces withdraw from their assembly areas and away from Atropia.

During combat operations, the 7th CAV liaison with Atropian forces proved essential to timely and relatively accurate fire support. Drill and rehearsal, both internally with attached Atropian tank units and externally with Atropian CPs and the USAF ASOC, enabled effective coalition and joint execution of critical TTP, resulting in successful mission execution.

Execution Checklist

☐ Notify mission partners and subordinate units changes to plans, orders, processes, and graphics in accordance with the KM plan.

☐ Optimize the commander's updates to focus on decision making and shared understanding.

☐ Establish and operate organizations to monitor, correct, and report critical coalition processes (i.e., CTAC, coalition targeting boards, coalition JAGIC, or coalition intelligence fusion centers).

ASSESS

> Assessment is a continuous activity of the operations process that supports decision making by ascertaining progress of the operation for the purpose of developing and refining plans and for making operations more effective. Assessment results enhance the commander's decision making and help the commander and the staff to keep pace with constantly changing situations.
>
> ADP 5-0

The interoperability assessment plan that is developed during planning and rehearsed and revised during the preparation phase, guides interoperability assessment. Based on results from recent multinational exercises, this assessment plan should include key measures selected to inform progress against the desired levels of interoperability and mission-critical interoperability requirements. For example, the commander wants to achieve Level 3 (Integrated) interoperability in command and control with all mission partners. One of the identified mission-critical interoperability requirements to achieve this goal is a coalition-wide COP. Measures selected to assess this requirement include COP accuracy, timeliness, and completeness. In order to consolidate monitoring and evaluation of these measures, the commander establishes a CTAC staffed with network, data, and KM SMEs, with representatives from all mission partners and direct contact with respective G-6 and KM staff. CTAC assessments are included in both the running estimate and with the overall assessment of the coalition COP displayed and updated in the commander's dashboard.

Interoperability assessment consists of three activities:

- Monitor the current situation, with focus on the mission critical interoperability requirements and achieved levels of interoperability between mission partners and across WfFs, as a comparison to the planned levels of interoperability.
- Evaluate the progress toward achieving desired levels of interoperability and meeting mission critical interoperability requirements, which include root cause determination and reporting through an interoperability running estimate, commander updates, and other commander directed information sharing.
- Recommend changes or taking direct action to improve interoperability, based on identified interoperability issues and evaluation of these issues.

MONITOR

MPCC or Designated Lead. The interoperability assessment plan defines responsibilities. This plan identifies the MPCC, or other designated staff element or leader, as the overall lead for interoperability assessment. This lead conducts monitoring, and aggregates monitoring results from other staff elements and commands, to develop an accurate and complete picture of the current interoperability situation.

Staff. Functional and special staff identify and report any information flow, procedural, or other interoperability issues. Regardless of assigned monitoring responsibilities, the staff provides interoperability feedback and assessments to the lead for aggregation, evaluation, and reporting.

Capabilities. The staff or special organizations are assigned assessment responsibilities for specific interoperability capabilities. Examples include the CNOSC that is responsible for network and common services assessments, and the CTAC with coalition-wide COP assessment responsibilities.

EVALUATE

Analyze Current Situation. The interoperability assessment lead, supported by the staff, mission partners, and special organizations (e.g., CTAC and CNOSC), analyze the current situation for trends and the root causes for emerging interoperability issues, and then aggregate current key measures into an overall assessment for each mission-critical interoperability requirement.

Running Estimate. The interoperability running estimate or other reporting mechanism, provides the commander, staff, and mission partners with the current interoperability situation across echelons, by mission-critical interoperability requirement.

RECOMMEND

Direct Action. Designated staff elements implement corrective actions within their functional area or area of responsibility. Examples include making minor adjustments to a WfF process or SOP; modifying network protocols to improve throughput, connectivity, or security; or augmenting a DLD during execution to provide additional required capabilities or capacity. Any changes are communicated across mission partners to ensure shared understanding and adaptation to the corrective action.

Recommendations to the Commander. Major changes to interoperability or operational plans, or required actions that may impact operational plans, scheme of maneuver, or commander's intent, are submitted as recommendations to the commander, with sufficient information to support the decision-making process.

Use Case 1. The MPCC monitors and reports interoperability issues throughout the operations process:

During planning: The MPCC coordinated development of required common plans, regularly reporting progress of plans against the established timeline. When required, the MPCC recommended additional boards, centers, planning teams, or working groups to address specific interoperability challenges.

During preparation: The MPCC tracked progress in required operator training, rehearsal of staff and units with coalition tools (e.g., common TTP, use of common services, and KM standards), monitored MPE network development and implementation, made recommendations, and implemented solutions to address interoperability gaps and shortcomings.

During execution: The MPCC and subordinate teams ensured interoperability tools and processes enabled mutual trust and confidence, shared understanding, and unity of effort. They took corrective action or provided recommendations to reduce uncertainty and friction between mission partners, and provided continuous interoperability running estimates to the commander, focusing on the commander's mission critical interoperability requirements.

Use Case 2. 7th CAV purpose-built a MPE focused on the tasks critical to mission success. The commander appropriately focused his assessment on his unit's ability to plan, prepare, and execute key TTP, given the limited time for planning and preparation:

- The commander required daily assessments regarding the planning and preparation for each critical TTP.
- During preparation, the commander personally observed and provided updated guidance during rehearsal of critical TTP.
- The commander coordinated the timing and execution of key TTP after hostilities began to ensure legal and effective conduct of tactical tasks appropriately sequenced to increase friendly force survivability and lethality.

Assess Checklist

- ☐ Designate a lead for interoperability assessment.
- ☐ Establish measures to monitor interoperability execution against the plan.
- ☐ Establish methods for staff feedback.
- ☐ Solicit recommendations from partners on ways to improve interoperability.
- ☐ Develop procedures to maintain an "interoperability running estimate."
- ☐ Evaluate progress toward desired interoperability results.
- ☐ Establish responsibilities (by functional area) and develop procedures to take direct action to correct and adjust interoperability solutions during execution.
- ☐ Present issues, analysis, and recommendations to the commander for decisions to improve interoperability.

Endnotes

1. FM 6-0, *Commander and Staff Organization and Operations*, 05 MAY 2014
2. ADP 5-0, *The Operations Process*, 31 JUL 2019

APPENDIX A

DIMENSIONS AND LEVELS OF INTEROPERABILITY

This appendix defines the human, procedural, and technical dimensions of interoperability, and provides examples of the different levels of interoperability.

Mission command interoperability is the achievement of effective expeditionary, uninterrupted mission command with designated unified action partners (UAPs) operating in a Mission Partner Environment (MPE), and across the full range of military operations through human, procedural and technical means.[1]

DIMENSIONS

Human. The human dimension of mission command interoperability addresses human-based activities (e.g., undertakings, behaviors, actions, and pursuits) that develop, and/or support shared understanding and mutual trust with the UAPs, which is fundamental to developing purpose, unity of effort, and reduction of friction. Examples include—

- Recurring standardized training with UAPs in the live, constructive, and virtual environments.
- Using trained liaison officers.
- Leader education (e.g., knowledge of UAP relationships, cultures, customs, and language).
- Creating and enforcing a "need to share" rather than "need to know" information exchange environment.
- Using common terms and lexicon.
- Establishing collaboration means, and routinely conducting collaboration with UAPs.
- Ability to see yourself and each other through a UAP after action review (AAR) process.

Procedural. The procedural dimension of mission command interoperability addresses processes and procedures that support and organize activities among the UAPs to minimize confusion, misunderstandings, and hesitation. It builds on trust, purpose, and unity of effort. Examples include—

- Standardized common UAP training and drills.
- Developing and using common standard operating procedures (SOPs).
- Common doctrine, terms, and graphics (e.g., military decisionmaking process [MDMP] and orders process).
- Methods and means of common collaboration.
- Leader education in standard agreements and impact of UAP national interests.
- Rapid development, promulgation, and training of tactics, techniques, and procedures (TTP).
- Developing and using classification guides and the write-for-release processes.
- Developing and using the coalition network joining, membership, and exiting instructions (JMEI).
- Safeguarding Secret//Releasable information (or mission secret information).

Technical. The technical dimension of mission command interoperability addresses the establishment, operation, and maintenance of the command and control network hardware, services, and applications that support the exchange of data and information between UAPs using communication information systems to enable increased shared situational understanding among the UAP commanders. Examples include—

- Using the synthetic training environment to support recurring UAP training.
- Establishing information management/knowledge management and software/hardware (e.g., SharePoint).
- Establishing network common services (i.e., email; web services; chat; voice over internet protocol; video teleconference over internet protocol; COP; and intelligence, surveillance, and reconnaissance [ISR] full motion video).
- Exchanging information between UAPs using secure tactical voice.

- Friendly force tracking.
- Establishing UAP agreed-to statement of requirements to guide national command and control acquisition.
- Automated language translation.
- Establishing cross domain services.
- Establishing gateways (when necessary) between UAPs' communications information systems to facilitate translation and exchange of operational information.

LEVELS OF INTEROPERABILITY

The Army strives for collective multinational land forces interoperability, with the level of interoperability dependent on national and/or Department of Defense objectives for the partner nation, the expected missions the partner is likely to perform in multinational operations, the partner's current and projected military capabilities, and the partner's own objectives. The Army recognizes four levels of interoperability with partner Armies.[2]

The levels of interoperability are derived from Army Regulation (AR) 34-1, *Multinational Force Interoperability*, 10 JUL 2015. These levels of interoperability are listed below, along with examples by level of human, procedural and technical characteristics associated with mission command interoperability. To advance and sustain a higher level of interoperability, it requires prioritization and continued effort over time.

Level 0: Not Interoperable.

Partner is not interoperable with the Army, command and control interface with the Army is only at the next higher level, and formations must operate independently from U.S. Army formations and operations.

Human

- Significant language barriers with the mission partner.
- Have not conducted any significant fires or maneuver training with the mission partner.
- Exclusive use of liaison officers to manually exchange information with the mission partner.

Procedural

- Lack common training tasks and drills with the mission partner.
- Lack common SOPs, doctrine, or TTP with the mission partner.
- The mission partner lacks the procedures to safeguard Secret// Releasable information.
- The mission partner lacks the ability to comply with the coalition network JMEI.

Technical

- Lack the ability to share information with the mission partner via mission command network at the operational level.
- Lack the ability to share information using secure tactical voice.
- Manual common operational picture (COP) with the mission partner.

Level 1: Deconflicted

The U.S. Army can coexist with key allies and multinational partners but forces cannot interact together. This level requires alignment of capabilities and procedures to establish operational norms, enabling multinational partners to complement U.S. Army operations. An example of deconflicted interoperability would be a UAP element operating independently within the battlespace of an Army formation.

Human

- Uses liaison officers to manually bridge the gap between the mission command network and the mission partner's network.
- Have conducted limited fires and maneuver training with the mission partner.

Procedural

- The mission partner has minimal information management, so there is manual exchange of information via portable electronic media.
- Minimal common training tasks and drills with the mission partner.
- Basic common SOPs and TTP addressing only boundary coordination with the mission partner.
- Information sharing is conducted on an ad hoc basis.

Technical

- Lack the ability to share information with the mission partner via the mission command network at the operational level.
- Able to exchange unsecured tactical voice.
- Limited automated COP at the strategic level with the mission partner.

Level 2: Compatible

The U.S. Army can interact with key allies and partners in the same geographic area in pursuit of a common goal. Multinational partners have similar or complementary processes and procedures, and are able to operate effectively with U.S. Army forces. For example, a compatible or Level 2 of interoperability, would be expected with a UAP element that shared a boundary with an Army formation.

Human

- Uses trained liaison officers to selectively bridge information that cannot be passed (either technically or due to policy restrictions) between the mission command network and the mission partner's network.
- Conduct routine fires and maneuver training with the mission partner.
- Conduct basic collaboration and exchange of agreed-to information.

Procedural

- Uses selected standardized common UAP training and drills.
- Uses selected common SOPs.
- Uses selected common doctrine, terms, and graphics.
- Uses basic means of common collaboration.
- Takes steps to safeguard Secret//Releasable information.
- Uses the coalition network JMEI.

Technical

- Selected ability to use the synthetic training environment.
- Basic use of information management/knowledge management software/hardware.
- Technically capable of using most, if not all, coalition network common services.

- Technically capable of exchanging limited friendly force tracking information.
- Technically capable of installing and using gateways at division level to facilitate translation and exchange of national information.

Level 3: Integrated

The U.S. Army can integrate with key allies and partners upon arrival in theater. Interoperability is network-enabled to provide full interoperability. Multinational partners can routinely establish networks and operate effectively alongside, or as part of, U.S. Army formations.

Human

- Routinely conducts recurring standardized training with UAPs in live, constructive, and virtual environments.
- Uses trained liaison officers.
- Strongly emphasizes interoperability in leader education and professional development.
- Creates and enforces a "need to share" information exchange environment, and uses common terms and lexicon.
- Establishes collaboration means and routinely conducts collaboration with UAPs.
- Ability to see yourself and each other through a UAP AAR process.

Procedural

- Uses standardized common UAP training and drills.
- Develops and uses common SOPs.
- Uses common doctrine, terms, and graphics (e.g., MDMP and orders process).
- Consistently uses methods and means of common collaboration.
- Leader education in standard agreements and impact of UAP national interests.
- Rapid development, promulgation, and training of TTP.
- Develops and consistently uses classification guides and write for release processes.

- Develops and consistently uses the coalition network JMEI.
- Procedures to safeguard Secret//Releasable information in place and enforced.

Technical

- Uses the synthetic training environment to support recurring UAP training.
- Establishes an integrated information management/knowledge management software and hardware (i.e., SharePoint) capability.
- Establishes network common services (i.e., email, web services, chat, voice over internet protocol, video teleconference over internet protocol, COP, ISR full motion video) in the MPE.
- Exchanges information between UAPs using secure tactical voice.
- Digitally tracking all UAP friendly forces.
- Establishes and incorporates UAP agreed-to statement of requirements to guide national command and control acquisition.
- Uses a technical automated language translation capability.
- Establishes and uses cross domain services.
- Establishes and uses gateways (when necessary) between UAP communication information systems to facilitate the translation and exchange of operational information.

Endnotes

1. Mission Command Center of Excellence (MCCoE), *Army Mission Command Interoperability White Paper*, 09 MAY 2018

2. AR 34-1, *Multinational Force Interoperability,* 10 JUL 2015

APPENDIX B

EXAMPLE: INTEROPERABLE INFORMATION EXCHANGE REQUIREMENTS

Information Exchange Requirement at Division Level	Proponent/ Agency	Comments/Constraints
Air defense artillery status (weapons and sensors)	Program executive office (PEO) Missiles and Space (M&S)/Program Directorate (PD) counter-rocket, artillery, mortar (C-RAM) Technical Management Directorate (TMD)	Do not load the integrated broadcast system (IBS) plugin for theater ballistic missile (TBM) early warning and tracking coming off the joint tactical terminal (JTT). Requires a foreign disclosure officer (FDO) memorandum stating the data coming from our system and the "releasable-to" country list.
Aerial mine delivery coordination (managed at division and above)	Army Capability Manager (ACM) aviation (AVN)	
Airspace coordinating measure request	Tactical Airspace Integration System (TAIS) program officer (PO)	
Aerial threat/targets (alerts/warning)	PEO M&S/PD C-RAM TMD	Do not load the IBS plugin for TBMs coming off the JTT. Requires an FDO memorandum stating the data coming from our system and the "releasable-to" country list.

Information Exchange Requirement at Division Level	Proponent/ Agency	Comments/Constraints
Aerial resupply coordination	ACM AVN	
Air assault and aviation planning and execution products (air assaults are division attacks)	ACM AVN	
Airborne command and control	ACM AVN	
Air-Ground Operations Integration and Coordination	ACM AVN	
Air medical evacuation support (coalition, joint, allied nation) general support	ACM AVN	
Air mission request	ACM AVN	
Airspace control	TAIS PO	
Airspace control measures	TAIS PO	
Air tracks (friendly, hostile, unknown)	Army Joint Support Team (AJST), analyst, airspace control branch	North Atlantic Treaty Organization (NATO)/ Korean allies will receive through area air defense commander channels. Link 16 is highly interoperable with mission partners.
Air warning and control system	AJST, analyst, airspace control branch	NATO/Korea Allies will receive through AADC channels. Link 16 is highly interoperable with mission partners.

Information Exchange Requirement at Division Level	Proponent/ Agency	Comments/Constraints
Army air and missile defense command requirements	PEO M&S/PD C-RAM TMD	Requires an FDO memorandum stating the data coming from our system and the "releasable-to" country list.
Artillery Raid Coordination	ACM AVN	
Air tasking order/ airspace control order	AJST, analyst, airspace control branch	Air tasking order may require FDO review.
Attack (hasty or deliberate) against an enemy not in contact with friendly forces	ACM AVN	
Available close air support/joint strike assets		
Battle damage assessment report (BDAREP)		ACM foundation: BDAREP Phase 1/U.S. Message Text Format (USMTF) (C104)
Battle update brief	U.S. Army Intelligence Center of Excellence Requirements Development Division (RDD)	
Chemical, biological, radiological, and nuclear assets		
Commander's critical information requirement		
Chat		
Chemical survivability and asset visibility		

Information Exchange Requirement at Division Level	Proponent/ Agency	Comments/Constraints
Civil affairs		
Civil military operations		
Collaboration		ACM network and services (N&S) forward (FWD): core services
Commander's situation report		
Concept of support	ACM AVN	
Counter fire	Product manager for fire support command and control (PdM FSC2)/ACM product support manager (PSM)	
Current combat power		
Current enemy situation		ACM foundation: USMTF #S309
Cybersecurity-integrated	ACM N&S FWD	
Essential elements of friendly information		
Fire planning	PdM FSC2/ ACM PSM	
Fire support capabilities overlay		
Fire support coordination	ACM AVN	Allies should possess requisite equipment to exchange fires data with U.S. fires information systems, such as the Advanced Field Artillery Tactical Data System (AFATDS).

Information Exchange Requirement at Division Level	Proponent/ Agency	Comments/Constraints
Friendly force information requirements		
Fire support coordination measure		
Focus of fires		
forward arming and refueling point location/status (deep operations)	ACM AVN	
Fragmentary orders		
Friendly locations within battlespace		
Friendly strike warning	ACM mission command (MC)/ command post (CP)	
Full motion video	ACM AVN	
ACM N&S FWD	ACM foundation, MPEG-2	
Future Combat Power		
Geospatial (terrain)		National Geospatial-Intelligence Agency (NGA) is the federal government functional manager, and has shared geospatial (terrain) data in the past on one or more Mission Partner Environment (Combined Enterprise Regional Information Exchange [CENTRIX]-Iraq, CENTRIX-Korea)

Information Exchange Requirement at Division Level	Proponent/ Agency	Comments/Constraints
Geospatial standard and shareable geospatial foundation	ACM geospatial Maneuver Support Center of Excellence (MSCOE)	Unclassified, based on NGA, easily sharable
Geospatial special map products-limited distribution	ACM geospatial MSCOE	FDO review on a case by case basis
Graphic control measures (air and ground)	AJST, analyst, airspace control branch	Releasable based on need-to-know
Host nation information requirements		
High payoff target/ high-value target list		May require FDO review for release
Joint prioritized target list/target nomination list		
Improvised explosive device report	U.S. Army Intelligence Center of Excellence RDD	
Information collection plan	ACM foundation	
Information collection request	ACM foundation	
Information collection tasking	ACM foundation	
Information operations		
Integrated air defense system data	ACM AVN	
Intelligence asset location/status	ACM AVN	

Information Exchange Requirement at Division Level	Proponent/ Agency	Comments/Constraints
Intelligence information report	ACM foundation	USMTF #C100
Intelligence preparation of the battlefield products	ACM AVN	
ACM foundation	Modified combined obstacles overlay-enemy course of action overlays; FDO review on a case by case basis (product and mission partner)	
Intelligence report	ACM foundation	Intelligence Report #I001. USMTF #C110
Intelligence summary	ACM foundation	Intelligence Summary Report #I005. USMTF #G131
Intelligence, surveillance, and reconnaissance (ISR)		The Army Universal Task List clearly identifies Army (joint/coalition) collector/ sensor sources of data or information for conducting counter intelligence, human intelligence, measurement and signature intelligence, signals intelligence and technical intelligence. Is Standardization Agreement (STANAG) 4559 Edition 3, or the Under Secretary of Defense for Intelligence intelligence community chief information officer's profile for content discovery and retrieval, the basis for sharing Army ISR data?

Information Exchange Requirement at Division Level	Proponent/ Agency	Comments/Constraints
Link diagram	ACM foundation	Targeting
Logistic significant events		
Logistic asset visibility		
MAYDAY	ACM MC/CP	
Medical evacuation request	ACM MC/CP	
Medical		
Microsoft products (Word, PowerPoint, Excel)	PdM ACM	
Moving target indicator	ACM foundation	STANAG 4607
Nuclear, biological, chemical reports (1-5)		
Obstacles		
Operational support airlift transport requests	ACM AVN	
Obstacles (vertical)	ACM AVN	
Orders (warning order, operations order, fragmentary order)	ACM AVN	Orders specific for the allied operation that are releasable to specific countries should be developed and shared, as opposed to general access to U.S. orders. This may require FDO review
Personnel		
Personnel recovery coordination	ACM AVN	
Plans	ACM MC/CP	
Priority intelligence requirements		
Priority of fires		

Information Exchange Requirement at Division Level	Proponent/ Agency	Comments/Constraints
Processing, exploitation, and dissemination analysis and reporting	ACM AVN	
General support quick reaction force coordination	ACM AVN	
Reconnaissance exploitation report	ACM foundation	USMTF #C101
Reports (situation report, observation report, spot report, execution matrix, emergency report [mayday])	ACM AVN	
Request for Information (RFI)	ACM AVN	
ACM foundation	ACM foundation. RFI Report #040. USMTF #F014	
Response to request for information (RRI)	ACM foundation	RRI Report #R045. USMTF #F015
Restricted operation zones		
Rules of engagement	ACM AVN	
Running estimate		
Screen captures	ACM foundation	.JPG or National Imagery Transmission format
Sensor reports (alerts)		
Sensors (Q36/37)		PdM FSC2/ACM PSM: Q50/53
Sensors (sentinel radar)	ACM AVN	

Information Exchange Requirement at Division Level	Proponent/ Agency	Comments/Constraints
Sensors (unmanned aircraft system [UAS])	ACM AVN	
Sensors Aircraft Survivability Equipment (Enemy Air Defense)	ACM AVN	
Significant events and incidents		
Specific information requirements	ACM AVN	
Spot report	ACM foundation	Report #S055
Staff estimates including enemy situation		
Still images	ACM foundation	National Imagery Transmission format
Supply and maintenance		
Survivability		
Sustainment engineering		
Tactical Elint report	ACM foundation	USMTF #C121
Tactical report	ACM foundation	USMTF #C111
Target information package	ACM foundation	
Target management	PdM FSC2/ ACM PSM	
Baseball card-targeting	ACM foundation	
Targeting data (division assets)	ACM AVN	
Tactical air control party coordination	ACM AVN	
Target intelligence data	ACM foundation	USMTF #S305

Information Exchange Requirement at Division Level	Proponent/ Agency	Comments/Constraints
Theater missile defense coordination	ACM AVN	
Threatwarn	ACM MC/CP	
Track management	PdM FSC2/ ACM PSM	
Unified action partner	AJST, analyst, airspace control branch	
UAS mission command support	ACM AVN	
PdM FSC2/ACM PSM	Gray Eagle Division Asset	
UAS maneuver, ISR, and fires missions	ACM AVN	Gray Eagle Division Asset. There may be no need for allies to have general access to this information.
Vertical hazards	ACM AVN	
Weather advisory or watch	ACM foundation	Weatherwatch/Report #W020
Weather (pilot reports)	ACM AVN	
Weather Warning-Severe	ACM foundation	Severe Weather Warning (SVRWXWARN) Report #S035
Voice over Internet protocol	ACM N&S FWD	

APPENDIX C

KEY TECHNICAL SOLUTIONS UNDER DEVELOPMENT

MISSION PARTNER ENVIRONMENT

Mission Partner Environment (MPE) is the overarching U.S. Department of Defense (DOD) capability framework to improve interoperability with non-DoD mission partners. MPE is integrated into the Joint Information Environment (JIE) and enables coalition mission command at a single security level. The MPE provides the means for commanders to effectively share their intent, communicate mission orders, and empower decentralized execution during unified action partner (UAP) operations. The MPE allows the commander to visualize the battlespace, direct action in a timely manner, and establish trust with mission partners. The MPE includes the network, integrated systems, and services required to enable information exchange. In most instances, the MPE provides common core services such as voice over internet protocol (VoIP), email, file sharing, and chat (e.g., instant text messaging), and enables critical data sharing between mission partners that is essential to developing a coalition common operational picture (COP), sharing map and graphics information, and digital exchanges across warfighting functions (WfFs). The enduring and episodic MPE concepts have evolved, as new terms for the Tier 1 and Tier 2 MPE labels, respectively. Currently, the MPE community of interest is proposing new terms for these concepts to reflect their likely scope and function (i.e., Enterprise MPE and Expeditionary MPE).

A key component to the MPE is delivery of common services to enable collaboration and improve understanding between mission partners. These common services are currently provided through a common services hub (CSHub), also known as an enterprise services provider (ESP). The ESP was the hub of the MPE network at the Joint Warfighting Assessment (JWA) 18.1 and JWA 19, and is ready now as a “fight tonight” capability. ESP is the title Joint Modernization Command (JMC) applied to the CSHub capability JMC implemented during JWA 18.1. The Cyber Center of Excellence and American, British, Canadian, Australian, and New Zealand (ABCANZ) prefer the CSHub designation. Figure F-1 provides examples of both the CSHub and ESP high-level architectures, as part of the MPE developed for Warfighter Exercise (WFX) 18-4 and JWA 18.1, respectively.

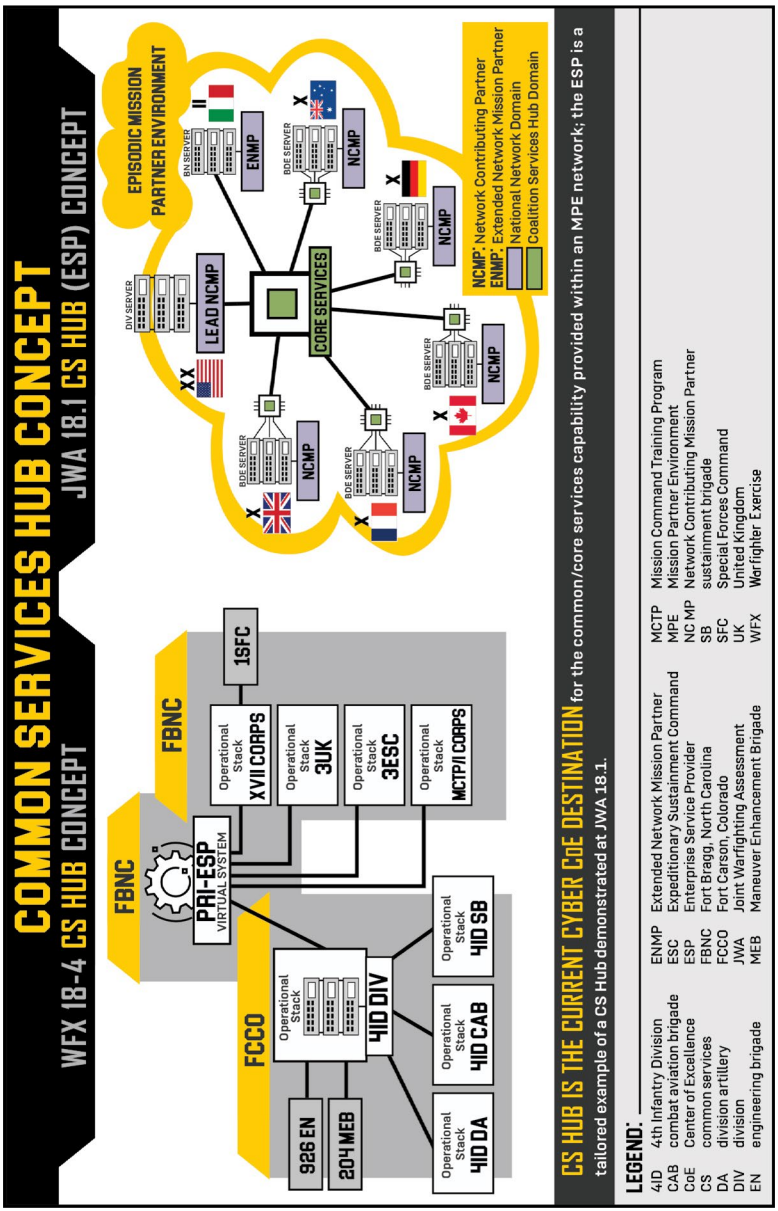

Figure C-1. Common services hub (Derived from WFX 18-4 Interoperability Technical Working Integration Group slide [MCTP] and JWA 18.1 CS hub discussion slide [U.S. ABCANZ])

The CSHub is both the central network interconnection point for all multinational partners, and the bridge between the MPE and the geographic combatant command's strategic MPE network. The CSHub enables the sharing of collaborative enterprise services (email, voice, chat, video teleconferencing, web/file sharing, etc.), and provides the path to integrate U.S. and multinational command and control systems and applications across WfFs.

Although the MPE was originally conceived as a technical solution to enable effective information sharing and collaboration between mission partners, effective delivery of an MPE capability must include the human and procedural solutions necessary to fully leverage this data exchange, such as a coalition information management (IM)/knowledge management (KM) plan; commander and staff training and rehearsal; common tactics, techniques, and procedures (TTP); and standard operating procedures (SOPs) across WfFs.

Currently, each instance of a MPE requires Headquarters, Department of the Army-level guidance and assistance to generate the resources, policy waivers, and overarching technical expertise required to design and implement the desired technical solutions. Although the Army is taking steps to reduce this overhead, in the near-term, implementing an effective MPE in a timely and cost-effective manner remains problematic. In operational terms, in a "fight tonight" scenario, a multinational force must already have an MPE or agreements in place, and preparations to rapidly implement an MPE capability, or rely on liaisons and existing communication information system interoperability to share information and build understanding. See the recently completed Army MPE concept of operations for the Army's authoritative view of MPE implementation, desired capabilities, and example use cases and mission threads.

APPENDIX D

Glossary

air support operations center (ASOC)	The principal air control agency of the theater air control system responsible for the direction and control of air operations directly supporting the ground combat element. (Department of Defense [DOD] Dictionary of Military and Associated Terms, July 2019)
alliance	The relationship that results from a formal agreement between two or more nations for broad, long-term objectives that further the common interests of the members (DOD Dictionary)
American, British, Canadian, Australian, and New Zealand (ABCANZ) Armies' Program	ABCANZ is an international program that promotes interoperability and standardization among the armies of the United States, Britain, Canada, Australia and New Zealand. The focus of the ABCANZ program is on interoperability… The Program Office for ABCANZ is the United States Army. ABCANZ Products, the prime tangible output of the program, are formal outputs of data or documentation from the Program that are intended to enhance interoperability among the ABCANZ Armies. The types of ABCANZ Products are standards, publications, architectures, databases, and reports. (Defense Standardization Program, "International Standardization," Accessed 02 FEB 2020)
area of responsibility	The geographical area associated with a combatant command within which a geographic combatant commander has authority to plan and conduct operations. (DoD Dictionary)
Artillery Systems Cooperation Activities (ASCA)	ASCA enhance and maintain an embedded operational communications interface for field artillery/fire support command and control systems of participating nations, enabling functional fire control interoperability.

coalition/ combined task force (CTF)	Multinational Planning Augmentation Team (MPAT) term for a multinational force that executes the military mission at the operational level during an multinational force effort. Such a military task force is multinational: coalition, combined, or a combination of the two. (MPAT, *Multinational Force Standing Operating Procedures Version 3.3*, 15 NOV 2019)
coalition force	A coalition force is an ad hoc arrangement between two or more nations for common action. (North Atlantic Treaty Organization [NATO] Allied Administrative Publication [AAP]-39, *NATO Handbook of Land Operations Terminology,* 04 DEC 2015)
Coalition Interoperability Assurance and Validation (CIAV)	This group provides an end-to-end mission based interoperability assessment methodology to improve U.S. Mission Partner Environment (MPE) operations with mission partners. This group is also responsible for change management of the joining, membership, and exiting instructions (JMEI) that describe network standards for partners joining a U.S., DoD led mission network. CIAV analyzes mission-based interoperability and overall mission effectiveness to resolve process, training, and technical capability gaps within coalition and mission partner environments by conducting comprehensive reviews of data flows between applications and systems that support one or more coalition mission threads. (Chairman of the Joint Chiefs of Staff Instruction [CJCSI] 5128.01, *Mission Partner Environment Executive Steering Committee Governance and Management,* 1 OCT 2014)
Coalition Network Operations and Security Center (CNOSC)	The CNOSC is the center of gravity for cyber security operations and actions. Includes functions of network operation center as well as cyber network defense.
coalition operation	Operation conducted by forces of two or more nations, which may not be allies, acting together for the accomplishment of a single mission.

Common Operational Picture (COP) Technical Assurance Cell (CTAC)	Supports the multinational force headquarters COP picture manager/knowledge management officer in designing, building, maintaining, continuously validating, and troubleshooting the coalition COP to ensure each mission partner national COP is accurately reflected in the coalition COP, and provides help desk support for subordinates as a key component of shared understanding.
combined	A term identifying two or more forces or agencies of two or more allies operating together. (DOD Dictionary)
Command Post Computing Environment (CPCE)	CPCE aims to reduce stove-piped legacy systems and provide an integrated, interoperable, cyber-secure and cost-effective computing infrastructure framework for multiple warfighting functions. CPCE will provide Army programs of record with a core infrastructure, including a COP tool, common data strategy, common applications such as mapping and chat, common hardware configurations and common look and feel (user interface). This effort eliminates duplicative or redundant implementations, speeds up and simplifies future development efforts and enhances interoperability and data sharing across multiple echelons. (Program Executive Office Command Control Communications-Tactical [PEO-C3T], "Command Post Computing Environment," Accessed 02 FEB 2020)
commander's critical information requirement (CCIR)	An information requirement identified by the commander as being critical to facilitating timely decision making. (DoD Dictionary)
Common (or Coalition) Services Hub (CSHub)	CSHub is an MPE common services concept to provide common collaborative and network services across a coalition (chat, voice over internet protocol, email, web portal/SharePoint, video teleconferencing, imagery sharing) within an MPE, using an appropriate model of federation.
critical interoperability requirement	An interoperability requirement that the unit must meet to support the desired levels of interoperability across warfighting functions.

Enterprise Mission Partner Environment	The enterprise level MPE relies on the joint information environment backbone and security architecture to enable the U.S. joint force to connect, access, and project releasable information into a shared information environment with mission partners. The enterprise MPE, comprised of global and regional MPE processing nodes, provides a flexible and agile means to establish distinct and separate mission networks with multiple mission partner sets. Enterprise MPE capability requires a persistent, deployable, always-on information sharing capability with allies and mission partners. The enterprise MPE provides a seamless, scalable, secure, cloud-hosted, end-to-end data exchange and information sharing environment that provides the ability to support connections by tactical elements and mission partners. Implementation of a standardized, global, enterprise MPE promotes security and enables rapid connection of U.S. tactical headquarters who must traverse combatant command geographic boundaries. Nation-to-nation systems at the enterprise level afford key allies the ability to conduct planning and collaboration during day-to-day, Phase 0 activities. (Derived from the Army Mission Partner Environment Concept of Operations [CONOPS], 27 SEP 19)
Enterprise Services Provider (ESP)	The U.S. Army, Joint Modernization Command implementation of the ABCANZ CSHub standard. ESP was successfully trialed during fiscal year (FY)18 and FY19 multinational exercise.

Expeditionary Mission Partner Environment	Deploying forces, in support of a combined joint task force mission, establish an Expeditionary MPE to share tactical level warfighting information and data with mission partners, and to connect, provide, and consume services to and from the Enterprise MPE as required. In support of operational to tactical level operations, the U.S. employed MPE must possess an information technology (IT) means, separate from the Non-classified Internet Protocol Router Network (NIPRNET) and the SECRET Internet Protocol Router Network (SIPRNET), to share information and exchange data with mission partners. Mission partners operating at the operational to tactical levels must possess an organic IT capability to share, consume, provide, and federate IT services within the Expeditionary MPE. Further, coalition forces are likely to be operating within a denied, degraded, intermittent, or limited (DDIL) contested communications, logistics, and information environment. Forward deployed forces that are supported by, but not dependent upon, the Enterprise MPE, and who are employing an Expeditionary MPE, are not constrained by limited reachback or disconnected operations. (Derived from the Army Mission Partner Environment CONOPS, 27 SEP 19)
identification, friend or foe (IFF)	A device that emits a signal positively identifying it as a friendly. (DOD Dictionary)
information operations	The integrated employment, during military operations, of information-related capabilities in concert with other lines of operation to influence, disrupt, corrupt, or usurp the decision-making of adversaries and potential adversaries while protecting our own. (DOD Dictionary)

joining, membership, and exiting instructions (JMEI)	Network standards for partners joining a U.S., DOD-led mission enclave. The processes and technical configurations required of mission partners when connecting a mission partner or national network extension to an event lead's mission network core at a security classification level specific to that event, proposing and implementing changes to services operating within the mission network, and when disconnecting a national extension from a mission network core. The intent of the JMEI is to provide a template for connection of joint services and mission partners in a trusted federated mission network that is consistent and coherent across the DOD. JMEI may be utilized as a template to guide establishment of a federation of networks to support any event with a unique security classification level information and data exchange environment shared by all mission partners electing to connect. (CJCSI 5128.01)
joint	Connotes activities, operations, organizations, etc., in which elements of two or more Military Departments participate. (DOD Dictionary)
joint air-ground integration center	A staff organization designed to enhance joint collaborative efforts to deconflict joint air-ground assets in the division's airspace. (DOD Dictionary)
joint terminal attack controller (JTAC)	A qualified (certified) Service member who, from a forward position, directs the action of combat aircraft engaged in close air support and other offensive air operations. (DOD Dictionary)
law of war	That part of international law that regulates the conduct of armed hostilities. (DOD Dictionary)
mission	The task, together with the purpose, that clearly indicates the action to be taken and the reason therefore. (DOD Dictionary)
mission critical interoperability requirement	Interoperability capabilities or functions the commander/staff identify as critical to enabling operational mission success in a multinational operation. Examples include a quality coalition-wide COP, or a coalition network enabling digital communications between all mission partners.

mission partner	Those with which the DOD cooperates to achieve national goals, such as other departments and agencies of the U.S. government; state and local governments; allies, coalition members, host nations and other nations; multinational organizations; non-governmental organizations; and the private sector. (DOD Instruction 8110.01, *Mission Partner Environment Information Sharing Capability Implementation for the DOD,* 25 NOV 2014)
Mission Partner Environment	An operating environment which enables operations and intelligence for planning and execution on a network infrastructure at a single security level with a common language. An MPE capability provides the ability for mission partners to share their information with all participants within a specific partnership or coalition beginning in Phase 0 and transitioning to execution of Phase 1, Day 1 operations. An effective MPE includes a combination of technical, procedural, and human domain solutions to enable timely, complete, and accurate information sharing, process execution, and unity of effort between mission partners. (DOD Instruction 8110.01)
Multilateral Interoperability Programme (MIP)	Multilateral Interoperability Programme (MIP) is a consortium of 29 NATO and non-NATO nations that meet quarterly to define interoperability specifications for the exchange of COPs and other operational information between their national command and control systems to deliver an assured capability for interoperability of information to support echelons from corps to battalion.
multinational operations	A collective term to describe military actions conducted by forces of two or more nations, usually undertaken within the structure of a coalition or alliance. (DOD Dictionary)
Multinational Planning Augmentation Team (MPAT)	MPAT consists of 31 Asia-Pacific countries (to include the U.S.) participating to collaboratively develop mutual tactics, techiques, and procedures and standard operating procedures for planning and execution of multinational operations within the region, and augment a multinational force headquarters in response to sudden onset crises. (Joint Publication [JP] 3-16, *Multinational Operations*, 01 MAR 2019)

Multinational Strategy and Operations Group (MSOG)	The MSOG's objectives are to— • Build relationships to enhance mutual trust and understanding of national perspectives and operational challenges and risks. • Influence and shape the development of operational practices for more effective and aligned coalition operations in a resource constrained environment. • Increase understanding of the strategic challenges and risks facing member defense organizations. • Influence and shape the development of coherent multinational responses to those challenges. (MSOG, *Charter,* 15 NOV 2018)
national command	A command that is organized by, and functions under the authority of a specific nation. It may or may not be placed under a NATO commander. (JP 3-16)
NATO Standardization Agreements (STANAGs)	NATO developed STANAGs that define processes, procedures, terms, and conditions for common military or technical procedures or equipment between the member countries of the NATO alliance. (NATO AAP-6, *NATO Glossary of Terms and Definitions*, 8 NOV 2018)
operation order (OPORD)	directive issued by a commander to subordinate commanders for the purpose of effecting the coordinated execution of an operation. (DOD Dictionary)
operation plan (OPLAN)	A complete and detailed plan containing a full description of the concept of operations, all annexes applicable to the plan, and a time-phased force and deployment list. (DOD Dictionary)
rules of engagement (ROE)	Directives issued by competent military authority that delineate the circumstances and limitations under which U.S. forces will initiate and/or continue combat engagement with other forces encountered. (DOD Dictionary)

running estimate	The continuous assessment of the current situation used to determine if the current operation is proceeding according to the commander's intent and if planned future operations are supportable. (ADP 5-0, T*he Operations Process*, 31 JUL 2019)
standardization	The process by which the DOD achieves the closest practicable cooperation among the Services and DOD agencies for the most efficient use of research, development, and production resources, and agrees to adopt on the broadest possible basis the use of: a. common or compatible operational, administrative, and logistic procedures; b. common or compatible technical procedures and criteria; c. common, compatible, or interchangeable supplies, components, weapons, or equipment; and d. common or compatible tactical doctrine with corresponding organizational compatibility (DOD Dictionary)
tactics, techniques, and procedures (TTP)	Tactics are the employment and ordered arrangement of forces in relation to each other. Techniques are non-prescriptive ways or methods used to perform missions, functions, or tasks. Procedures are standard, detailed steps that prescribe how to perform specific tasks. (CJCSM 5120.01)
unified action partner (UAP)	Those military forces, governmental and nongovernmental organizations, and elements of the private sector with whom Army forces plan, coordinate, synchronize, and integrate during the conduct of operations. (FM 1-02.1, *Operational Terms*, 21 NOV 2019)

APPENDIX E

Acronym List

1AMD	1st Atropian Mechanized Division
3UK	3rd Division United Kingdom
4ID	4th Infantry Division
7AD	7th Armored Division
7th CAV	7th Cavalry Regiment
8ID	8th Infantry Division
AAP	Allied Administrative Publication (NATO)
AAR	after action review
ABCANZ	American, British, Canadian, Australian and New Zealand
ACM	Army Capability Manager
ADP	Army Doctrine Publication
AFATDS	Advanced Field Artillery Tactical Data System
AJST	Army Joint Support Team
APAN	All Partners Access Network
AO	area of operations
AR	Army Regulation
ASCA	Artillery Systems Cooperation Activities
ASOC	Air Support Operations Center
ATP	Army Techniques Publication
AVN	aviation
BDAREP	battle damage assessment report
BTG	battalion tactical group
CAC	Common Access Card
CALL	Center for Army Lessons Learned
CAS	close air support
CBRN	chemical, biological, radiological, and nuclear
CCIR	commander's critical information requirement
CIAV	Coalition Interoperability Assurance and Validation

CID	combat identification
CJCSI	Chairman of the Joint Chiefs of Staff Instruction
CNOSC	coalition network operations and security center
COA	course of action
CONOPS	concept of operations
COP	common operational picture
COS	chief of staff
CP	command post
CPCE	Command Post Computing Environment
C-RAM	counter-rocket, artillery, mortar
CSHub	common services hub
CTAC	COP Technical Assurance Cell
CTF	combined task force
DLD	Digital Liaison Detachment
DP	displaced persons
DPICM	Dual-Purpose Improved Conventional Munition
DOD	Department of Defense
DOTMLPF-P	doctrine, organization, training, materiel, leadership and education, personnel, facilities, and policy
EPW	enemy prisoner of war
ESP	Enterprise Services Provider
FDO	foreign disclosure officer
FM	Field Manual
FMN	Federated Mission Networking
FSC2	fire support command and control
FWD	forward
FY	fiscal year
HQ	headquarters
IBCT	infantry brigade combat team
IBS	integrated broadcast system
IER	information exchange requirement
IFF	identification, friend or foe
IM	information management

ISR	intelligence, surveillance, and reconnaissance
JAGIC	joint air ground integration center
JIE	joint information environment
JMC	Joint Modernization Command
JMEI	joining, membership and exiting instructions
JP	Joint Publication
JTAC	joint terminal attack controller
JTF-W	Joint Task Force-West
JTT	joint tactical terminal
JWA	Joint Warfighting Assessment
KM	knowledge management
KMO	knowledge management officer
M&S	missiles and space
MC	mission command
MCCoE	Mission Command Center of Excellence
MDMP	military decisionmaking process
MDO	multi-domain operations
MIP	Multilateral Interoperability Programme
MNCC	multinational coordination center
MNF	multinational force
MNI	multinational interoperability
MPAT	Multinational Planning Augmentation Team
MPCC	mission partner coordination center
MPE	Mission Partner Environment
MSCoE	Maneuver Support Center of Excellence
MSOG	Multinational Strategy and Operations Group (formerly MIC)
N&S	network and services
NATO	North Atlantic Treaty Organization
NGA	National Geospatial-Intelligence Agency
NTP	Network Time Protocol
OP	observation post
OPLAN	operation plan

OPORD	operation order
PACE	primary, alternate, contingency, and emergency
PD	program directorate
PdM	product manager
PEO	program executive office
PME	professional military education
PMESII	political, military, economic, social, information, and infrastructure
PO	program officer
PSM	Product Support Manager
RDD	requirements development division
RFI	request for information
ROE	rules of engagement
RRI	response to request for information
RSOI	reception, staging, onward movement, and integration
SA	situational awareness
SBCT	Stryker brigade combat team
SEAD	suppression of enemy air defenses
SME	subject matter expert
SOF	special operations forces
SOP	standard operating procedure
S//REL	Secret//Releasable
STANAG	standardization agreement
TACLANE	Tactical Local Area Network Encryption
TACON	tactical control
TAIS	Tactical Airspace Integration System
TBM	theater ballistic missile
TMD	Technical Management Directorate
TP	TRADOC Pamphlet
TR	TRADOC Regulation
TRADOC	U.S. Army Training and Doctrine Command
TTP	tactics, techniques, and procedures
UAP	unified action partner

UAS	unmanned aircraft system
UK	United Kingdom
UN	United Nations
USAF	U.S. Air Force
USAREUR	U.S. Army, Europe Command
USMTF	U.S. Message Text Format
VoIP	voice over internet protocol
VTC	video teleconference
WARNORD	warning order
WfF	warfighting function
WFX	Warfighter Exercise
XO	executive officer

APPENDIX F

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