Center for Army Lessons Learned

News From the Front

The Army Interoperability Measurement System

AIMS

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Overview

Until now, the U.S. Army lacked an integrated and holistic strategic-level plan to build interoperability with its key partners and had no standardized or enduring measurement system to ensure identified interoperability gaps are resolved. During significant training exercises with multinational (MN) partners, CALL collects observations, and following the exercises, it publishes after action reports (AARs). These AARs have led to interoperability improvements, but the lack of an Army-wide standardized way to assess interoperability gaps resulted in diminished impact on eliminating or mitigating critical interoperability gaps. A key reason for this is that such issues were not directly connected to a capability owner. To improve interoperability, Headquarters Department of the Army (HQDA) G-3/5/7 (general staff operations, plans, and training) built a coherent Army Interoperability Campaign Plan subordinated to the Army Campaign Plan, created bilateral interoperability roadmaps, and stood up a multinational team of planners to develop, track, and exploit bilateral interoperability roadmaps. To assess interoperability progress and inform resource allocation decisions, the Army developed an Army Interoperability Measurement System (AIMS) which measures interoperability levels among the U.S. Army and its partners. The AIMS is scalable, focused, strategic-to-tactical, linked to interoperability plans, and it has bilateral, cross component, and joint utility. With sound concepts, linkages, processes, and AIMS in place, the Army can design and implement training exercises that, foremost, train U.S. and MN forces while providing armies an opportunity to observe and measure if interoperability goals are achieved. Interoperability is only one subset of security cooperation activities, and it is important to have the capability to assess, monitor, and evaluate interoperability in order to enhance interoperability and husband limited resources.

Background

As of 2018, the U.S. Army did not have an integrated Multinational Interoperability (MNI) strategic-level plan, nor did it have a systematic and standardized means to measure interoperability between the U.S. Army and its key unified action partners (UAPs). CALL AARs have captured many interoperability lessons learned and capability gaps, but these are not systematic, and they were not sufficiently exploited to drive improvements in MNI with key UAPs. To address this gap, the Army G-3/5/7 directed the creation of a Multinational Fusion Cell (MFC), which is manned by Military Personnel Exchange Program (MPEP) officers and Foreign Liaison Officers (FLOs) from key UAPs. Further, Department of the Army Military Operations–Stability and Security Cooperation (DAMO-SSC) directed the MFC to create bilateral interoperability roadmaps, which are planning mechanisms for interoperability between the MFC member countries and the U.S. Army. To track subsequent gains in interoperability, the Army G-3/5/7 further directed the creation of an enduring means to measure interoperability between the U.S. Army and UAPs.

The Interoperability Campaign Plan

Relentless digitization and new operating concepts have made interoperability much more complex. The Interoperability Campaign Plan (ICP) synchronizes efforts across the Army and informs bilateral and multinational interoperability efforts to overcome the increasing challenge of complexity. HQDA developed and staffed the ICP in support of the Army Campaign Plan (ACP), and HQDA published the ICP as a fragmentary order (FRAGORD) to the ACP. The ICP identifies how the U.S. Army will be interoperable with selected partners by identifying ends, ways, and means, synchronized by time, partner, and priority focus areas (PFAs). It enables focused planning and execution and aligns responsibility, accountability, and authority for interoperability.

While a plan is crucial, it is imperative to have a measurement process to assess progress and identify and mitigate interoperability gaps.

Measuring Interoperability

The U.S. Army measures interoperability in terms of the four levels defined as–

- Level 0 (not interoperable): UAPs have no demonstrated interoperability. Command and control (C2) interface with the Army is only at the next higher echelon. UAP formations must operate independently from U.S. Army formations and operations.
- Level 1 (de-conflicted): U.S. Army and UAPs can coexist but do not interact. This requires alignment of capabilities and procedures to establish operational norms, enabling UAPs and the U.S. Army to complement each other's operations.
- Level 2 (compatible): U.S. Army and UAPs are able to interact with each other in the same geographic area in pursuit of a common goal. The U.S. Army and UAPs have similar or complementary processes and procedures and are able to operate effectively with each other.
- Level 3 (integrated): The U.S. Army and UAPs are able to integrate upon arrival in theater. Interoperability is network enabled to provide the full range of military operations capability. UAPs are able to routinely establish networks and operate effectively with or as part of U.S. Army formations.

The ICP, MFC planners, and bilateral interoperability roadmaps all use these levels to inform the Army enterprise about the current state of, and gains in, interoperability.

CIRCuIT

Prior to AIMS, HQDA worked with the Center for Army Analysis (CAA) to develop the Communications Interoperability Capability Appraisal Table (CIRCuIT). CIRCuIT worked on the principle that Level 2 Army tactical tasks (ARTS) would be used to measure interoperability. In order to do that, each of the appropriate Level 2 ARTS required definitions and information elements for each of the four levels of interoperability. DAMO-SSC and CAA worked with the Army Centers of Excellence (CoEs) to develop definitions for each of the interoperability levels and information elements for a select set of level-two Army tactical tasks.

In April 2019, at WARFIGHTER EXERCISE (WFX) 19-4, a CIRCuIT proof of concept was conducted. DAMO-SSC and CAA worked with a CALL-led collection and analysis team (CAAT) and exercise participants to facilitate collection of information at WFX 19-4. The data obtained from CIRCuIT supported an exploitation panel (EP), which identified levels of interoperability and key interoperability gaps observed at WFX 19-4. One issue with CIRCuIT was that the breadth of the criteria used was too vast. The breadth of the criteria utilized all the center of excellence, or CoE, input, which was laid out in large matrices and possessed too many information elements for an observer to easily digest. Further, CIRCuIT was too complex to be considered for release to the broader Army, as it would require significant training and reorganization of CAATs.

RAND Arroyo Center Analysis of Alternatives

Concurrent with planning efforts to field CIRCuIT as a proof of concept at WFX 19-4, DAMO-SSC requested the RAND Corporation Arroyo Center conduct an analysis of alternatives (AoA) of interoperability measurement options within the U.S. Army. RAND compared several frameworks, including U.S. Army Training and Evaluation Outlines (T&EOs) currently used within the Army. RAND also used CALL collection approaches, an approach developed by RAND Arroyo Center for 7ATC, a data collection approach employed by the Joint Modernization Command (JMC) at JOINT WARFIGHTING ASSESSMENT (JWA) 19, and CAA's CIRCuIT. They also used the collection approach developed by the American, British, Canadian, Australian, and New Zealand (ABCANZ) Armies' Program for JWA 19 (the Critical Questions List); the U.K.'s Military Interoperability Assessment Tool, or MIAT; and a generic expert panel approach.

Ultimately, RAND found that none of the approaches fully met the Army's requirements. Subsequently, RAND recommended a new framework, which utilizes much of the work done by the CoEs for CIRCuIT. This new framework was named the Army Interoperability Measurement System or AIMS.

Additionally, interoperability measurements currently include measuring brigades and higher echelons, while omitting more tactical-level measurements. Measures must link to the doctrine, organization, training, materiel, leadership and education, personnel, facilities, and policy (DOTMLPF-P) spectrum.

Based on experience from the CIRCuIT proof of concept at WFX 19-4, measures are organized by and reflect the PFAs: communication and information systems (CIS); information management (IM); intelligence, surveillance and reconnaissance; intelligence fusion; digital fires; and sustainment.

Subsequently, DAMO-SSC created another PFA for use with AIMS, information management and knowledge management (IM and KM), and made CIS a standalone PFA, due to the importance and the need for simplifying the areas to be measured. PFAs, not warfighting functions (WfFs), are the means of organizing the collection of interoperability data because despite being organized internally by WfFs, the Army and its key partners look at interoperability *specifically* by PFA.

What is AIMS?

AIMS serves the purpose of identifying interoperability levels and interoperability gaps between the U.S. Army and UAPs at an exercise. Often misunderstood as a singular software system, AIMS is comprised of four components, which include different functions, tools, and processes–

1. Component one, the quantitative component, consists of five simple instruments for CIS, IM, KM, fires, intelligence, and sustainment. These instruments contain mostly go and no-go style questions, referred to as interoperability measures, which can be completed by an observer or exercise participant.

2. Component two, the qualitative component, is a mechanism for inputting observations developed by CAATs. These observations are meta-tagged to component one interoperability measures to enable the automatic association of interoperability measures with interoperability gaps and enable capability gap analysis.

3. Component three, or "The Dashboard," is the automatic association that takes place, and which is the digital entity where components one and two are both stored. Component three was intentionally developed as an Excel-based platform to enable ease of use and faster promulgation to the Army enterprise.

4. Component four or the exploitation mechanism is when EP convene immediately following a signature training exercise and are comprised of representatives from all participating countries. These panels collectively work to ensure that the results derived from component one are consistent with "ground truth," and if there is an issue, they adjudicate the issue. EPs play a critical role in synthesizing the results from the quantitative and qualitative data analysis to identify and take actions to resolve capability gaps. Key outputs of the EP include bilateral records of decisions (RODs), which are staffed for bilateral approval. RODs enable finalizing data and information before being distributed to the proper MFC representative for exploitation using the bilateral interoperability roadmaps. Additionally, U.S. and MFC planners are held accountable for addressing their gaps in the HQDA-led interoperability operational planning team (OPT). These processes ensure that information is properly exploited. (See Figure 1 on page 4.)

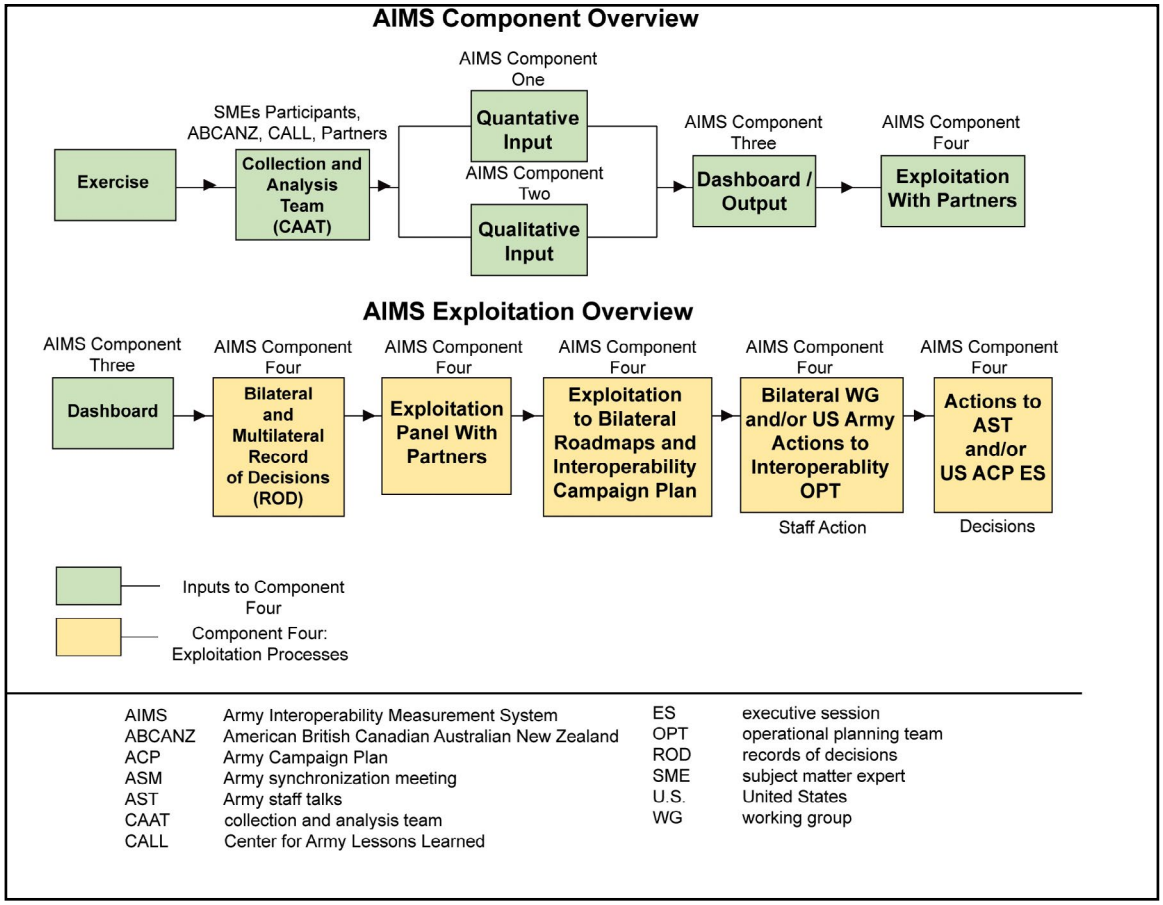

Figure 1. SSC brief given by Col Robert Howieson to ABCANZ National Directors at the ABCANZ Executive Council Meeting, Royal Military Academy Sandhurst, England, 13 NOV 2019.

JWA 19 AIMS Pilot

AIMS was first piloted at JWA 19. The Joint Multinational Interoperability (JMNI) assessment team led by JMC, DAMO-SSC, RAND, and CAA worked with the PFA collection cells to complete components one and two of AIMS. Scores were manually calculated, given that component three had not yet been developed. This data was subsequently reviewed in an EP, which produced RODs for the U.K., Canada, Australia, and New Zealand, as well as a multilateral ROD for ABCANZ partners. RAND and DAMO-SSC also collected feedback from subject matter experts (SMEs) at the exercise, which was used as a baseline for planning the refinement of component one measures throughout the rest of 2019.

Refining AIMS

AIMS component one is derived from the initial input received from the CoEs. Through piloting of AIMS at various exercises (often with the assistance and cooperation of CALL), including JWA19, MAPLE RESOLVE 19, TALISMAN SABER 19, and YAMA SAKURA 77, DAMO-SSC and RAND received feedback from other SMEs. This feedback was collected and discussed with the CoEs during the refinement stage. Through these discussions, IMs were refined to make them clearer and more doctrinally accurate.

Emerging Requirements

Throughout AIMS refinement, DAMO-SSC engaged with Army Service component commands (ASCCs) to gain their input. ASCCs expressed significant interest in AIMS, and some early versions of AIMS IMs were released to different ASCCs. An initial interoperability measurement requirement was to measure brigade and higher echelons to inform the MFC, bilateral roadmaps, and the ICP. Feedback from the ASCCs indicated that AIMS did not provide adequate metrics to measure interoperability at tactical levels, meaning echelons below brigade. DAMO-SSC and RAND began a dialogue with the Joint Multinational Readiness Center to incorporate metrics for tactical-level exercises. Ultimately, DAMO-SSC intends to provide a system which can measure interoperability between the U.S. Army and UAPs across most echelons, at a minimum of battalion and above echelons.

Current State and Way Ahead

At the time of this article's publication, DAMO-SSC and RAND are finalizing AIMS refinement of the sustainment PFA IM lists with logistic, medical, and other sustainment SMEs. Component three currently exists as a prototype Excel-based program, which houses component one and component two. Planning is underway for AIMS full operational capability in future exercises, in coordination with JMC and its JMNI Assessments Cell, which also includes CALL, ABCANZ partners, NATO Land Command, and key MN partners participating in JWA and Defender exercises. It is envisioned that during JWA and Defender AIMS will be fully exercised and exposed to key stakeholders. The results and insights gained will be used to finish any needed refinements and finalize AIMS for use by the Army enterprise, after approval by Army senior leaders.

The Army intended to fully employ AIMS at JWA 20 and DEFENDER EUROPE (DE) 20, but the exercises were canceled due to COVID-19. DAMO-SSC in coordination with JMC and its JMNI Assessments Cell which also includes CALL, ABCANZ partners, NATO Land Command, and key MN partners is identifying alternative exercises to employ AIMS. At the selected exercises, AIMS will be fully exercised and exposed to key stakeholders. The results and insights gained will be used to finish any needed refinements and finalize AIMS for use by the Army enterprise, after approval by Army senior leaders.

Joint Interoperability and "Intra-operability"

HQDA recognizes that there is also a need to measure interoperability between Army units and between the other services—joint interoperability. As it has been developed so far, AIMS is capable of being modified to adequately measure brigade and higher echelon interoperability between U.S. Army units, including National Guard and Reserves—intra-operability. HQDA plans to address joint interoperability measurement after making AIMS available to the Army enterprise. The AIMS framework also can be used by the other services, as well as key UAPs and NATO, to enable similar interoperability measurement capabilities. Ultimately, measuring interoperability across exercises enables the assessment, monitoring, and evaluation of a subset of security cooperation activities.