Advancing Globally Integrated Logistics Effort 2017 Wargame Report

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Abstract

This report describes the execution and analysis of a logistics game created for the Joint Staff J-4, Directorate for Logistics. The game, Advancing Globally Integrated Logistics Effort 2017 (AGILE 17), centered on developing a better understanding of the requirements associated with the implementation of the Joint Logistics Enterprise (JLEnt). The objective for AGILE 17 was to identify JLEnt interoperability seams and gaps in meeting globally integrated logistics demand during simultaneous, transregional crises in contested environments.

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Executive Summary

The Advancing Globally Integrated Logistics Effort (AGILE) initiative is a Joint Staff J-4-led biennial wargame series focused on the development and implementation of the Joint Logistics Enterprise (JLEnt). The JLEnt encompasses the U.S. Department of Defense (DOD) services, combatant commands, combat support agencies, other U.S. government departments and agencies, the commercial sector, nongovernmental organizations (NGOs), intergovernmental organizations (IOs), and multinational partners. A unified JLEnt would create an integrated and synchronized global logistics network response for any crisis event. Knowing the roles, responsibilities, and authorities of JLEnt partners is essential to planning, executing, controlling, and assessing logistics operations. JLEnt partners must collaborate both before and during a crisis to ensure the coordinated employment and sharing of capabilities and resources. Owing to the diversity of organizations involved, however, challenges exist to achieving globally integrated logistics and unity of action. To that end, the Joint Staff J-4 Directorate for Logistics designated the Center for Naval Analyses (CNA) to develop AGILE 17, the second wargame in a series, to further explore the JLEnt coordination frameworks, agreements, and other connections.

Lessons learned from the first wargame, Logistics Wargame 2015 (LOGWAR 15), provided the basis for AGILE 17. Its objective was to identify JLEnt interoperability seams and gaps in meeting globally integrated logistics demand during simultaneous, transregional crises in contested environments.

AGILE 17 took place May 8-12, 2017, at the Lockheed Martin Center for Innovation in Suffolk, Virginia. A wide spectrum of representatives across the global logistics community participated in the game (see Appendix A). Altogether, over 145 participants from more than 60 different organizations attended the wargame; over 40 percent were from outside the DOD, and more than 30 percent were from outside the U.S. government (USG) (see Appendix A).

The AGILE 17 game scenario involved concurrent domestic and foreign crises to evaluate the potentiality of having to draw on similar resources and transportation mechanisms. Domestically, AGILE 17 players were tasked to respond to an earthquake in Southern California (SoCal). The SoCal scenario centered on a domestic response to a catastrophic earthquake and subsequent tsunami. With more than 500,000 people displaced, mass care support of 2.5 million people required, and critical infrastructure destroyed, responders from the U.S. government, industry, and

NGOs first had to address the immediate aftermath of the earthquake, and then had to support short-term recovery efforts. Overseas, players focused on a scenario related to restoring stability in a Pacific nation. The Pacific scenario focused on a complex emergency in which military stability and security operations occurred in tandem with humanitarian relief.

Although specific scenarios were chosen to facilitate the act of playing the wargame, the Joint Staff J-4 sought to capture universal logistic lessons that would be relevant to any global crisis response and would foster improved understanding and interactions among JLEnt organizations. Based on observations and post-game analysis, CNA recommended a potential way forward to improve the interoperability across the entire JLEnt. The next steps recommended by CNA are organized under four topics:

1. Because information sharing will be an integral component in realizing a unified and timely response to a crisis, JLEnt partners should consider the following:

   - As much as possible, JLEnt partners need a central communication and coordination focal point to ensure that efforts are not unnecessarily duplicated and to gain a clear operational picture of the situation as it unfolds.

   - Leverage existing information systems, such as ReliefWeb, All Partners Access Network (APAN), and United Nations Humanitarian Response Depots (UNHRDs), to provide information about assets and capabilities across the entire JLEnt.

   - A complementary solution is to foster a deeper knowledge of the types of capabilities JLEnt partners have (air/ground transportation, commodities, services, etc.) and, during an ongoing operation, to reach out to the partner with the approximate capability profile to ascertain the specifics of what that partner can provide.

   - Create a Logistics Common Operating Picture (LogCOP) to reduce the risk planners and logisticians assume when making global asset reallocation decisions.

2. There is a general lack of familiarity with other JLEnt participants. To coordinate and collaborate more efficiently, it is incumbent on each organization to have a base knowledge about the major JLEnt responders and how they can interact and interoperate with them.

   - Educate personnel by establishing courses specific to JLEnt operations or by taking courses offered by the major logistics JLEnt participants (e.g., the

United Nations (UN), U.S. Agency for International Development, DOD, and the Federal Emergency Management Agency) that provide an overview of each organization.

- Consider training and exercising with other JLEnt partners, particularly in areas where there is either frequent need for humanitarian assistance responses or ample warning of potential complex emergencies occurring.

3. Deliberate planning across JLEnt organizations is needed to enable a better understanding of timelines, lead times, logistics flow and gaps. Deliberate planning is particularly important for coordination across organizational and national boundaries. Incorporating industry, IO/NGO, and multinational partners with DOD and federal agency planning prior to a crisis will enable a more effective JLEnt response during a crisis. Furthermore, the heavy reliance on contract support across the JLEnt requires an improved ability to deconflict, synchronize, and understand commercial sector capabilities and capacity. To fully leverage the JLEnt during a crisis, the following actions will be necessary:

- Integrate logistics planning across Whole of Government and include industry, IO/NGO, and multinational partners to encourage communication and facilitate innovative solutions.

As an aspect of deliberate planning, our recommendations for Operational Contract Support (OCS) synchronization include:

- Proper training of personnel in all echelons of the services who can work with commanders and staff.

- Establishment of Boards, Bureaus, Centers, Cells, and Working Groups (B2C2WG) for contingency operations to coordinate and communicate regarding joint contracted capabilities.

- Incorporation of OCS planning during the deliberate planning phase with OCS-trained personnel, especially for commonly contracted commodities.

4. In a resource-constrained environment, there may be a competition for assets and capabilities. Many of the larger JLEnt partners have preestablished processes for prioritization and adjudication.

- It would be beneficial for JLEnt participants to become familiar with the processes to ensure that they know where to "plug in" (e.g., Joint Planning and Execution Community, Local Emergency Management Agency, Joint Field Office) to participate in the process.

Three issues which played a lesser role in AGILE 17 but should be considered for further study include:

1. The level of classification at which information can be shared with JLEnt partners before and during a crisis.

2. Any customs and border control issues which lead to bottlenecks in moving relief supplies across borders.

3. The development of and/or adherence to standardized requirements for humanitarian missions.

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Glossary

AAR	After-Action Report
ACSA	Acquisition and Cross-Servicing Agreements
AFNorth	U.S. Air Force North
AGILE	Advancing Globally Integrated Logistics Effort
ANG	Air National Guard
AOI	Area of Incident
AOR	Area of Responsibility
APAN	All Partners Access Network
APEX	Adaptive Planning and Execution
ARNorth	U.S. Army North
BCT	Brigade Combat Team
B2C2WG	Boards, Bureaus, Centers, Cells, and Working Groups
BN	Battalion
CAAF	Contractors Authorized to Accompany the Force
CAP	Civil Air Patrol
CCDR	Combatant Commander
CCMD	Combatant Command
CFC	Combined Forces Command
CJCS	Chairman of the Joint Chiefs of Staff
CLPSB	Combatant Commander Logistics Procurement Support Board
CMCoord	Civil Military Coordination
CNA	Center for Naval Analyses
COIN	Counter-Insurgency
CONUS	Continental United States
COP	Common Operating Picture
COTP	Captain of the Port
CRAF	Civil Reserve Air Fleet
CRG	Contingency Response Group
CSH	Combat Support Hospital
DCE	Defense Coordinating Element
DCO	Defense Coordinating Officer
DFARS	Defense Federal Acquisition Regulation Supplement
DHS	Department of Homeland Security
DLA	Defense Logistics Agency
DMZ	Demilitarized Zone
DOD	Department of Defense

DOS	Department of State
DORRA	DLA Office of Operations Research and Resource Analysis
DP	Displaced Person
DSC	Dual Status Commander
DSCA	Defense Support of Civil Authorities
EOC	Emergency Operations Center
EPA	Environmental Protection Agency
ESF	Emergency Support Function
FAR	Federal Acquisition Regulation
FEMA	Federal Emergency Management Agency
FSA	Federal Staging Area
GFM	Global Force Management
GLOC	Ground Lines of Communication
GLS	Global Logistics System
GSA	General Services Administration
HA	Humanitarian Aid
	Humanitarian Assistance
HA/DR	Humanitarian Assistance and Disaster Relief
HAP	Humanitarian Accountability Partnership
HEB	High-Energy Biscuit
HET	Heavy Equipment Transporter
HAZMAT	Hazardous Material
HHS	U.S. Department of Health and Human Services
ICRC	International Committee of the Red Cross
IDRL	International Disaster Response Laws, Rules and Principles
IEHK	Interagency Emergency Health Kit
IFRC	International Federation of Red Cross and Red Crescent Societies
IHL	International Humanitarian Law
IMAT	Incident Management Assistance Team
IO	International Organization
IOF	Initial Operating Facility
IPR	In-Progress Review
ISB	Incident Supports Base
IT	Information Technology
JCE	Joint Coordinating Element
JCS	Joint Chiefs of Staff
JFC	Joint Force Commander
JFO	Joint Field Office
JHU/APL	Johns Hopkins University's Applied Physics Laboratory
JLEnt	Joint Logistics Enterprise
JLOTS	Joint Logistics Over-the-Shore
JMPAB	Joint Materiel Priorities and Allocation Board

JPEC	Joint Planning and Execution Community
JS	Joint Staff
JTF	Joint Task Force
KIHAC	Korean Integrated Humanitarian Assistance Center
LA	Los Angeles
LEMA	Local Emergency Management Agency
LMD	Logistics Management Directorate
LNO	Liaison Officer
LogCOP	Logistics Common Operating Picture
LOGWAR-15	Logistics Wargame 2015
LSC	Lead Service for Contracting
LSCC	Lead Service for Contract Coordination
MA	Mission Assignment
MASF	Mobile Aeromedical Staging Facility
MCDA	Military and Civil Defense Assets
MEU	Marine Expeditionary Unit
MISO	Military Information Support Operations
MNF	Multinational Force
NCA	National Command Authority
NEO	Noncombatant Evacuation Operation
NG	National Guard
NGB	National Guard Bureau
NGO	Nongovernmental Organization
NOAA	National Oceanic and Atmospheric Administration
NRCC	National Response Coordination Center
NRF	National Response Framework
NWS	National Weather Service
NZ	New Zealand
OCHA	Office for the Coordination of Humanitarian Affairs
OCSIC	Operational Contract Support Integration Cell
OCONUS	Outside the Continental United States
OCS	Operational Contract Support
OES	Office of Emergency Services
OFDA	Office of U.S. Foreign Disaster Assistance
OPLAN	Operation Plan
OPORD	Operation Order
POD	Point of Distribution
POLA	Port of Los Angeles
POLB	Port of Long Beach
PSMA	Prescripted Mission Assignment
REOC	Regional Emergency Operations Center
RFF	Request for Forces
ROK	Republic of Korea

RRCC	Regional Response Coordination Center
RRF	Resource Request Form
RSO&I	Reception, Staging, Onward Movement, and Integration
SAG	Surface Air Group
SAR	Search and Rescue
SCHR	Steering Committee for Humanitarian Response
SDDC	Surface Deployment and Distribution Command
SecDef	Secretary of Defense
SOC	State Operations Center
SOF	Special Operations Forces
SoCal	Southern California
UCG	Unified Coordination Group
UGF	Underground Facilities
UK	United Kingdom
UN	United Nations
UNAMIR	UN Assistance Mission for Rwanda
UNHRD	UN Humanitarian Response Depot
U.S.	United States
USACE	U.S. Army Corps of Engineers
USAF	U.S. Air Force
USAID	U.S. Agency for International Development
USA	U.S. Army
USAR	Urban Search and Rescue
USCG	U.S. Coast Guard
USFJ	United States Forces Japan
USFK	United States Forces Korea
USG	U.S. Government
USMC	U.S. Marine Corps
USN	U.S. Navy
USNORTHCOM	U.S. Northern Command
USPACOM	U.S. Pacific Command
USTRANSCOM	U.S. Transportation Command
WCO	World Customs Organization
WFP	World Food Programme

Introduction

The Advancing Globally Integrated Logistics Effort (AGILE) initiative is a Joint Staff (JS) J-4 led biennial wargame series focused on the development and implementation of the Joint Logistics Enterprise (JLEnt) concept. The JLEnt encompasses the entire logistics community, including various military services, other branches of the U.S. government (USG), the commercial sector, nongovernmental organizations (NGOs), international organizations (IOs), coalition partners, and allies. As a concept, a JLEnt response would have the unity across all responding organizations to integrate and synchronize a global logistics response to any crisis event. This is an idealized form of how a JLEnt would be operationalized, and the current mechanisms for interaction and collaboration still have obstacles to overcome to achieve such an important, yet lofty, goal.

The inception for what would become the JLEnt concept can be traced to the 2010 Joint Concept for Logistics [1]. This document outlined the requirements for an enterprise solution to the increasingly complex logistical requirements. The expected result would be the delivery and sustainment of logistical support to forces wherever they were deployed. In the next few years, the Capstone Concept for Joint Operations [2], Joint Concept for Logistics Experiment Baseline Assessment Report [3], and "Operation of the Logistics Enterprise in Complex Emergencies" [4] were published, furthering the idea of operationalizing a JLEnt in a real-world response.

Following from these initial efforts, Gen Dempsey, Chairman of the Joint Chiefs of Staff (CJCS), directed the Joint Staff's J-4 to "continue to develop and implement the Joint Logistics Enterprise" via a progressive wargame series initiative. This series of wargames focused on the JLEnt concept would help improve the understanding of capabilities across the JLEnt, provide a venue for realistic and credible logistics play in wargames, and help to identify and explore long-term sustainment issues.

The JS J-4 Directorate for Logistics turned to the Center for Naval Analyses (CNA) to develop the wargame series. The first game in the series, Logistics Wargame 2015 (LOGWAR-15), took place July 21-23, 2015, at CNA. It was set in a fictitious country in the Southern Pacific in the context of a complex humanitarian contingency. It was designed to challenge players into thinking about the best methods for maximizing the value derived from improved collaboration and the best possible implementation of the JLEnt concept [5].

Building on the lessons learned from the LOGWAR-15, AGILE 17 was designed to test the resiliency, responsiveness, and interoperability of a JLEnt response to a complex emergency.

Game objectives

The J-4's objective is to progress incrementally in the development of a roadmap for logistical responses that are flexible, collaborative, and effective. As the second effort in the series, AGILE 17 looked to expand on the lessons learned from LOGWAR-15.

AGILE 17 was designed to identify JLEnt interoperability seams and gaps in meeting globally integrated logistics demand during simultaneous, transregional crises in a contested environment. The game scenario involved concurrent domestic and foreign crises, which could potentially draw on similar resources and transportation mechanisms. Specifically, AGILE 17 players were asked to respond to both an earthquake in Southern California (SoCal) and a complex emergency related to restoring stability in a foreign nation in the Pacific. The SoCal scenario centered on a domestic response to a catastrophic earthquake. With more than 500,000 people displaced and infrastructure destroyed, responders from the USG (Department of Homeland Security, Federal Emergency Management Agency (FEMA), Department of Health and Human Services (HHS), and the Department of Defense (DOD)), the state, the local community, industry, and NGOs first had to address the immediate aftermath of the earthquake, then shift to recovery efforts. The instability of the Pacific nation scenario focused on a complex emergency in which military stability and security operations occurred in tandem with humanitarian relief and governance. This complex environment helped test the resiliency and responsiveness of the global logistics community.

Although specific scenarios were chosen to facilitate the act of playing the game, the JS J-4 sought to capture universal logistics lessons that would be relevant to any global crisis response and help foster better interaction between the U.S. military, IOs, industrial partners, and NGOs. In particular, the J-4 wanted to know:

1. Can the JLEnt deliver a fully integrated capability responsive enough to support the operational mission?

2. What capacity gaps can be filled by non-DOD JLEnt partners?

3. Where do roadblocks exist in the JLEnt interoperability, and can they be removed?

4. Does the DOD have the information it needs to make a reallocation/reset decision from a global management prospective?

5. Which processes can deliberate planning improve between JLEnt organizations?

6. How does a cyber attack change a JLEnt organization's behavior or response?

Game mechanics

The game was played on two geographic stages: in the Pacific and in Southern California. Players made simultaneous decisions on both stages. Therefore, players' decisions to allocate resources to one geographic front could inhibit the players' on the adjacent front from allocating the shared resources.

Scenario overview

The game scenario initiated with the collapse of a Pacific nation; at the same time, Southern California was hit with a severe earthquake, tsunami, and numerous aftershocks. These catastrophes positioned players with limited resources, which had to be balanced among the two game scenarios. Players were tasked with deciding how to respond to the situation and were also asked to provide humanitarian aid (HA) to those in need. Players had the option to use DOD forces during the simultaneous crises either to engage in the Pacific nation and/or to fulfill HA missions in the Pacific nation and SoCal.

Goals

In both the Pacific and SoCal scenarios, players were asked to focus their efforts on identifying and packaging resources and capabilities to meet requirements, followed by fulfilment of requirements, execution, and contingency planning.

Player roles

In the Pacific scenario, players were divided into four teams with each team assigned to Red, Green, Orange, or Blue. Red represented the central Pacific nation government. Red's goal within the game was to maintain the original central government in the Pacific nation. Green represented South Korea and its interest to stabilize the Pacific nation as the central government collapsed. Orange represented insurgents or warlords, who sought to claim power in local regions of the Pacific nation. Blue represented the U.S. players. Blue was tasked with supporting the Green operations, while ensuring that their actions were seen as benefiting humanitarian efforts and not as military strategies. Additional players in the Pacific scenario who collaborated with Blue and Green were multinational partners and the HA community, including United Nations (UN), World Food Programme (WFP), U.S.

Agency for International Development (USAID), Bureau of Population, Refugees, and Migration, and Team Rubicon (who represented the NGO community).

For the SoCal scenario, players were divided into various categories, such as the DOD, government agencies, state agencies, IO/NGO, and industry. With participation from FEMA as a part of the white cell, the remaining State of California and FEMA roles were simulated by the control team. The objectives of the DOD players were to fulfill the mission assignments they were issued. Government agencies provided aid in whichever domain they had specialty expertise. The NGOs' objectives were to support the government agencies and coordinate between the other players. The industry players' primary objective was to restore functionality to damaged infrastructure to regain operational flows. Additionally, industry players were able to pursue new profit avenues by establishing work order contracts.

Player interactions

Both Pacific and SoCal scenes advanced over a sequence of seven concurrent turns. Each turn represented a week of time in the scenario and was allocated approximately three hours of game play. At the beginning of each turn, an intelligence briefing and situational update was held for all players regarding the status of the HA and Disaster Relief (HA/DR) efforts in the Pacific and SoCal scenarios. Following this briefing, players were divided amongst the three Pacific scenario rooms (U.S. Secret/NoForn, Secret/Five Eyes[1] (FVEY) and Unclassified HA) and the SoCal room, which were preset with respective game boards and control/white-cell players.

Once separated, the players received a more extensive briefing on the state of affairs in their respective situations. In the Pacific scenario, players had to keep track of each province's respective population status, movement, requirements, and allegiance. The population status categories were Affected, Displaced, Expectant, and Expired. The affected population was defined as the population lacking some of resources required to meet their essential (food/wash/health) needs. The Displaced population referred to the population migrating in search of essential resources and shelter; over time, this group required more resources to meet their essential needs. The Expectant population was the members of the displaced population whose health had deteriorated to the point that they would expire in the next turn if they did not receive access to the essential resources. All unserved populations advanced one category each turn when their needs remained unmet.

Blue performance was evaluated through the world opinion index. This index was subject to control assessment. The perception of Blue operational performance in the world community was important to the National Command Authority (NCA), the

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[1] Five Eyes is an intelligence alliance that includes Australia, Canada, New Zealand, the United Kingdom and the United States.

leadership of Korea, the international partners, and the IO/NGOs. Combat operations, expectant populations, and internment camps had a significant effect on the index. For the SoCal scenario, actions taken to address the natural disasters followed the FEMA National Response Coordination Center (NRCC) protocols. The FEMA NRCC coordinated a "push" of federal resources in the first 72 hours after the incident. Prescripted Mission Assignments (PSMAs) were issued to players to speed up the Mission Assignment (MA) development process in the early stage of response. The objective for SoCal players was to appropriate resources to manage the Southern California emergency. Blue performance for the SoCal scenario was evaluated on the basis of the successful completion or resolution of mission assignments.

Infrastructure mechanics

In the Pacific scenario, ground and sea transport was regulated by the number and type of inputs (i.e. vehicle type, number of assets or supplies) relative to internal road and rail capacity limitations (see Figure 1). Ports, airfields, roads, and rail lines had a capacity expressed in metric tons per week (MT/week). To simplify internal capacity for the game, internal capacity was assumed to be restricted to either use for internal distribution or throughput, but could not be used for both.

Ground and sea transport route capacities were subject to degradation through combative actions and Orange/Red attacks. Regular combat, particularly airpower combat, degraded the provinces' infrastructure within the contested environment. Orange/Red units were able to assign units to attack and dismantle infrastructure. Conversely, Blue/Green engineering units (which were more vulnerable to attack than regular combat units) were able to repair infrastructure and restore transportation capacity. Air transport was capable of mobilizing units, logistics, or passengers. Within the country, air transport was restricted to the capacity of airmobile force units.

In the SoCal scenario, the earthquake propagated damages across several miles, catalyzed a tsunami, and was followed by numerous aftershocks. The FEMA Operations Section divided the affected area into Branches. Federal Staging Areas (FSAs)/Incident Supports Bases (ISBs) were established.

On the ground, millions were without power. Numerous buildings were either completely or partially collapsed, resulting in casualties and leaving many injured. Local officials reported that millions were required to shelter-in-place and were in need of basic resource support. Infrastructural damages included refineries on fire, chemical leaks, damaged railways and derailed trains, hospitals left nonfunctional with patients requiring immediate transport, damaged roadways, port closures, oil and natural gas pipeline ruptures, disrupted telecommunications, ruptured aqueducts, damaged water pipelines, damaged airports, destroyed houses, and displaced household pets.

Figure 1.   Pacific nation scenario game map
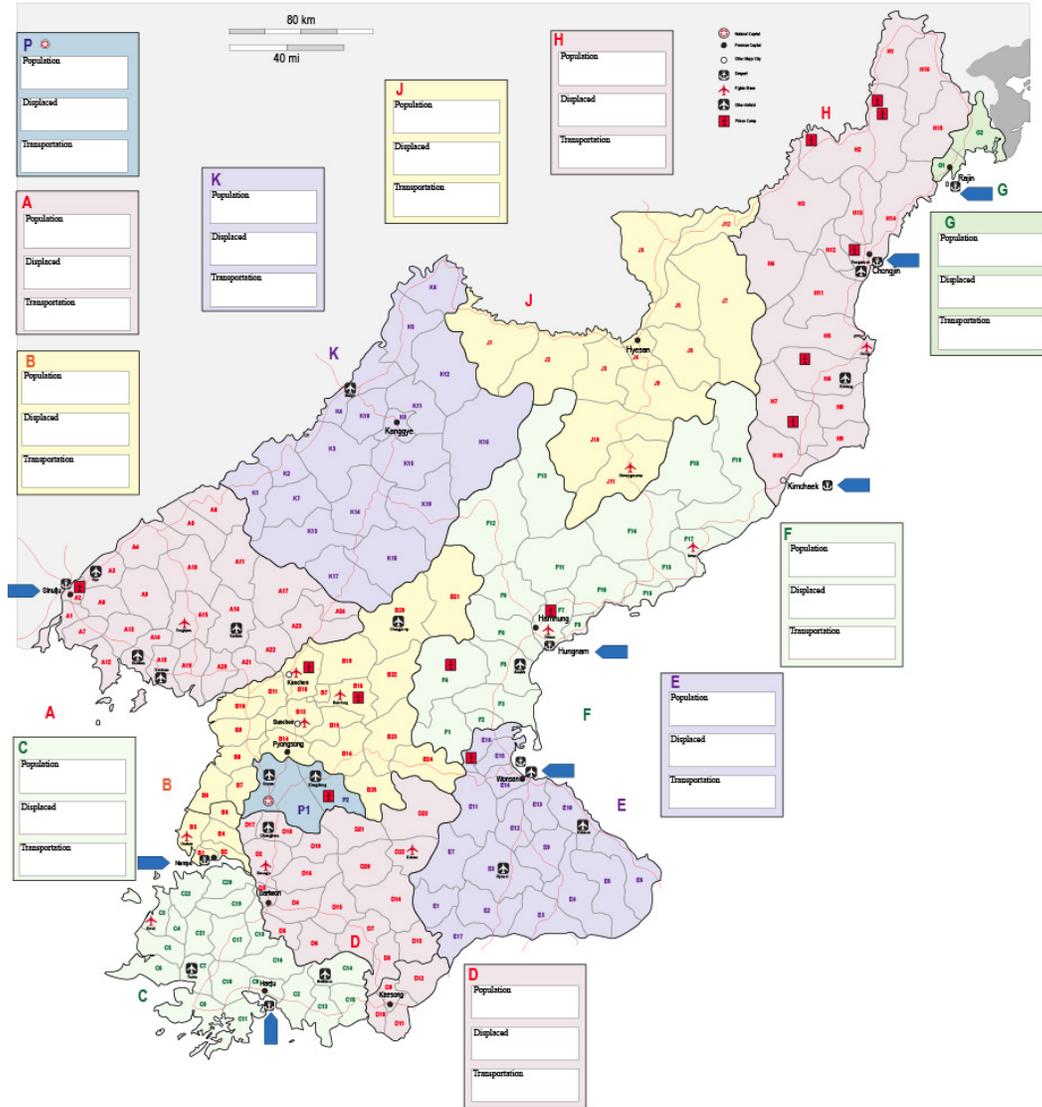
Command relationships

The Pacific scenario was a mixed-matrix style of game that allowed players significant free-play in determining each course of action regarding kinetic, HA, and information operations focused on operational logistics. The SoCal scenario played out as a scripted game with dynamic control for accommodating players' turn-by-turn responses. The State of California, FEMA NRCC, and other nonplaying

organizations were simulated by SIMCELL controllers, in addition to the participation of a FEMA representative.

The Global Logistics System (GLS) simulated the dynamic interplay of Pacific and SoCal resource positioning and allocation. Pacific and SoCal players received information and real-time updates from the GLS, which was required for logistical decision-making in both game scenes.

Models and databases

The Southern California Catastrophic Earthquake in the SoCal incident scenario was based on the California Geological Survey and the U.S. Geological Survey's ShakeOut Scenario of 2008. This scenario was designed and used for Ardent Sentry 2015/FEMA SoCal and Pacific. In the past, the Southern San Andreas Fault has generated earthquakes of magnitude 7.8, on average, every 150 years. The most recent and somewhat comparable earthquake, which ruptured a portion of the fault line in the ShakeOut Scenario, happened more than 300 years ago.

The Southern California Palos Verdes Tsunami modeling was developed for the game by the California Geological Survey, the National Tsunami Warning Center, and the Alaska Region Tsunami Program.

As the game play progressed, players were confronted with a scarcity of U.S. Pacific Command (USPACOM) resources available to meet the Pacific and SoCal HA requirements. All U.S. military resources were tracked using the GLS white cell, which acted as an intermediate-game monitoring cell. The GLS was operated by its developers from Johns Hopkins University's Applied Physics Laboratory[2], who facilitated the resource interplay across the Pacific and SoCal scenes.

The Defense Logistics Agency's Office of Operations Research and Resource Analysis (DORRA) was used to simulate the sustainment requirements for the U.S. forces and the affected population in the Pacific scene and to capture movement of resources in theater.

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[2] For more information about the contributions of Johns Hopkins University's Applied Physics Laboratory, please see Appendix I.

Rules

General

Time. Each turn in the game marks the passing of one week in the scenario.

Turn Length. Players are given 2.5 hours per turn, followed by 60 minutes for adjudication.

Briefings. Players receive a 10- to 20-minute briefing and intel update at the beginning of each turn. Following the whole-group briefings, players separate into the Pacific and SoCal rooms where they receive a more exhaustive briefing. Additionally, a player representing the media will deliver press briefings during one day of gameplay.

Pacific scenario

Pacific Turn Sequence. For each turn, Pacific player actions occur in the following sequence: (1) PLANNING, (2) COORDINATION, (3) EXECUTION, (4) REQUIREMENTS, and (5) COORDINATION.

PLANNING. During planning, the Joint Force Commanders (JFCs) and the members of the Republic of Korea (ROK) Coordination Cell[3] are responsible for organizing their respective governance, logistical, and operational actions.

Governance. ROK Coordination Cell members must identify how many units will be tasked with Counter Insurgency/Governance. They must also identify the focus of the CI/Governance units within each province (i.e., kinetic, nonkinetic, HA, or mixed).

> *Population Status.* Population status will diminish by 1 category for each turn that the populations' needs go unattended. (For example, when left unserved for 1 turn, an *Affected* population will diminish to the *Displaced* population status. A *Displaced* population becomes an *Expectant*, and an *Expectant* will expire.)

> *Province Attitude.* Each province has a population attitude that varies from -10 to +10. (For example, a population attitude of -10 indicates Red loyalty, whereas 0 corresponds with Orange and +10 with Blue.)

Logistics. JFC and the ROK Coordination Cell must identify areas of the greatest need and begin to push supplies to those areas. The JFC must remember that logistic requirements for forces must be continuously fulfilled as those forces move. All units must be supplied, and combat units must be supplied before resources can be distributed amongst the local population. They will need to define the

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[3] During the wargame, the ROK Coordination Cell was represented by one participant.

transportation, security, and distribution requirements for their chosen course of action.

HA. Each population group represents 50,000 people. A large internment camp is 2 units. Affected populations, which are not in need of shelter, require 1,250 MT/week (3×/6×).

Migration. The U.S. Navy (USN) and ROK Navy can remove approximately 100 refugees/day from the peninsula. The need for evacuation increases across the Demilitarized Zone (DMZ).

Operations. Even though the path is obstructed, the JFC should plan on moving north. The JFC will need to allocate forces to different provinces and distribute airpower sorties.

Force Actions. Regular units can take either defensive covered actions or offensive uncovered actions. For each province, allocate sorties and units to defensive/offensive actions. Next, define the attacker-to-defender ratio. Losses are assigned after the results are calculated. (Note: since Red/Orange (R/O) usually take the most losses, they may not want to move or conduct offensive actions.)

Force Movement. Regular ground units may move 3 districts per turn. Airmobile brigade units can provide transport to anywhere on the Pacific map. Blue has air units that may be assigned to provinces, each one counts as a Brigade Combat Team (BCT)/Division equivalent. Blue air units can be allocated between close air support and battlefield air interdiction. Irregular units moving more than one district or conducting regular offensive actions will be uncovered.

Force Unit Sizes. A regular Pacific nation R/O/ROK has a Division size of 3xBCT. An irregular Pacific nation R/O has a Division size of a Battalion (BN). US units are BCT. Governance/engineering/Special Operations Forces (SOF) units are designated by the individual unit level.

— Pacific nation R/O/ROK regular: Division (3xBCT)
— Pacific nation R/O irregular: Battalion (BN)
— U.S.: BCT
— Governance/engineering/SOF: individual unit level

Force Conflict. The outcome of force conflict depends on the size of the unit, unit capabilities, province attitude, and defensive measures employed by the opposition. Adjudication will be semi-rigid as players will be granted a vote.

COORDINATION. JFC should consult with the ROK Coordination Cell to distribute the South Korean governance and logistics units. The ROK Coordination Cell will interact with the international community to identify the required sources and capabilities. They will work with U.S. DOD and others (e.g. World Food Programme (WFP), etc.) to move required logistics into the country and to distribute HA to north of the DMZ.

EXECUTION. During this phase, control will resolve kinetic and nonkinetic actions, move populations, and determine the population status and attitude for each province on the map.

REQUIREMENTS. After execution, players must reassess their status relative to their respective objectives.

> **World Opinion Index.** Blue progress is subject to the index, which is assessed by control. The view of how the Blue operation is going in the world community is important to all involved leadership, as well as the IO/NGOs. The index is described as being at one of the following five levels: Great, Good, Fair, Poor, or Tragic.

Great	The operation is a great success and the people affected are being treated quickly, efficiently, and with great dignity.
Good	The operation is serving all the people involved, but there are some challenges.
Fair	Not all of the people are getting served, and there are challenges.
Poor	There have been some significant challenges and/or the population is deteriorating and has not been served.
Tragic	Mass starvation, moving populations, atrocities abound, etc.

Southern California scenario

SoCal Turn Sequence. For each turn, SoCal player actions must occur in the following sequence: (1) MISSION ASSIGNMENTS, (2) COORDINATION, (3) FULFILMENT, (4) EXECUTION, and (5) BRIEF-OUTS (Figure 2).

Figure 2.   Graphical representation of SoCal game sequence
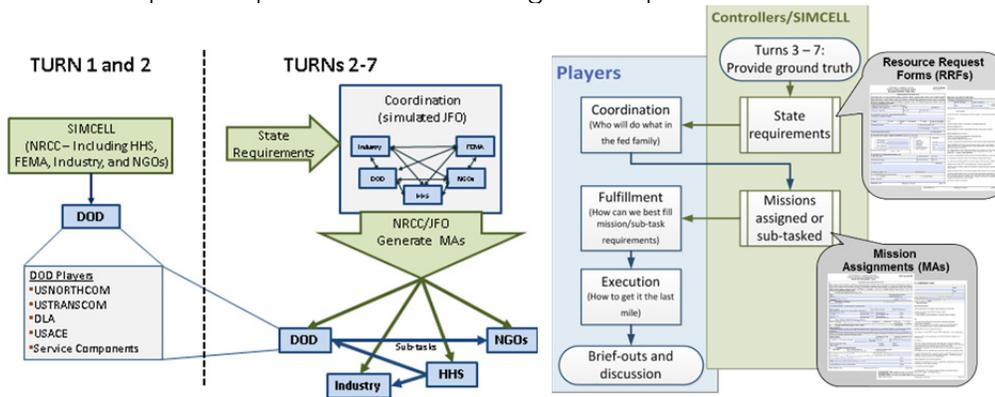
MISSION ASSIGNMENTS. At the start of each turn, FEMA, along with the State of California (simulated by control), will issue mission assignments with high priority tasks to provide aid to the regions affected by the natural disaster.

COORDINATION. Once mission assignments are received, coordination begins. During coordination, FEMA, the Unified Coordination Group[4] (UCG), and the DOD coordination players will engage in conversations to determine which organization should be tasked with fulfilling each of the mission assignments. Players must also decide whether or not a given mission assignment is valid prior to assigning it to an organization for fulfilment.

FULFILMENT. After mission assignments are issued to players, players are responsible for detailing how their respective organizations will fulfill the requirements of the mission assignments.

EXECUTION. Execution takes place during adjudication. Players should make requests for resources. Players are able to verify confirmation of their requests by checking with the U.S. Transportation Command (USTRANSCOM) players and the GLS.

BRIEF-OUTS. During brief-outs, players are expected to generate new mission assignments or to address any ongoing issues.

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[4] The Unified Coordination Group (UCG) includes the Federal Coordinating Officer, the State Coordinating Officer, the Defense Coordinating Officer (DCO), and other officials from the local, state, and federal levels. The DCO and his or her staff process the requests from FEMA for DOD assistance.

Wargame Reconstruction

This section presents a brief overview of the major actions that occurred during the game. This reconstruction of AGILE 17 is meant to serve as context for the Observations and Analysis section of this report.

Road to crisis (pre-gameplay events)

Pacific scenario

In January 2017, the absence of the Supreme Leader of a Pacific nation from a key government session reignited old speculations about the leader's health. His continued absence from the public over the next few weeks did nothing to dispel these rumors. Over the next few months, the leader remained absent from the public eye, and official government channels gave only vague assurances that the Supreme Leader was merely overworked and taking a well-deserved vacation. As the power vacuum persisted, Western Intelligence sources started to see signs of factions forming in the secret police and security forces. The central government's control of the provinces started to weaken, and then several army commanders broke from the central government and began operating independently (Orange). These defections were followed by various regional party committees and officials.

Fearing a civil war and the possible spillover to South Korea, the Republic of Korea (ROK) started to mobilize its military (Green). In support of its ally, the U.S. (Blue) started to move additional forces into theater. These initial fears proved to be well founded. Skirmishes broke out between various military factions inside the Pacific nation. Furthermore, the 2nd Corps and units preferentially in the south and west of the Pacific nation had remained loyal to the central government. Without guidance from the central government, they fell back on self-generated orders. Alarmed by the Green mobilization, the 2nd Corps independently decided that a demonstration of strength was necessary and subsequently fired artillery into Seoul.

The Pacific nation economy, fragile at the best of times, deteriorated as military groups seized resources for themselves. With many local leaders paralyzed by the uncertain political environment, basic services broke down, such as water, power, and food delivery from farms. Local markets continued to function, but only

erratically as prices fluctuated wildly and market controls ceased to function. As the situation worsened, increasing numbers of refugees were picked up by the Green and Blue military forces in the surrounding islands or while crossing the DMZ. The stories told by these refugees painted a grim picture of humanitarian conditions in the North.

Facing a growing humanitarian crisis, an erratic Pacific nation military (Red), and a nascent civil war, South Korea appealed to the United Nations (UN) Security Council for a declaration of international HA to the North, including military action to stabilize the region. China and Russia did not veto the resolution, but instead abstained, allowing it to pass.

After the passing of this resolution, China quickly established a 50-km buffer zone inside the Pacific nation to protect its borders from refugees. Shortly thereafter, a swift and decisive attack by Blue and Green air forces destroyed the air forces and Surface-to-Air Missile batteries inside the Pacific nation. The next day, D-Day, the ROK nationalized its key infrastructure and industries as Green infantry divisions crossed the DMZ into the Pacific nation.

SoCal scenario

On an early morning in May (E-Day), California experienced a 7.8-magnitude earthquake, which propagated west/northwest along the San Andreas fault, roughly 100 miles east of Los Angeles (LA). As a result of the earthquake, 500,000 people were displaced and 2.4 million people in the area required some type of mass care support.

During the 72 hours (E+3) following the initial earthquake, the Governor of California declared a state of emergency. California set up both the State Operations Center (SOC) in Mather, California, and the Governor's Office of Emergency Services (OES) Regional Emergency Operations Center (REOC) in Los Alamitos. The response in the first 72 hours of the incident was managed locally and at the state level by first responders and community organizers. As the scale of the disaster overwhelmed local resources, the governor turned to federal agencies for assistance.

FEMA Region IX activated a Regional Response Coordination Center (RRCC) in Oakland, California, at Level 1, with a full staff for all Emergency Support Functions (ESFs) [6] and interagency liaisons (LNOs). The National FEMA Incident Management Assistance Team (IMAT) West, working with other federal agencies, formed the UCG at the California SOC. IMAT personnel also established an Initial Operating Facility (IOF) co-located in the area of incident (AOI) with the REOC.

Blue was then tasked with supporting civilian efforts in the disaster, as specified in the Joint Publication, "Defense Support of Civil Authorities," or DSCA [7]. Support

provided by federal military forces, DOD civilians, or National Guard (NG) forces as assistance to civil authorities during domestic emergencies such as this SoCal catastrophic earthquake falls under DSCA.

D+00 - D+06/E+03 - E+09 (Turn 1)

Pacific scenario

The ROK president allocated warehouses in Busan and Gimhae for use by the UN and other NGOs in fulfilling the humanitarian mission. There was some pushback from the UN and NGO communities on these locations because of the large distance from the DMZ. The ROK president, however, did not want to put warehouses in Taegu or Seoul, given the military presence in those locations.

In terms of force basing, Ulsan was selected as the primary RSO&I (Reception, Staging, Onward Movement, and Integration) node for incoming Blue forces. Japan granted permission for U.S. aircraft to make use of the air bases in Japan that the United States currently uses in steady-state peacetime operations, providing that no kinetic operations originated from those bases. Japan reported that they might consider making commercial airports available as well, but on a per-request basis.

At this time, the U.S. Secretary of Defense (SecDef) permitted Blue to deploy only air forces across the DMZ, in keeping with Blue's mission of providing support to the Green-led mission. Broadly, the ROK Joint Chiefs of Staff (JCS) took on the mission of providing HA north of the DMZ with the Combined Forces Command (CFC) in a supporting and logistical role and the United States Forces Korea (USFK) supporting the CFC.

Green sent infantry divisions across the DMZ into provinces D and E where they engaged Red forces. These ground forces were supported by Green and Blue fighter squadrons. Green's objective in province D was to seize a strategic Red battleground where the Red 2nd Corps artillery was located. Green was able to capture the battleground and destroy the artillery, but not before the artillery shelled Seoul, killing roughly 300,000 people and wounding 2 to 3 million. U.S. casualties were roughly 3,000, with 300 killed. An industrial city near the battleground was also captured. The fighting in province D destroyed 20 percent of the road capacity in that province. In province E, fighting mostly stalled, but Green was able to seize an airfield in that province. Through the course of fighting, 30 percent of the road capacity was damaged in this province.

In the northern provinces of the Pacific nation, infighting occurred between Red and Orange forces. The conflict was especially fierce in province A, leading to the destruction of 20 percent of the roads in that province. Orange groups

communicated (through back channels) to Blue and Green that they would accept support in the form of money and munitions but that they would not accept any foreign military presence.

Both Red and Green attempted Special Operations Forces (SOF) operations. Red attempted three SOF actions aimed at degrading port capacities at Ulsan and Donghae. Red was only successful in its attack on Donghae, reducing the port capacity by 20 percent. Green SOF in province E made an unsuccessful attempt at Military Information Support Operations (MISO) to establish positive messaging with the local population.

By D+6, displaced populations in several provinces had started migrating southward. They moved from province B to D, from province A to B, and from province F to E. In province P, the affected population transitioned to displaced as supplies began to run out. The heavy fighting in province A caused additional population to become affected.

SoCal scenario

Three days after the earthquake (E+3), the primary issues were organizing the command structure of the JFO (Joint Field Office) and assessing the current situation in order to effectively utilize available resources. Ordinarily, the JFO would be set up within 12 to 72 hours of a disaster, with additional staff joining as needed [8]. Because of the limited number of representatives from each agency, the initial phase of discussion to help determine what assets each service could and should provide, which would normally happen[5] as a part of the UCG [6], was shifted to the Defense Coordinating Officer (DCO). The discussion that would normally occur at the UCG happened between the DCO and each service.

The DCO, acting under the authority of the JFO, handled the distribution of mission assignments. Each active duty service had a Liaison Officer to coordinate that agency's role in the response [7]. Typically, FEMA or the designated coordination agency will coordinate with the DOD and other federal agencies to issue mission assignments (MAs) to the DOD for specific disaster response tasking, with the goal of most effectively using federal and interagency resources[5] [9].

Once the JFO was organized, the majority of effort during E+3 through E+9 centered on the transportation of emergency supplies and personnel to the affected area. In addition, 16 hospitals that were badly damaged had to be completely evacuated to

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[5] Because of game mechanics and the available players for the game, some artificiality was introduced into the gameplay in comparison with real-world processes for the Korean Peninsula and SoCal scenarios. In the Observations and Analysis section, we will cite "game-isms," compare them to doctrine/real-world practices, and compensate for them in our analysis.

surrounding medical facilities. Because of road and rail damage, significant airlift capabilities were required. The U.S. Navy (USN), USTRANSCOM, and the Air National Guard (ANG) supplied rotary and fixed wing aircraft for patient movement out of affected hospitals, for urban search and rescue (USAR), and for movement of supplies and first responders. Canada, recognizing a shortage in heavy lift capabilities, offered the use of fixed and rotary wing aircraft. Army and Navy Reserve components provided ground transportation vehicles to move supplies and personnel from Federal Staging Areas (FSAs) to small, medium, and large shelters and points of distribution (PODs).

Members of the JFO also discussed port assessment and repair at length. The assessment and repair efforts at the two affected ports were determined to be a highly integrated cooperation between the United States Coast Guard (USCG) under the authority of the Captain of the Port (COTP), U.S. Army Corps of Engineers (USACE) survey teams, the Port of Long Beach authorities (POLB), the Port of Los Angeles (POLA) authorities, and industry partners. Specifically, USCG and USACE worked together to assess and clear the waterways, buoys, and piers, while commercial stakeholders coordinated with POLB and POLA to assess their privately owned terminals and cranes.

D+07 - D+13/E+10 - E+16 (Turn 2)

Pacific scenario

In the ROK, the need to reach out to UN allies became urgent as the casualties in Seoul greatly exceeded what was anticipated for this phase of the operation. Blue air bases had no medical capabilities, and Blue forces were equipped to handle only the troops' medical needs. Due to the shelling of Seoul, the ROK president closed Incheon to white tail aircraft (civilian and HA), but Incheon remained open to grey tail (military). The ROK president consented to a Blue Contingency Response Group (CRG) working to aid in the repair of Incheon and assist in the airport's operations. Blue medical units had submitted an earlier Request for Forces (RFF) for the 121st Combat Support Hospital (CSH) but, owing to increased need, they requested an additional Mobile Aeromedical Staging Facility (MASF) at Incheon.

The main Blue and Green military action during this period was a combined land/sea attack on the port in province C. The goal of this attack was to open up a seaport in the Pacific nation that could be used for delivery of humanitarian aid in the future, especially in light of congested and degraded Ground Lines of Communication (GLOCs). This attack involved multiple Green divisions, a Blue Marine Expeditionary Unit (MEU), and airpower from fighters, attack helicopters, and combat aviation brigades. In addition to degradation of the port, the road capacity was reduced by 10

percent. Before Red lost control of the port, they unleashed a malware attack on the port control systems, degrading port capacity to 25 percent of maximum capability. The system would remain degraded until a cyber team could be brought in to fix it.

As fighting continued in province D, the road capacity was reduced by 20 percent (new capacity was 64% of the original). ROK JCS's desire to push north quickly and use the industrial city captured last week as a supply center meant that Green forces might bypass southern Underground Facilities (UGFs), leaving the area impermissible and creating a need for Blue ground forces to follow on and secure the area, an approach not yet authorized. While CFC Commander did not intend to immediately send Blue forces across the DMZ, he sought preliminary approval.

Red and Orange both engaged ROK forces in province E, though they did not coordinate their efforts. The fighting in province E resulted in the defeat of the Orange I Corps, the Red V Corps taking heavy losses, and a 30 percent reduction in road capacity in the province (capacity dropped to 49% of original).

Road throughput limitations required Blue and Green to use all available supply aircraft for airdropping sustainment for military units north of the DMZ. Even with these efforts, four infantry divisions received only Class I resupply and were unable to engage in any offensive operations since they only had the bare minimum of fuel and munitions necessary to maintain a perimeter.

Elsewhere, Red and Orange continued infighting. In province H, Orange seized control of the port. Red digitally sabotaged the port control systems, as they earlier did to the port in province C, so that the capacity of the port was reduced to 25 percent of the maximum.

The UN and NGOs, aware of the humanitarian needs in the northern area of the Pacific nation, established a relationship with local Orange leaders in province H, whereby the UN provided humanitarian aid under the condition it would not allow a foreign presence in the province. Orange then set up Displaced Person (DP) camps and distribution centers with supplies provided by NGOs.

By the end of D+13, the Department of State (DOS) had declared a Noncombatant Evacuation Operation (NEO)[6] and requested Blue help in the evacuation of civilian U.S. personnel on the peninsula. The airport in Seoul remained closed, so alternate evacuation routes were needed. As the U.S. Ambassador intended to share this request with UN allies, Blue needed to remain vigilant in case those allies requested Blue support for a NEO of their own citizens.

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[6] For detailed information regarding the NEO, please see the classified annex.

SoCal scenario

At E+10, Southern California was hit with a tsunami due to the collapse of an underwater shelf off of Palos Verdes. The tsunami inundated the POLB/POLA, sinking two large vessels in the Long Beach channel and obstructing the West Basin of the POLB. In addition, waterways were filled with soil and debris and needed to be dredged before reopening the port. Facilities on Pier B were badly damaged by the tsunami waves, rupturing oil storage tanks and spilling oil into the channels of the POLB.

Discussion in regard to the HAZMAT (hazardous materials) response mission assignment ultimately led the DCO to reject the request for Blue support because the mission was seen to be outside Blue capabilities. The DCO suggested sending the assignment to the Environmental Protection Agency (EPA).[7]

USTRANSCOM used existing Surface Deployment and Distribution Command (SDDC) contracts to move POD supplies and shelter supplies, with Army and Navy reserve units providing augmentation support of ground transportation vehicles. The USTRANSCOM assets were sourced from multiple locations: SoCal, the Pacific Northwest, and the East Coast. JLOTS (Joint Logistics Over-the-Shore) assets from multiple ports in the continental United States (CONUS) moved to Port Hueneme for the distribution of food as well as general on/offloading capabilities.

D+14 - D+20/E+17 - E+23 (Turn 3)

Pacific scenario

Up to this point, the quantity of humanitarian assistance delivered had fallen far short of the needs. The Blue and Green mission objectives for D+14 – D+20 were to largely stay in place and focus on security, policing, and humanitarian assistance. Blue and Green estimated that they were roughly 200,000 metric tons short of meeting the projected sustainment needs for the Pacific nation people this week. J-4 reported that the US European Command could make additional C-17s available, alleviating the demands on USTRANSCOM assets.

Existing contracts in ROK and Japan could provide the necessary sustainment for 30 days (there were over 1,000 contracts on the peninsula alone). However, with ROK nationalizing their infrastructure, activating the ROK contracts required approval from the ROK president. The approval was eventually granted, but required time,

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[7] In reality, the EPA may be overwhelmed with the size or number of HAZMAT situations and call on the DOD to provide additional capabilities [10].

effort, and discussion to resolve. Despite tensions between ROK and Japan, Japan was willing to ship food to Korea using commercial Japanese ships, and Korea allowed such assistance. For political reasons, the U.S. ambassador rejected a proposed plan to buy sustainment from China.

As the week began, the NEO was under way, with civilians flowing south to evacuate. The plan used road and rail to send hundreds of thousands of civilians, roughly half of which were U.S. nationals, to Busan and Gimhae for evacuation. Incheon Airport remained closed, and Seoul Air Base remained closed to white tail aircraft, despite continued pressure from the UN and HA community for a headquarters closer to the population in the Pacific nation. Life support systems were expected to be stressed by bottlenecking in the southern ports, with sustained populations of tens of thousands of noncombatants anticipated at each holding station, arriving by bus or ferry from northern ROK. Therefore, the president of South Korea demanded that ports for NEO and ports for incoming supplies and RSO&I be deconflicted to avoid overwhelming capacities.

Ferries and limited airlift were capable of transporting up to 50,000 civilians per day from southern ROK to Japan, at which point they were handed off to their home countries for continued evacuation. United States Forces Japan (USFJ) was responsible for the transportation of U.S. nationals from Japan to CONUS, where USNORTHCOM and HHS would take over repatriation and processing. The entire process (NEO, repatriation, and processing) was expected to take about 50 days.

Blue and Green forces continued to face stiff opposition in the Pacific nation. In the southern three provinces, Red and Orange shifted from a straight military fight to insurgency. Several, but not all, Red and Orange divisions were disbanded into guerilla units for this purpose.

In province C, Red insurgency attacked a few Green divisions and smaller units, while reducing the road capacity by 10 percent (capacity dropped to 81% of original). Blue and Green counterattacked with SOF and regular divisions, defeating one guerilla unit. The Blue MEU at the port redeployed aboard ship toward the eastern side of the Pacific nation in preparation for an attack in the next several days.

Red and Orange guerillas and divisions continued fighting Green divisions in province E. Some Red units were engaged and destroyed; however, this also resulted in a 20-percent reduction in road infrastructure (capacity was then 39% of original). Green SOF conducted Counter-Insurgency (COIN) operations in this province. As a result, the overall sentiment in province E shifted from Red-leaning to neutral.

Despite continued fighting, Blue and Green were able to conduct some noncombat operations. A CRG team at province C's port repaired the damage from the previous week's malware attack, which had rendered the cranes inoperable, thus bringing the port up to full capacity. Engineers in provinces D and E were able to repair some of

the roads, increasing road capacities by 10 percent in each province (capacities were then at 70% and 44% of starting values).

Red continued using cyber attacks and SOF to disrupt Blue and Green. Anticipating a future attack on the port in province E, Red used malware to sabotage the port, as they had done with ports in other provinces, reducing its capacity to 25 percent of its maximum. Red SOF only had mixed success. They were able to sabotage the port of Donghae and reduce its capacity another 20 percent, but had failed operations against two separate dams.

The Defense Logistics Agency (DLA) Korea developed a plan to use Heavy Equipment Transporters (HETs) in a push-and-pull resupply scheme to provide sustainment for Green forces in the southern part of the Pacific nation. This greatly reduced the demands on road infrastructure and allowed a single sustainment brigade to support an entire division. While empty HETs returning south could be used to transport local affected populations across the border into ROK, the president of South Korea did not want to risk hostile action by refugees in ROK.

The UN HA was closely coordinating with the ROK government. NGOs stated their willingness to go north of the DMZ, but not into any region with active fighting. Given the lack of security and limited road transport capacity, UN HA developed a plan to deliver SkyLife packages on GPS-guided parachutes via Blue C-17s. Each package would contain high-energy biscuits (HEBs), four of which provide the complete nutritional needs for one person per day. UN HA also wanted to include water purification tablets,[8] but none were available in theater at the time. After talking with Blue, the UN discovered that there were only enough available air assets to provide support to two of the UN HA proposals in provinces C and E. Despite these growing efforts to meet the humanitarian crisis, they fell far short of the needs, leading to the deaths of 500,000 civilians in province D, 100,000 in province E, and 200,000 in province A.

SoCal scenario

Between E+17 and E+23, the USCG, DCO, and USNORTHCOM focused attention on supplying maritime capabilities as a work-around for the damaged POLB/POLA. The DOD JLOTS operation at Port Hueneme could not fulfill the entirety of commercial needs for POLB/POLA; thus, presidential orders requiring the expedition of port cleanup were issued to the DCO. The USCG proposed an innovative solution to accelerate the reopening of the port and to comply with executive orders. By using

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[8] Water purification tablets are used by the HA community in place of shipping bottles or bladders of water. This reduces the weight of sustainment needs by 85 percent for the affected population and by 95 percent for displaced population.

booms to confine the oil spill to the POLB basin, work could begin on the POLA with an estimated recovery of 50 percent capacity in 2 weeks.

Because the Blue resources were being used both in CONUS and outside CONUS (OCONUS), agency representatives started to look outside Blue to commercial partners and NGOs to fulfill mission assignments. Existing contracts and local contractors were frequently tapped into to fill gaps in transportation capacities, particularly for trucking needs. DLA was able to complete only half the resource request for ice, while it could fulfill the entire request for food and water. Blue agencies decided to fill other gaps by calling up reserve units, including the Reserve Army Veterinary Corps, and by mobilizing squadrons or teams that were uniquely qualified to fill recovery needs. The DCO conferred with participating agencies about which Blue airfields should be used to support the volume of aircraft, people, and supplies moving in and out of the region, considering runway capacity, hangar capacity, fuel supply, existing support staff, and/or the ability to move in fuel and support staff as needed.

The agencies working in OCONUS for the NEO coordinated with USNORTHCOM to determine a joint repatriation center in the United States. A large-scale repatriation effort requires coordination across USNORTHCOM, DOS, HHS and other USG agencies, with the repatriation location chosen based on capacity of the airfield/port, adequacy of security for the evacuees, and a DOD-based or other electronic processing system to track repatriates [11]. Military facilities may be chosen for a NEO because these sites often meet the necessary requirements. USNORTHCOM determined that the NEO should operate through six bases on the U.S. west coast, chosen so that the NEO effort would not interfere with the disaster response.

D+21 - D+27/E+24 - E+30 (Turn 4)

Pacific scenario

Blue and Green developed a more detailed plan for this time period to address the humanitarian crisis. First, the president of South Korea agreed to allow white tail HA air traffic into Incheon by night, maintaining the grey tail policy by day. UN HA sustainment would then be transported by ground across the DMZ in sunlight (as the UN prefers) during a 4-hour daily allotment. In addition, three sites were selected as targets for the establishment of HA camps in southern provinces of the Pacific nation: ports in provinces C and E, plus a location in province D. The port in province E was anticipated to be secured within the week. Each camp was expected to serve 50,000 civilians initially and grow over time, though growth was limited by logistics and by the risks associated with mixing ethnicities and with creating a potential single point of failure. Third, the president suggested setting up permanent

distribution centers at the ports in provinces C and E, and the previously captured industrial city in province D. These are all easy points for resupply by land, sea, and air. The UN also strongly desired the port in province B as an entry point for HA operations, but seizing it would require a Forcible Entry Operation by Blue forces, which had not been authorized yet. Meanwhile, China agreed to the establishment of a humanitarian corridor along the northern border of the Pacific nation.

In support of these goals, the primary Blue and Green attack was a major amphibious assault on province E's port, using the MEU redeployed last week, a Blue Marine division, Green infantry divisions, plus fighter squadrons from two nuclear carriers and additional land-based squadrons. The port was successfully seized, but at a loss of 20 percent of the road capacity in province E. Blue and Green intentionally did not target the port, sparing it from damage. With this assault, ports on both sides of the peninsula were available in the future for delivering humanitarian aid.

Elsewhere in province E, heavy fighting took place. Orange lost 4 divisions, which resulted in a 30 percent reduction in the road capacity, and later Orange attacks by insurgents degraded the road capacity another 30 percent (road capacity after all attacks this week were 17% of initial capacity).[9]

The humanitarian situation worsened from the previous week: another 500,000 people died in province D, 200,000 dead in provinces A and B, and 50,000 died in province E. Several factors contribute to the mounting death toll, including combat operations, discovery of a Pacific nation internment camp, and an inability to get aid to the region. In contrast, the opening of the port in province C the previous week enabled the delivery of aid in that province, providing some life-saving supplies and care to the population there. Air drops of SkyLife packages continued, but they were far short of the requirements. Starting this week, airdrops included water purification tablets and empty water bladders. The continued heavy fighting in province D made it impossible to deliver significant HA in that province. Blue and Green had no forces in the northern provinces A and B, making it impossible to deliver aid there.

SoCal scenario

On E+24, a significant aftershock (magnitude 5.2) occurred, requiring the reevaluation of airfields, ports, and other critical infrastructure. To facilitate a more effective response, the DCO and the National Guard Bureau (NGB) worked under a Dual Status Command (DSC) and augmented NG forces with federal active duty

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[9] All of the road degradations in Kangwon during this week took place consecutively, rather than a cumulative 80-percent loss of the initial road capacity. This simulates the fact that attacks later in the week may cause more damage to infrastructure which had been previously destroyed.

soldiers [4]. Medical assets and ground transportation assets were beginning to reach their limits as air assets were used less intensively.

The U.S. Air Force (USAF) set up the Civil Air Patrol (CAP) California Wing to perform aerial damage assessment as a part of its emergency services mission (which includes disaster relief and humanitarian services). At this point, USTRANSCOM alerted the DCO that airlift capabilities that had previously been used OCONUS were now available and that air assets loaned from Canada should be returned.

Several requests for assistance during this week were rejected by Blue agencies because of a perceived illegitimacy of the requests. In other words, if the agency tasked with the resource request believed that the request should have been able to be met by the state, the request was rejected. This was regardless of the fact that the requests explicitly stated that state and local assets were exhausted. Ordinarily, the level of Blue involvement in a particular request for assistance would be discussed and coordinated through the UCG before being handed to an agency as a mission assignment [6].

D+28 - D+34/E+31 - E+37 (Turn 5)

Pacific scenario

In the western half of the country, Blue and Green continued to fight against largely insurgent units. Blue captured an airfield in province C and the port in province B. As with other ports, Red sabotaged the port control systems with malware, leaving the port at 25 percent capacity until fixed. Though the UN had requested access to this port last week, it chose to delay establishment of an HA camp there for a week to ensure that Blue and Green forces had adequately secured the area.

Green moved several reserve divisions into the restored port in province C. However, some noncombatant units just south of the port were left unguarded, and Red insurgent activity was able to destroy a sustainment brigade and an engineering unit.

Fighting continued in province D. Despite the fighting, engineers were able to clear some roads, leading to a 20-percent increase in road capacity in this province (new capacity was then 84% of initial value).

COIN operations executed by Green in province E were a success. As Red realized they were losing control in the province, they released the 50,000 prisoners from the internment camp in the northernmost district of the province. Given the poor conditions of these camps, these persons were classified as expectant. Engineers were also able to fix some roads, increasing the road capacity by 10 percent in the province (new capacity is 19 percent of original value).

Elsewhere in the Pacific nation, Orange freed the prisoners from the two camps in province F, adding 100,000 expectant population to that province. Orange insurgents also destroyed 40 percent of the commercial airfield capacity in the province. Finally, in province B, Red guerilla attacks degraded the capacity of two of the military airfields: one by 20 percent, the other by 40 percent.

Red continued to use cyber attacks to disrupt South Korea. A successful attack reduced the commercial infrastructure capacity by 50 percent, making it difficult to get new trucks from the private sector. A Red SOF attack succeeded against dams, causing both flooding along the central route (in South Korea) across the DMZ and a 50-percent reduction in the road capacity.

Over the past few weeks China had become increasingly concerned about the military action in the Pacific nation, especially regarding the level of involvement by Blue, creating the appearance of a less Green operation. As a result, China activated two Luyang Surface Action Groups (SAGs), mobilized Military Police just across the China/Pacific nation border, and elsewhere started mobilization of three mechanized infantry divisions. In addition, increased submarine activity was noticed. To assuage these fears, the ROK president was in constant contact with Beijing, providing assurance that this is a Green-led mission and that Blue involvement has focused on seizing seaports and airports to make it possible to deliver humanitarian aid.

On a similar note, SecDef expressed dismay over the number of Blue casualties due to fighting north of the DMZ, especially considering China's displeasure with their presence. He encouraged keeping Blue forces on the ground to a minimum and asked the CFC Commander to contemplate an exit plan and how soon the plan should be enacted. The CFC Commander responded that a sudden change of direction away from Blue's current support role would send the wrong message to the Green forces and government.

This week the IO/NGOs increased their engagement with Orange leaders in order to deliver HA to northern provinces. The IO/NGOs had previously reached out to the Orange leader in province H to set up some DP camps there and provide aid. The scope of this operation increased with the establishment of a field hospital to provide medical care. Facilitated by Green SOF messaging, the UN also engaged with Orange in province F to deliver HA supplies using the port, with Orange providing local security. The UN continued SkyLife airdrops into the Pacific nation, with Class I supplies being shipped by sea from Thailand or Vietnam as ROK's resources were starting to deplete. The UN estimated that 16,000 tons of sustainment should be sufficient for 4 million civilians for a week. This is roughly 570 grams/person/day, consistent with the total sustainment needs per person, assuming the use of water purification tablets (see Appendix G: Humanitarian Aid Needs for further discussion).

So far, humanitarian aid deliveries in provinces C, D, and E have not been very effective due to continued fighting and the poor conditions of the Pacific nation roads. Faced with mounting civilian casualties, the ROK president, in consultation with the UN and NGOs, reversed an earlier policy and allowed the establishment of DP camps across the DMZ in South Korea. Since commercial trucks were already being used to supply the military, and these trucks were returning empty to South Korea, a decisions was made to put displaced and expectant persons on these trucks returning south, and set up camps just across the DMZ in South Korea. The benefit of this plan was that the road capacity in South Korea is sufficient to supply these camps. Still wary of the threat refugees represent to national security, the ROK president required these camps to be distant from any major cities or infrastructure. With this plan, the ROK was able to relocate several hundred thousand people from the Pacific nation to DP camps in the south this week. FVEY allies declared their willingness to support the humanitarian complexes in ROK, but not to provide aid within the Pacific nation.

At the end of a week, the ROK president met with the HA community to discuss the next steps. The ROK president granted a request to extend UN use of major roads from four to six hours daily, but did not agree to loan 2,000 buses for transporting refugees into ROK, as the country's bus system was already strained by the NEO. The UN anticipated being able to move nearly one million refugees over the next two weeks.

As a result of all of these humanitarian initiatives, the humanitarian situation this week was much improved compared to last week, though there were still some preventable[10] deaths: approximately 50,000 dead in provinces D and E.

SoCal scenario

Starting on E+31, the disaster response shifted to restoring power and infrastructure in the region, as 1.5 million citizens in the region were without power and 2.0 million continued to require some type of mass care support. Reliance on contracting with commercial partners continued throughout E+3 to E+37. In particular, USACE leaned heavily on contractors for infrastructure repairs, debris removal, and inspection of critical systems. In previous disasters, a heavy reliance on contracted goods or services has led to shortages at the supply level [12-13], regardless of whether there was a preexisting contingency contract.

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[10] References to "preventable deaths" in this text refer to populations whose deaths would have been avoided if humanitarian aid (food and water) had been delivered in a timely fashion. In other words, these deaths were not inevitable and were not caused by Red/Orange hostilities.

The major discussion topic for this period was which method of transportation to use to fulfill mission assignments. As resupply demands increased, the logistics could have been handled either by trucking if enough roads were operable, or by airlift, a more expensive option. The NGB established that the roads would have checkpoints for controlling which trucks could move in and out of the AOI. Because the assumption by the NGB was that the more critical response assets and personnel would be given priority at those checkpoints, the coordinating agencies favored using trucking when possible.

At this point in the response, USTRANSCOM relayed the message that more airlift was available to CONUS. Previously, that airlift had been used to deliver forces, assets, and supplies into the OCONUS theater. An earlier decision had been made by the DOD participants to favor using the airlift for the Pacific scenario rather than SoCal, in part because those assets were in transit to the Pacific theater prior to the earthquake. By D+28, Blue had most of the forces and assets they needed, freeing up airlift for CONUS. Military and commercial cargo aircraft were being used to transport vehicles and large groups of support personnel to the SoCal area. The Civil Reserve Air Fleet (CRAF) plan had been activated for the Pacific Scenario, which meant that any assets that are a part of CRAF were no longer available for SoCal. There were competing demands for road/trucking capacity from disaster recovery support operations, DLA, DOD resupply, commercial port operations, and rail replacement operations.

D+35 - D+41/E+38 - E+44 (Turn 6)

Pacific scenario

On D+35, Blue successfully closed the spillway on the dam attacked by Red last week. While flooding subsided, road capacity across the middle DMZ road was still only 70 percent of maximum (it had been at 50%).

Blue and Green did not have any major combat operations this week, instead focusing on COIN operations and stability operations. Additional units were pushed into the port in province B, including three stability divisions. The fighting in this province reduced the road capacity by 10 percent, to 90 percent of the original capacity. Several operations secured access to multiple small airfields in western districts of provinces B and C.

Another stability division was moved into province C. Engineers in this province were able to repair roads, increasing the road capacity by 30 percent (capacity was then 105% of the original value). In province E, engineering units were able to clear and

repair roads, increasing road capacity by 30 percent (bringing capacity to 25% of the original value).

Red guerilla units in province B attacked infrastructure and destroyed 50 percent of the road capacity in the province (total capacity was 45% of original value).

Red executed two cyber attacks in South Korea. The first shut down the power in the southeast part of the country, affecting Busan, Gimhae, and Ulsan. Red also was able to use cyber attacks to degrade the capacity of the three corridors into the Pacific nation by 10 percent.

The main new humanitarian effort during this time period focused on province H. Orange freed roughly 300,000 prisoners from camps in that province. The UN, working with ROK, was able to charter ferries from Hong Kong and move roughly 225,000 of these prisoners to newly set up camps in the South, near Donghae. Some preventable deaths in the Pacific nation still occurred this week, but the total was less than 50,000 people.

SoCal scenario

In the final stages of the response (E+38), efforts shifted to recovery and long-term stabilization of the area. Because these tasks were no longer immediate, life-saving missions, there was much confusion about the requests and whether Blue had the responsibility to fulfill requests. The NG, DLA Energy, and USACE presented a great deal of resistance to providing long-term recovery support in response to requests for fuel distribution for consumers, fuel distribution security, and public facilities. Several requests for longer term facilities for public use, such as temporary government or education facilities went to the General Services Administration (GSA) representative for sourcing and contracting. This procedure follows the outline of the DSCA process, which specifies that Blue should rely on Blue facilities for their operations, while obtaining further property support through the GSA, USACE, or other USG departments and agencies [7].

Observations and Analysis

A main objective in AGILE 17 was to exercise the interoperability of the participating JLEnt partners. Although there were instances in the wargame where the participating organizations delivered an integrated response, by and large, significant work needs to be done before a fully integrated response can be achieved. Based on CNA's observations and analysis of the wargame, we have highlighted several of the key issues that need to be addressed for greater cooperation and coordination of effort across the JLEnt. We will discuss the following observations:

1. Information sharing between participants

2. Knowledge of JLEnt partner capabilities and assets

3. Deliberate planning across organizations

    a. Operational Contract Support (OCS)

4. Prioritization and adjudication processes

5. Additional findings

    a. Classification restrictions

    b. Relief bottlenecks across borders

    c. Lack of standardization

Information sharing between participants

Background

A key component in creating a unified effort for a JLEnt response is information sharing among all participating organizations [3]. In any large-scale response, one organization will not be able to meet all requirements. The need may arise whereby, in meeting a response requirement, an organization will need to leverage a partner's capabilities or assets. If information across the entire JLEnt is shared, the full range of capabilities and available resources of the JLEnt at large can be utilized for a timely, integrated response.

Social Networks

Findings

Figure 3 represents a social network for the major logistics organizations of AGILE 17. For a more detailed social network plot of all organizations, see Appendix B: Social Network Analysis. Figure 3 shows the pathways (solid lines) that the major organizations used to communicate with each other. Note that, in a social network, the size of the node (circles) scales with the number of connections that node has with other nodes in the social network and does not represent level of effort.

Figure 3 shows that, at least for this wargame, each of the key strategic logistics players are communicating and coordinating with almost all of the other key strategic logistics players, with no organization being isolated from the group. The scale-free[11] social network that formed in AGILE 17 should have allowed the collective group of organizations to quickly identify gaps across the entire network in resources and assets. This was not the case for AGILE 17, however.

Figure 3.   Strategic logistics social network[a]
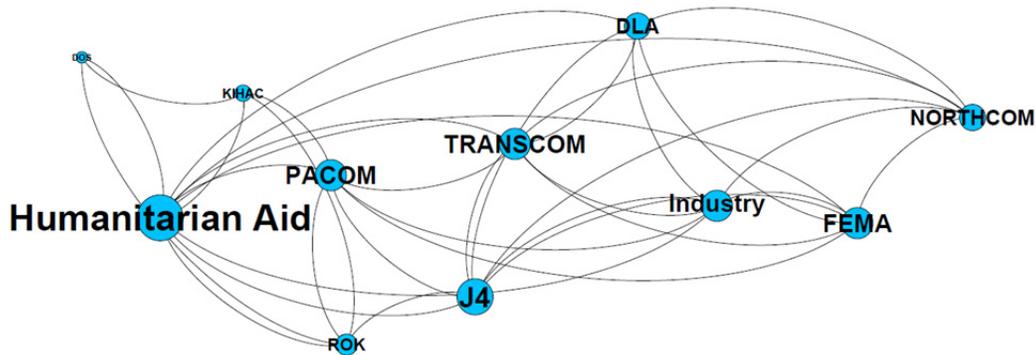
[a.] For simplicity, several of the organizations were aggregated for Figure 3. For example, the Humanitarian Aid (HA) node is composed of WFP, U.S. Agency for International Development (USAID), Bureau of Population, Refugees, and Migration, and Team Rubicon.

While the social network demonstrates the positive attribute of matrixed communication among the large logistics partners, it does not show what information was being relayed. Having lines of communication open amongst all logistics organizations is necessary but not sufficient for information sharing. For instance, Figure 3 shows that the HA community is the largest information hub based

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[11] A scale-free network is characterized by some nodes or "hubs" which have many more connections than others [14]. A random network, by comparison, is characterized by each node having approximately the same average number of connections.

on number of connections. HA had communication with every other large logistics player in AGILE 17, but the HA community only had information regarding the humanitarian crisis and response. It had no insight into the military operations being conducted. This is important to note because, as Figure 4 shows, for the first 24 days of the operation (Turns 1-4), the military was the major contributor (followed by China) of logistic supplies flowing into the Pacific nation. Both the military logistics and Chinese HA supplies were opaque to the HA community.

In AGILE 17, the consequence of this was a delay in the delivery of humanitarian aid as road and port capacities were maxed out. Because the HA community had no information into the military or Chinese operations, it planned delivery of goods to people in need via road and port networks that were, unbeknownst to them, too full with military supplies to support their transport.

Figure 4.   Logistics flowing into the Pacific nation by turn, broken down by percentage of military versus humanitarian aid
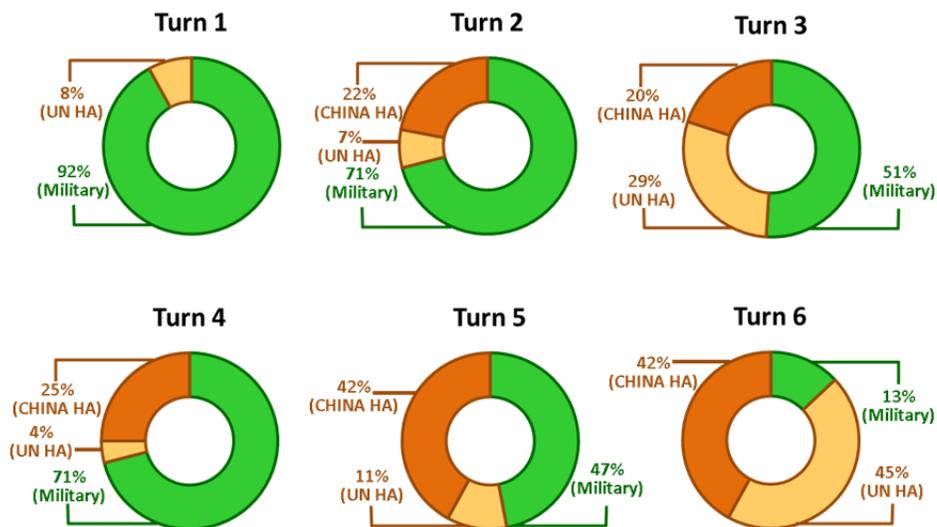
Source: Dataset provided by the DORRA.

Recommendations

If a JLEnt response will have a unity of action, then **a network needs to be created where the pertinent information is being shared with all necessary organizations**. One aspect of that may be to have a global asset management tool that is accessible to all or most JLEnt partners.

Global asset management

Findings

Another observation during AGILE 17 was that of global asset management. Decision-makers assumed risk in making global asset management decisions due to insufficient knowledge about the requirements, assets, or capabilities of other JLEnt participants. The heart of this problem is the inability to receive and synthesize timely logistics information from the numerous and diverse responding JLEnt organizations. The most common consequence of this issue noted during AGILE 17 was a delayed or inefficient response; however, in real-world crises, this issue has manifested itself not only in time-delays but also in duplicity of effort [15] and mission fratricide [16]. If AGILE 17 had occurred in a heavily Contested Environment, as could be the case in future conflicts, the logistics operations would likely have been under a far greater strain.

Recommendations

To avoid these pitfalls, it is imperative that there be an ability to share information across the JLEnt so that decision-makers have enough information to make important logistics decisions.

In order for JLEnt partners to be able respond effectively and efficiently, they will have to leverage complementary partner capabilities to fulfill requirements, but **this requires an understanding of (1) what assets the different JLEnt partners have in the area and (2) where those assets are geo-located at any given moment in time (i.e., asset visibility)** [17]. Having these two things (discussed in more detail below) ostensibly creates a Logistics Common Operating Picture (LogCOP) across the entire JLEnt.

In-theater partner assets

Findings

Observers in the game noted that, if a requirement exceeded an organization's initial capacity, they would attempt to internally reach back within their own organization (typically outside the area of responsibility (AOR)), instead of leveraging JLEnt partners with capabilities within the AOR. This stovepiping of capability highlights integration issues that restrict a true unity of action in a JLEnt response.

During E+03 – E+09 (Turn 1) of the SoCal scenario, the U.S. Army (USA) received a mission assignment (MA10, see Appendix C: SoCal Mission Assignments) to provide urban search and rescue (USAR) augmentation forces for collapsed high-rise buildings. To meet this requirement, USA needed to transport support teams from

San Diego into the affected area for necessary staffing for command and control of USAR operations. Due to the limited availability of assets within the AOR, USA did not have the ability to transport its staff to the affected area. Unbeknownst to USA, USTRANSCOM, or USNORTHCOM, the Royal Canadian Air Force had two C-17s available for use. It was not until E+10 – E+16 (Turn 2) when a Canadian player overheard the USA player attempting to find alternative internal USA lift assets (stovepiping) to transport its staff that the Canadians knew to offer the Army their C-17s. Within that turn, USA accepted the Canadian offer and the C-17s were adjudicated by game controllers to have arrived in the area of need with the USA staff within a matter of hours. This is just one example of several occurrences in the game when partner capabilities were unknown and this lack of awareness resulted in a delayed response.

Recommendations

These issues within the game echo problems plaguing real-world crisis response. Traditionally, FEMA brings life-saving commodities such as food and water from outside the disaster zone, often from great distance, into the affected area. A study by CNA [18], however, revealed that leveraging the commercial grocery stores' shelf-stable distribution hubs/warehouses, which could already be in the disaster zone and near the survivors, would have almost 100 times the necessary supply to meet the caloric daily rations of the affected population. If FEMA procured private-sector vendors' shelf-stable inventory within a disaster zone, it would significantly improve the national capacity to feed the survivors of a wide-area, extreme event involving a dense urban area. FEMA currently does not leverage the private sector's assets following a natural disaster because this "will require an unprecedented reorganization of current transportation capacity to create delivery capabilities that do not currently exist" [18].

Fundamentally, the lack of sufficient knowledge about what other JLEnt organizations have in theater impedes the ability of a uniform and concise response. In resource-limited environments or no-warning events, the immediate response of any organization will not be sufficient to address the requirements of the crisis. Therefore, responding organizations will need to rely on outside partners to help fill those requirements. Not knowing what capacity other participating organizations bring in a crisis limits the available resources of responding organizations.

There are existing information technology (IT) infrastructures that JLEnt partners can tap into in order to have better situational awareness of partner capacities. For example, information-sharing websites, such as the UN's ReliefWeb or the DOD's APAN, can give information updates and even needs requirements during a crisis response. In addition, the UN humanitarian response depots (UNHRDs) allow organizations outside the UN to store goods in the depots with the caveat that the organization must catalogue all the supplies being stored so that other organizations can be aware of the commodities, even if those other organizations cannot access or

procure them. **Taking the information-sharing website concept and expanding it to include all JLEnt partners could assist in better knowledge of total theater assets and capabilities across the JLEnt.**

Asset visibility

Findings

If commodities and assets were static or requirements and needs not dynamic, the above-described in-theater asset solution might be sufficient, but this is not the case in a complex response. Requirements evolved over the course of AGILE 17 as conditions improved or deteriorated, at times shifting even while commodities and assets were already in transit to the AOR. Therefore, to make informed asset management decisions, there has to be an understanding of where a particular commodity, asset, or capability is at any given moment as it moves into and through the theater.

Social networking theory suggests that a scale-free social network (as opposed to a random network) allows the nodes in that network to communicate quickly [14], increasing the probability that needed information and resources will be made available in a timely manner. While Figure 3 resembles a scale-free network, the lack of pertinent information being transmitted to each of the different nodes inhibited the players in AGILE 17 from fully leveraging the benefits of matrixed communication pathways. For example, during the SoCal scenario, each organization assumed that the transportation infrastructure would be available for moving their assets to and from the theater. However, a lack of visibility of all organizations' asset movement and of the overall transit to, from, and within the area would likely have caused an overuse of some transportation nodes and pathways.

Recommendations

If information sharing is to be fully realized for the benefit of a unified and timely response to a crisis, the JLEnt partners should consider sharing information about partner in-theater assets and creating asset visibility, ostensibly generating a Logistics Common Operating Picture (LogCOP). The information a LogCOP would provide could reduce the risk assumed by operational /strategic planners and logisticians as they try to make global asset relocation decisions with an incomplete knowledge of all assets and capabilities in and out of theater.

Knowledge of JLEnt partner capabilities and assets

Unity of action requires familiarity with partners that currently does not exist between many of the JLEnt organizations. In the previous subsection, we discussed the lack of understanding about the assets or capabilities that different partners bring in a JLEnt response. Yet, this lack of understanding goes beyond just assets. There is also a lack of sufficient knowledge about what different JLEnt organizations' functions are in crisis response and how to collaborate with those partners once the response begins.

Functions of different JLEnt partners

The DOD, NGOs, IOs, multinationals, and industry can have different functions in a crisis response. Furthermore, those functions can change depending on the type, location, and severity of the crisis. If the goal of a JLEnt response is to have a singular, integrated response, then each participating JLEnt member needs an understanding of the roles and responsibilities of other JLEnt members. This becomes problematic when organizations do not train or exercise together.

Findings

There were several instances in the game when various players did not know the function of some of the other responding organizations. In the Pacific scenario, many of the players did not know the role of the Korean Integrated Humanitarian Assistance Center (KIHAC), South Korea's version of FEMA. This slowed down the initial response because several DOD players attempted to coordinate efforts directly with the ROK President instead of with KIHAC. This lack of knowledge about organizations' roles and responsibilities in the wargame parallels the confusion seen during real-world contingencies. For example, in after-action reports (AARs) and analysis of the federal response to Hurricane Sandy [19], the U.S. Army North (ARNorth) reported confusion on the roles and responsibilities of a dual-status commander (DSC)[12] in a multistate crisis response, leading to challenges in allocating forces across multiple affected states. Similarly, the Office of the Assistant Secretary of Defense for Homeland Defense and Americas' Security stated that the lack of

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[12] A DSC is empowered to relay orders on behalf of state and federal chains of command to lead a coordinated (state and federal) military response. The National Defense Authorization Act formalized the DSC role in 2012 [7].

certainty regarding the role of the Joint Coordinating Element (JCE)[13] rendered the JCE largely ineffective.

Recommendations

Understanding the function of the different JLEnt partners is imperative to a timely and unified response. Although this can be difficult, particularly for a large response, **responding organizations should at the very least have a working knowledge about the large responding organizations**. For instance, HA organizations responding to a foreign disaster should know how USAID functions and their role in relationship to WFP or the DOS. Likewise, military personnel should understand the role of FEMA and DSCA in a domestic response.

Understanding JLEnt partner collaboration

Background

The JLEnt is a collaboration between partners with dissimilar processes and procedures. The level of cooperation between these organizations requires there to be a clear lead for each role while maintaining sufficient flexibility to encompass a multitude of organizational structures, doctrines, and processes. The following examples of interagency collaboration can inform future JLEnt partnerships.

One such example of an interagency and nongovernmental partner collaboration for logistics management is the FEMA Logistics Management Directorate [20] (see Appendix H: Interagency and Federal Crisis Response Processes for more information). Up to 75 percent of the shipments for disaster relief that FEMA provides may originate from vendors or from other federal agencies [21]. Although FEMA's record of responding to natural disasters is far from perfect, FEMA's protocols generally reflect "leading practices for interagency collaboration by identifying a lead agency and clearly identifying and agreeing upon responsibilities as leadership is shared, by funding and staffing collaborative interagency mechanisms, and by defining desired outcomes and measures with which to monitor their progress and success" [22].

While FEMA's LMD provides an avenue for JLEnt partners to collaborate in a U.S. domestic disaster response, the UN has a similar collaboration system with its "cluster system" [23] for foreign disaster response. During a humanitarian aid mission, organizations are designated by the Inter-Agency Standing Committee[14] as

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[13] The purpose of the Joint Coordinating Element was to aid in the coordination, integration, and synchronization of federal military forces.

[14] The Inter-Agency Standing Committee was established in 1992 to serve as the primary mechanism for coordinating UN and non-UN humanitarian assistance [24].

the coordinating lead for areas such as logistics, food security, shelter, and health [25].

Findings

Throughout the wargame, participants commented that comprehensive lists of other partners' capabilities, assets, and personnel would have improved the efficacy and expediency of the response. Unfortunately, a comprehensive list does not, and in all likelihood will not, exist. The capabilities and assets of any organization fluctuate over time and as such would quickly render any master list of JLEnt partner capabilities obsolete.

Frequently, participants were uncertain of the assets and responsibilities of other organizations. For example, the USNORTHCOM representative in the SoCal scenario was unfamiliar with the assets and capabilities that USACE or USCG would use to restore damaged infrastructure. If a JLEnt partner is unaware of other partners' capabilities, they are unlikely to know who to reach out to in order to fill capacity gaps.

Throughout the game, JLEnt partners filled capacity gaps, strengthening the overall crisis response. For example, commercial partners in the SoCal scenario provided increased capacity and worked in collaboration with USACE and the USCG in infrastructure repair, airlift, and damage assessment. In the Pacific scenario, commercial airlift and cruise liners were offered as additional transportation options for the NEO. Additionally, the WFP and Team Rubicon provided HA by ground transportation to regions in the peninsula which were inaccessible to military organizations. However, the method of collaboration between organizations was primarily for participants to offer solutions, rather than to request resources from others. This implies that JLEnt partners may not be aware of what assets or capabilities to ask for and from whom.

Recommendations

If a diverse set of organizations is going to work together to respond (or even just operate geographically near each other) in major crises, interaction at some level will naturally occur. Various organizations will serve different functions in the crisis, will have different objectives for the response, and may have preestablished communication and coordination processes. **To more efficiently coordinate and collaborate with JLEnt partners, it is incumbent on each organization to have a base knowledge about the major JLEnt responders and how to interact and interoperate with them**. A multitude of courses offered by the UN, USAID, DOD, and FEMA can assist in this preliminary education by providing overviews of the various organizations [26-31]. However, **new courses, training opportunities, or workshops focused specifically on JLEnt operations may be required to truly foster a**

cooperative, joint enterprise across federal agencies, the DOD, IO/NGOs, and the private sector.

Deliberate planning across organizations

For complex operations, the planning of logistics, manpower, resources, and capabilities requires communication, coordination, and a significant amount of time. Ideally, deliberate planning would occur prior to a crisis response, particularly for coordination across organizational or national boundaries. We will first discuss general observations regarding deliberate planning and the use of contractors, followed by a more in depth discussion of Operational Contract Support (OCS).

Findings

One observation during the AGILE 17 wargame was that the constraints caused by the limited infrastructure capacity prevented the efficient, timely deliveries of personnel, equipment, and commodities to provinces with needs or populations making requests. Deliberate planning of logistical movement in theater prior to the operation may uncover infrastructure capacity limitations such as these, enabling problem solving at an earlier stage. Additionally, when logisticians identify the resources available in theater, including operating bases, logistics bases, and transit infrastructure, that information can inform and instruct the appropriate use of support without overwhelming the local logistical system [32]. The initial sources of support are often organic, originating from the Army, USTRANSCOM, DLA, or other military support organizations. Contractor, industry, or IO/NGO support can bridge the gaps that occur between the arrival of forces and organic support in theater or that arise in an operation over time.

In the context of the peninsula response, although missions and objectives may have differed between participants, all organizations required basic sustainment and commodities, which can be planned for specifically. During AGILE 17, there was often assumed to be adequate supply for all requesting agencies. However, if several large organizations are competing for the same critical commodities and services as the civilian populace in an austere marketplace (which may not be capable of supporting the demand), then shortages may negatively impact the population, the host-nation government, or relief agencies in the area. A real-world example of this situation would be the 2010 Haiti earthquake response, in which the contracting officers quickly learned that supplies and services in Port-au-Prince were in high demand, dictating that contracted support had to originate from the United States, the Dominican Republic, or elsewhere [33].

On the OCONUS side, because the ROK had nationalized its infrastructure, activating preexisting contracts with ROK required approval at the presidential level. Even

though DOD agencies had specific information regarding the number and nature of preexisting contracts on the Korean peninsula, the activation, fulfilment, and delivery of those contracts is not a certainty. If ROK had nationalized resources that were ostensibly contracted for by the United States, the ROK would have priority for those assets. This situation also highlights the applicability of a formalized JLEnt adjudication process or procedure (discussed in the following section): assuming that both the ROK and the United States are participating in a JLEnt operation, a formal adjudication procedure may alleviate this type of conflict.

The primary issue on the CONUS side was a lack of understanding of what had already been contracted for by FEMA and which vendors still had capacity for new contracts. Receiving contract support in CONUS had less dependency on the resolution of authority issues and more on the existing inventory and production rate of commodities that had been contracted for. During the game, DLA discovered that they only had enough existing contracts with vendors to partially fulfill requests for packaged ice (see MA03c and RRF45 in Appendix C: SoCal Mission Assignments and Appendix E: DLA Estimated Support for more information). As a real-world example, the hurricane season in 2004-2005 depleted the stock of blue tarps and led to a nationwide shortage, even though FEMA had ongoing contracts for these tarps [12]. The guidance for the DOD when assisting in a CONUS-based disaster response is to minimize the use of contracted support to avoid competing with FEMA or ESF coordinating agencies for local or regional vendors [34-35].

Additionally, DOD and federal agency players did not necessarily invite industry partners to participate in planning discussions regarding commercial assets prior to assuming those assets could be requested. During one discussion of the damaged infrastructure in the region, the DOD participants were surprised to learn that industrial organizations had some contingency plans in place and would immediately begin finding alternative shipping routes, contracting for trucks or other transportation, and fixing rail and port infrastructure independently of the DOD's response. Following an in-depth discussion with industry representatives on how the port infrastructure would be repaired, the DOD participants were able to reevaluate which incidents in the area needed their attention.

Operational Contract Support (OCS)

Background

One of the most important aspects for successfully incorporating contracted support into a complex operation is planning. As soon as a joint operation is conceived or discussed, the likelihood is that some degree of support will be contracted, and that many of the contracts will be for similar types of support. Therefore, initializing the OCS process early in joint operations planning will provide adequate time for

recognizing and targeting the most efficient and most cost-effective joint contracting solutions.

OCS is a capability that enables the efficacy and efficiency of a commander in a complex operational environment. Specifically, OCS is "the process of planning for and obtaining supplies, services, and construction [materiel] from commercial sources in support of joint operations" [35]. Contingency contracting through the OCS process can include emergency contracting in either CONUS or OCONUS environments as needed [32].

The OCS process begins with planning and the identification of which requirements could be satisfied by contracted support. The support to a joint force operation can come from several sources, including acquisition and cross-servicing agreements (ACSA), mutual logistics support agreements, host-nation support, multinational military support, and contracted support [36]. Planning is a particularly important part of this process; the timeframe starting from the initial requested activity to the requirement validation can take a few weeks to a few months depending on the urgency, validity, and expense of the request [33].

A requirement that has been determined to be appropriate for contracting will be developed and refined as a requirements package. The next steps are to determine what type of contracted support would be most effective and to award the contract to the vendor(s) with the desired capabilities/criteria. Developing the requirements package involves specifying scope, identifying technical standards, cost estimation and market research, determination of the period of performance, and all associated documentation [36]. A poorly defined requirements package will likely waste government resources on a product or service that does not fulfill the requestor's needs.

An integral part of the OCS process is to manage and oversee contracted work to prevent waste, fraud, and abuse. Contractor management necessitates the ongoing engagement of commanders, staff, and requiring activities to prevent potential issues and to hold contractors accountable [37]. Oversight and management of contractors is a critical piece of the joint operations puzzle, and "the JFC and component commanders must ensure there are sufficient contract qualified oversight personnel … available to adequately monitor contractor performance to include both technical and tactical matters" [36] in order to successfully integrate the desired contracted activity into the larger operational picture.

There is an extensive library of guidance within the Joint Staff and the services providing doctrine, policy, and implementation of OCS processes for a wide range of operations [32, 34, 36-40]. The Annex W, compiled by the logistics staff of each service, is the primary method for combatant command personnel, service components, and combat support agency planners to document the inclusion of OCS into operation plans (OPLANs) or operation orders (OPORDs) [36]. Effective planning

for contracted support would provide the requested commodities, services, and personnel in a cost-effective, expedient method that is in alignment with federal regulations and acquisition law (such as the Berry Amendment[15]) [36, 41-42].

Findings

During the AGILE 17 wargame, contracting solutions were often proffered as a reactive solution to fill in gaps in assets and capabilities. However, contracting was often used as the "easy button." Participants did not undergo the rigorous processes necessary for planning and managing contractors in order to effectively integrate contracted support into military operations. The OCS process was abstracted in the game by assuming that, if contracts or vendors were available, all desired contracted support would be received as rapidly as needed. The likelihood that participants requested conflicting assets or commodities from the same vendors during the wargame is high; in reality, those requests would need to be deconflicted.

Furthermore, the OCS representatives usually had to assert themselves to remind other participants of the capabilities that could be contracted for in each region, reflecting a tendency to primarily turn to contracted support reactively rather than proactively. While many JLEnt partners did coordinate or communicate with the J-4/OCS representative, several organizations did not, including foreign national partners (UK, Australia, NZ, China), U.S. military representatives (USMC, USN/ARG, AFNorth), and some of the DLA partners (DLA-Fuels, DLA-Class I subject matter experts, DLA/ Whole of Government Division) (see Appendix B: Social Network Analysis for more information). Ideally, DLA and other combat support agencies would coordinate with OCS planners during deliberate planning for operations in addition to further collaboration through an OCS "Community of Interest working group" that includes interagency, combat support agency, and service component representatives [39].

As reflected in current operations, AGILE 17 proved the necessity and heavy reliance of the joint force on contracted support. Unfortunately, much like current operations and planning efforts, OCS was not fully integrated and planned from the outset. Many participants were unaware of OCS policy and procedures. In particular, the lack of OCS-trained personnel prevents a complex, global, joint operation from fully utilizing OCS as an enabling capability and could likely result in delays, inefficiencies, contract fratricide, and inflated costs.

Fully incorporating the OCS process into the AGILE 17 game mechanics may not have been practical considering that the gameplay started after Phase 0; however, the growing importance of contracted support in operational environments highlights

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[15] The Berry Amendment specifies that the Department of Defense must give preference to domestically produced products during procurement, including domestically-produced food, clothing, and specialty metals [41].

the need for DOD logisticians and planners to train for and understand the OCS process and capability. The participants would usually wait until requirements exceeded capabilities before turning to contracting as a solution. Including OCS planning from the beginning will most efficiently integrate contracted support into the crisis response.

Recommendations

During Phase 0 (Shape) operations or earlier, logistics planners across the Whole of Government should coordinate to integrate efforts. To maximize effectiveness and minimize ad hoc processes during a crisis, these planning groups should also include industry, multinational partners and IOs/NGOs when feasible. Further, OCS planners should ideally be coordinating across agencies, establishing Boards, Bureaus, Centers, Cells, and Working Groups (B2C2WG) (such as the Joint Requirements Review Board), drafting contractor management policies, researching contractor locations and capabilities, identifying potential requirements, and developing an OCS common operating procedure [39]. During the planning phase, existing contracts and agreements can be analyzed for each specific operation to anticipate gaps between requirements and preexisting contracted support. Throughout the remaining phases, there are OCS-specific actions related to the preparation, deployment, sustainment, drawdown, and closure of contractor actions and related contract management [36].

We recommend each combatant command train more staff members to have an understanding of and familiarity with the OCS process. If trained personnel exist across the services and are able to work with commanders, staff members, and contracting offices, OCS will serve its function as an enabling capability rather than a constraint. In order to support deliberate planning and steady-state operations, each CCDR should have a permanent Operational Contract Support Integration Cell (OCSIC), with the staff size and configuration dependent on the location and mission [36]. A previous wargame at CNA dealing with the Navy's implementation of the OCS process highlighted the need for the service acting as the Lead Service for Contracting (LSC) to have the training and personnel required to support a large-scale joint operation [43].

The dangers of having too few personnel with a sufficient understanding of contingency contracting and the OCS process have been clearly illustrated in the recent "Fat Leonard" scandal [44] in which a lack of contract support integration, contracting support, and contractor management opened the door to fraud and bribery. Even a small contract support team with relevant experience would improve contracting plans, oversight, and management, enhancing the military's ability to leverage contracting during operations while remaining cost-effective [33].

Furthermore, **developing and/or participating in OCS working groups during deliberate planning rather than during a crisis response will enable the identification of both existing contracts and appropriate contacts in other agencies, IO/NGOs, host or partner nations, and the private sector**—a necessary coordination and research step in the OCS process. While DOD acquisition processes are not applicable to non-DOD organizations, the OCS process, as a part or function of the DOD, may provide a key communication and coordination node for contracting across the JLEnt. Non-DOD organizations in a JLEnt would presumably communicate with the OCSIC inside the DOD without sharing contracts directly. **It may be beneficial to develop a specific framework or process for non-DOD organizations to coordinate with the OCSIC so that, during contingency operations, the communication lines are clear and effective**.

For the operations in ROK, commercial vendors were available for assets that fall under the Berry Amendment. **Depending on the level of urgency, blanket exemptions from the Berry Amendment may be necessary; however, doctrinal guidance for when this is appropriate may need to be developed beforehand because of the flexibilities inherent in contracting in emergencies** [45].

Prioritization and adjudication processes

In a resource-constrained environment, prioritization and adjudication may become an issue, particularly between organizations competing for the same high-value, low-quantity resources. The priorities during a disaster response evolve as critical systems are repaired and issues are addressed. In contrast to missions within the DOD, which usually have clearly defined lines of command that must be adhered to, a disaster response can operate across agencies, nations, or state and regional offices to deliver disaster relief as quickly as possible, regardless of who is providing the relief.

The roles and process for the U.S. to respond to a crisis depend on whether the response is in CONUS or OCONUS. This subsection discusses play during the AGILE 17 wargame and addresses the established prioritization and adjudication procedures used in real-world operations for both CONUS and OCONUS.

AGILE 17 DOD SoCal disaster response observations

Background

If a CONUS disaster is deemed to require federal intervention, FEMA administers the response in close coordination with the affected state(s). The National Response Framework (NRF) establishes guidance for authorities and core capability

responsibilities, with FEMA acting as the incident lead [6]. The regional, state, and local representatives determine priorities and relay that information to the FEMA administrator. At that point, FEMA will attempt to push its resources in accordance with requests from the state. The response efforts, including logistics, firefighting, search and rescue, public safety and security, and communications, are organized by function into Emergency Support Functions [6]. Each ESF area has a coordinating and a primary agency with FEMA supporting as needed.

FEMA will turn to the DOD for assistance if available assets from FEMA and at the local and state level are in use, exhausted, or unable to cope with the ongoing response effort. The SoCal scenario during AGILE 17 assumed this situation as the starting point. The process of DOD forces supporting FEMA or other ESF coordinating agencies is through the Defense Support of Civil Authorities (DSCA) [7]. During a DSCA mission, military forces are acting as a supporting agency for the civil authorities, who retain control. Furthermore, the DOD is a supporting agency for all of the ESFs, primarily because of the wide range of capabilities within the DOD family [40].

Mission assignments (MAs) usually originate as a request from the state for federal assistance. FEMA formally requests DOD assistance by issuing an MA, which is normally developed in coordination with the DOD as a part of the Joint Field Office through the Defense Coordinating Officer (DCO). The exception would be for prescripted mission assignments (PSMAs), which are drafted before the occurrence of an incident in order to expedite the deployment of relief personnel and supplies [6]. A DOD Specialist will evaluate requirements, track DOD resources that have been deployed to the incident, coordinate between FEMA and DOD agencies, and reconcile DOD MAs prior to departure. After the DCO has validated the MA, the assignment is passed on to the appropriate combatant command (CCMD)—usually USNORTHCOM—for fulfilment and execution.

Findings

Most of the mission assignments in the first few turns of AGILE 17 were supporting life-saving operations, such as medical patient transportation, search and rescue, and food and water deliveries to affected populations (see Appendix C: SoCal Mission Assignments for detailed information). Because the DOD has immediate response authority, it can respond to requests for assistance from civilian authorities using DOD resources for life-saving missions, for mitigating property damage, and for the prevention of human suffering within the United States [7].

Without a representative from the State of California participating in the game, there were no conflicts in regard to the state's desired prioritization of air, naval, or ground transportation for the movement of DOD supplies and personnel. However, DSCA missions are in support of civil authorities and would therefore need to defer to the priorities and judgments of FEMA officials at the federal level or to state and

local officials, especially for issues involving the use of local infrastructure. This lack of understanding regarding the relationship between FEMA and the DOD to provide a coordinating versus a resource-providing role, respectively, is a critical issue that has affected the federal response to previous disasters [40].

One issue that may have required an adjudication/prioritization discussion but was overlooked during the game was the use of six bases in CONUS identified to handle the incoming NEO population. The use of these six bases (Fort Hood, Texas; Joint Base Lewis-McChord, Washington; Joint Base Andrews, Maryland; Travis Air Force Base, California; Hill Air Force Base, Utah; and Buckley Air Force Base, Colorado) as joint RSO&I locations would likely have interfered with the airlift movement responding to the SoCal earthquake. Military bases are often dual-tasked as staging areas by multiple federal agencies to provide facilities and support staff for responses, occasionally overwhelming the base's capacity [41].

A source of confusion and debate during the game was whether the DOD had the authority or the responsibility to conduct certain requests for assistance. For example, the request made in week 6 for force protection for new and ongoing missions as a result of attacks on DOD members (see Appendix C: SoCal Mission Assignments for detailed mission assignments and requests for assistance) was pushed back to local law enforcement because Title 10 forces are not authorized to perform civilian force protection missions [42]. The Joint Publication detailing Defense Support of Civil Authorities (DSCA), however, clearly states that "federal forces may provide support to federal, state, territory, tribal and local law enforcement organizations reacting to civil disturbances, conducting border security and counterdrug (missions, preparing for antiterrorism operations, and participating in other related law enforcement activities" [7]. For this particular mission assignment, which was the "protection of DOD personnel, DOD equipment, and official guests of DOD," the military forces would have been legally allowed to protect DOD personnel [7].

This confusion regarding the responsibilities, legality, and authorities during DSCA missions is not atypical. A DSCA mission is unusual in comparison with a typical DOD mission in that the task, purpose, and actions taken are determined concurrently with the response, creating open-ended questions about what support will be provided and how the support will be provided [43]. Because of the evolving priorities during a disaster response, FEMA operates within a flexible framework rather than a prescriptive procedure or chain of authority. Disaster response partners collaborate and coordinate strategic movements within the framework, adjusting resource and personnel deployment and movement in accordance with current priorities [9]. In addition, resource providers share situational awareness and resource status information, collaboratively identifying and addressing challenges to, from, and within an operational area.

Recommendations

In order for a JLEnt community to effectively employ and distribute assets during a CONUS-based disaster response, **a framework for a JLEnt prioritization and adjudication process should be developed, including suggested roles and responsibilities for DOD, federal agency, industry, IO/NGO, and multinational partners**. Existing organizations, coordination cells, and liaisons should be leveraged to improve communication regarding response priorities. For example, an Emergency Operations Center (EOC) can determine or suggest priorities for industrial partners during a CONUS-based disaster. During the first few days after Hurricane Sandy, Riggins Oil was receiving orders for petroleum from all over the affected region with no indication as to which customers should receive priority. However, the State EOC soon communicated with Riggins that emergency generators at water and sewer facilities should be top priority and deliveries were reallocated accordingly [46].

Furthermore, the primary responders within the DOD (such as USNORTHCOM) would benefit from DSCA training. A Joint Task Force (JTF) commander will likely be responsible for managing both federal (Title 10) and state (Title 32) forces in a complex emergency and will need to understand the differences in roles and responsibilities for each force [47]. Additionally, FEMA, ARNorth, and other organizations offer courses providing an overview of DSCA, including the use of military resources for assisting civilian authorities and the existing procedures for integrating military resources into a large-scale disaster response [48-49]. **The development of a new course inclusive of both DSCA and non-DOD partner roles would also clarify the responsibilities of the military in a CONUS disaster response.**

AGILE 17 DOD Pacific nation crisis response observations

Background

Joint Publication 5-0 provides the DOD guidance on the planning of joint operations [44]. This document supports both Deliberate Planning, for future or possible future operations, and Crisis Action Planning, for time-sensitive operations. The same general framework is used for both types of operations; the main difference is the timescale available for planning.

When allocating units between CCMDs (not materiel), Global Force Management (GFM) processes are used. When a CCDR desires additional forces not within their CCMD, they follow the allocation procedures within GFM to request these additional forces. Each request includes an assessment of the operational risk if the force is not provided. The requests (typically one per unit) are forwarded to the Joint Staff,

where a recommended solution is determined. This solution is briefed to the CJCS for endorsement, but ultimately must be approved by the SecDef (Title 10, U.S. Code, Section 162). In cases of contentious allocations, a Global Force Management Board may meet to discuss and endorse a solution prior to the CJCS. During Crisis Action Planning, the same procedures are followed, but with a shorter timescale [44].

One drawback of both the Joint Materiel Priorities and Allocation Board (JMPAB), which prioritizes materiel allocation at the strategic level (see Appendix H: Interagency and Federal Crisis Response Processes for more information), and GFM is that both are DoD-only processes. Thus, JMPAB will not help when coordinating with foreign governments or interagency support. Similarly, GFM will not normally handle interagency requests, though it is possible that the JS will determine the best solution is a non-DoD asset. In such cases, the JS will coordinate with other agencies to try and meet the request for forces. However, the SecDef does not have the authority to order the assets and people of other agencies [44].

Another drawback of these systems is that they might not operate rapidly enough in a crisis situation. Both JMPAB and GFM are supposed to be able to operate quickly when needed; however, the information required before final adjudication decisions are made involves multi-step processes which will necessarily induce some delays.

Findings

During the game, there were instances when it was necessary to adjudicate the allocation of logistics assets, commodities, or military units between different organizations. There were no established procedures in the game for these cases other than existing procedures as described in the background section above and in the appendices below; therefore, the President or SecDef acted as the final adjudicator. These instances also demonstrated seams and gaps in communication and coordination between organizations.

These seams in coordination and communication between the DoD, foreign governments, and the UN and IO/NGOs can carry over to the execution of joint operations and was observed happening in the game. Some examples:

- In Turn 3 (D+14 – D+20), players desired to tap into their existing OCS contracts on the peninsula in order to support military operations (Blue and Green forces). Despite having over 1,000 contracts in place, it was not clear if any of them could be exercised, since the ROK had nationalized their key infrastructure. As a result, the CFC needed approval from the ROK president before they could purchase supplies through Operational Contract Support.

- The CFC was not always aware of the availability of other countries' assets for delivering aid (especially from FVEY partners). As a result, the FVEY

players sometimes felt underutilized. During the Hot Wash, one of the FVEY players remarked they felt isolated at first, and had to work to inject themselves into the game. They first had to find out what the requirements were and then make others aware of the assets they had available.

- In Turn 3 (D+14 – D+20) Blue players discussed purchasing HA supplies from China to meet the growing HA needs. This plan was blocked by the U.S. ambassador. However, the UN and other NGOs did not face this restriction, and were able to purchase HA supplies from China for delivery. This suggests that better coordination between Blue forces and the UN and NGOs could have achieved the desired HA outcomes.

In addition to gaps in coordination during the planning and execution of joint operations, another issue that arose was a competition for logistics assets or units between USPACOM and CONUS. Surprisingly, there was not as much competition for resources between theaters as expected. However, when both USNORTHCOM and USPACOM asked for the same resource, an adjudication decision had to be made. A chief example of this occurred at the beginning of the game, when both USNORTHCOM and USPACOM desired the hospital ship USNS Mercy. Since the Mercy had already arrived in USPACOM prior to game start, it was adjudicated the ship would remain in USPACOM.

Recommendations

While the Adaptive Planning and Execution (APEX) system (see Appendix H: Interagency and Federal Crisis Response Processes for more information) is excellent for planning military-centric operations, it is not well-designed for joint civilian-military operations. The current system could be expanded for such operations, or a **new system for adjudication and prioritization could be devised that would incorporate the DOD and other U.S. government agencies on an equal footing**. Classification issues might prevent the inclusion of NGOs for some operations, but their input could be facilitated through USAID. **Civil-military coordination on the operational level could be enhanced if the DOD were to train a cadre of personnel in such coordination.** This could be done through the programs offered by OCHA's Civil-Military Coordination Section. The Joint Interagency Task Force – South is an example of a successful long-term interagency collaboration that involves information sharing, collaboration, and coordination between the DOD, law enforcement, and foreign governments.

Global Campaign Plans could adjudicate the allocation of resources between CCMDs without involving the SecDef or President. These plans are defined as joint operations affecting multiple CCMDs, such as combating transnational terrorists or weapons of mass destruction. The APEX system can also be used for Global Campaign Plans. In such cases, the President or SecDef will decide to implement a Global Campaign Plan, and then appoint the CJCS or a delegated CCDR to act as the

supported commander in JPEC for planning purposed only. Global planning procedures are also applicable during Crisis Action Planning, which involves time-sensitive operations. However, a Global Campaign Plan may not be relevant when facing multiple distinct scenarios, as was chosen for AGILE-17. In the real world there are some established procedures for deconflicting competing demands for logistics, commodities, or units.

Procedures should be developed to allow a rapid adjudication on the allocation of assets between multiple operations when necessary. There are several ways to achieve this. In crisis situations a level of authority above a single CCMD could be established, which would bypass the JMPAB and GFM processes. Another option would be to develop pregenerated risk analyses for assets or forces likely needed between CCMDs, which could speed the JMPAB and GFM allocation processes. Finally, using the framework for Global Campaign Planning procedures used in APEX, a strategic plan could be developed for the scenario played in this game, or similar scenarios with competing demands for HA/DR in USNORTHCOM versus other CCMDs. These plans could then be activated when necessary.

This subsection has shown that, for both a domestic and foreign disaster, there are processes in place that outline the authorities and processes for prioritization and adjudication. **JLEnt partners should familiarize themselves with the adjudication and prioritization processes of other participating organizations;** this recommendation is analogous to the one described earlier in "Knowledge of JLEnt partner capabilities and assets." Doing so can help ensure that they know which coordination cells to "plug in" to (e.g., JPEC, LEMA, JFO) and how to most effectively interact with those cells in order to fully participate in the process of prioritization and adjudication of their requirements, assets, and capabilities for the larger JLEnt response.

Additional findings

In addition to the observations and recommendations above, we discuss further issues in the following subsections which may affect a JLEnt. These issues did not play as significant a role in affecting the response during AGILE 17; however, participants and observers did discuss during the game the role these issues could potentially play during a real-world crisis. We will discuss:

     a. Classification restrictions

     b. Relief bottlenecks across borders

     c. Lack of standardization

Classification restrictions

In complex emergencies, a common issue impeding collaboration between DOD and non-DOD partners is the classification of information for DOD operations. AGILE 17 was no exception. During the game, there were specific pieces of information about the military operations that could only be shared between the ROK and the U.S. This created an immediate barrier between the ROK/U.S. and all other responding entities.

During the initial game turns, the Canadian, British, New Zealand, and Australian players had no visibility into ROK/U.S. military operations. This manifested itself in a lack of a common operational picture (COP) of the situation, which frustrated the FVEY partners. In some instances, the HA community had more situational awareness about military operations in the Pacific nation than the FVEY partners did, due to continuous HA community dialogues with Orange and Red.

This gap in situational awareness was particularly problematic during the early stages of the game when Blue/Green airlift was insufficient for meeting operational demands. Because the road network in the Pacific nation had limited capacity, Blue and Green were forced to use air assets to supply logistics support within the Pacific nation. Blue and Green quickly exceeded their airlift capabilities, and there was one instance in which combat units were not resupplied and subsequently rendered combat ineffective for one turn. The FVEY partners would likely have offered their available airlift in South Korea to aid in the logistic resupply if they had some situational awareness of the operations or known what the Blue/Green lift requirements were. Although the total lack of a COP was somewhat artificial and the FVEY countries would probably have had some information about the operating picture, this situation from AGILE 17 typifies the persistent issue of classification.

We have cited an example of classification impeding effectiveness in military operations, but these issues exist outside of the DOD and its allied partners. The lack of insight into the DOD operations also impacted the IO/NGOs ability to successfully provide humanitarian aid to regions in the Pacific nation. During Turn 1 of the game, the DOD did not communicate changes in aircraft availability to the HA community, who were planning to use DOD assets for food airdrops to affected people in the Pacific nation. At the last minute, the HA community was told that their request would be denied. From that point forward, the HA community relied on commercial and allied partners as a primary source for transportation instead of Blue or Green.

These examples in the game are indicative of how in real-world operations the issues of classification can affect interoperability. **The military should examine what information it can share with JLEnt partners before and during a crisis. Most of the information regarding logistics for the military is unclassified, so some of the issues with information sharing and classification may be solved simply by**

socializing the military not to automatically default to using classified networks for communication.

Furthermore, multinational, IO/NGO, and industry partners provide additional solutions during a crisis that may be overlooked if these partners are excluded due to classification restrictions. One example seen during the game was the coordination of the UN with the Orange leader to deliver HA to provinces in the Pacific nation which were less accessible to other organizations. **JLEnt partners should understand that sharing information at an unclassified level with allied, IO/NGO, and industry partners will provide additional innovative solutions to operational problems, thus benefiting overall mission effectiveness.**

Relief bottlenecks across borders

When a disaster affects a nation in such a way that foreign humanitarian aid is required, customs regulations and border protection laws could restrict the flow of relief goods and personnel into the affected areas [50]. As shown in Table 1, these issues could originate from within the host nation, from relief agencies, or between the host nation and the world community.

Table 1.   Potential customs-related issues that could affect the flow of relief into a nation

Issues that Restrict the Flow of Relief Supplies into a Nation		
Stemming from host nation	**Stemming from relief agencies**	**Stemming from host nation relationship with world community**
Application of taxes, duties, and other fees on incoming relief supplies	Lack of coordination among relief actors	Differences in standards and laws between sending, transit, and host nations
Lack of surge capacity (both personnel and work hours) to deal with large-scale crisis	Ignorance of nation-specific customs and regulations	Hostilities (or diplomatic uncertainty) with host nation
Differences in entry requirements among various ports of entry	An increasing number of independent (or uncertified) NGOs	
Extreme vetting of incoming goods		
Refusal to ask for or allow assistance from relief community		

Sources: Derived from [50-52].

During AGILE 17, China established border protection and the ROK nationalized its infrastructure during the same turn. Although Blue and Green were in continuous coordination, this restriction of movement at key points along the border, namely ports and airports, could have negatively impacted movement of Blue, FVEY, or HA commodities and assets to and from the region. In another example from the game, the massive movement of tens of thousands of noncombatants from the north to southern ports created bottlenecking at those ports. The president of South Korea had to deconflict the demands for port facilities from both the NEO and for incoming supplies to avoid overwhelming port capacities.

These challenges of bottlenecks across national borders can be addressed by the host nation, particularly if it is proactive. For example, prior to the Great East Earthquake that affected Japan in 2011, the Japanese government had created procedural measures to facilitate duty exemptions, clearance procedures, and the waiving of inspection fees in the event of a disaster requiring outside assistance [51]. These measures alleviated many issues that had caused considerable delays for other nations in the past, such as the customs clearances issues that plagued Sri Lanka and Indonesia in the aftermath of the 2004 tsunami and the insistence on taxing UN food aid by the government of Eritrea during the droughts in 2005 [51]. **Host nation**

governments should refer to various guidelines that, if properly implemented, can expedite the delivery of relief goods. These guidelines cover:

- Simplifying customs procedures (Special Annex J.5 of the Revised Kyoto Convention [53])

- Allowing temporary admission of "goods imported for humanitarian purposes" (Annex B.9 of the Istanbul Convention [54])

- Establishing an HA/DR agreement between the host nation and international community (UN/World Customs Organization (WCO) Model Agreement [55] or the Model Act for the Facilitation and Regulation of International Disaster Relief and Initial Recovery Assistance [56])

- Reducing the red tape associated with the entry of relief goods and personnel (IDRL Guidelines [56])

Relief agencies can also implement improved policies to diminish the chance of a delay occurring when entering a nation. USAID/OFDA's *Field Operators Guide* advises its response teams to dedicate personnel who research and review a country's customs and border laws before, during, and after a crisis affects a given nation [57]. In addition, by working with various NGO and humanitarian coordinating agencies (USAID/OFDA, UN/OCHA, WFP, etc.), the entry of goods and personnel from smaller relief agencies can be better planned and organized [58].

For most DOD foreign HA operations, customs and border control issues should not be problematic if the host nation government and host nation military are coordinating with or receptive to the relief efforts [59]. In such cases, military aircraft are generally exempt from international customs duties and taxes, search, seizure, inspection, and other various fees (overflight fees, navigation fees, etc.) [59]. However, these exemptions do not extend to DOD-contracted commercial aircraft used for airlift or other missions [59]. **Therefore, coordination and communication with both the host nation and the coordinating relief agencies about customs and border protections is recommended**.

Lack of standardization

When a lack of knowledge regarding JLEnt partners exists, there will likely be consequences that impede the efficiency and effectiveness of the JLEnt response as a whole. In AGILE 17, a difference in the HA requirements determined by KIHAC versus those computed by the WFP could have been a friction point in the game. Although this did not play out, it does highlight how differences between organizations in their requirements for meeting the same need affects logistics planning and requires collaboration and communication in order to adjudicate. Interoperability suffers

without mutually agreed upon standards or processes to determine which requirements during a humanitarian aid mission will be met and which will not.

While standards adjudication did not negatively affect the response in AGILE 17, it is evident how a set of benchmarks along these lines could have factored into the planning and execution of HA operations. Broadly, situations arose during the game involving refugees, NEOs, and the establishment and supply of HA camps, all of which require complex bundles of decisions that could be aligned by a core set of guiding principles. More particularly, in the Pacific scenario, UN HA negotiated extensively with Blue and Green leadership concerning which ports and airfields should be prioritized and how roadways could be shared in order to provide support to displaced populations in the Pacific nation. The HA standards suggested by the Sphere project [60] were explicitly referenced in Turn 5. If all involved JLEnt members had agreed upon a unifying code of standards ahead of time, it would have facilitated and expedited these negotiations.

Partnerships and coordination between NGOs and state militaries in an HA context demand special considerations. While Military and Civil Defense Assets (MCDA) "should be employed by…humanitarian agencies as a last resort" [61-62], complex emergencies frequently require their use. Because MCDA mobilization is a state action, and because these assets (including personnel) may be armed, a much broader corpus of international law comes to bear on HA operations with military involvement, even in a support role. The UN's guiding principle that HA must always be provided in accordance with humanity, neutrality, and impartiality takes on elevated importance in this context [63].

Keep in mind that civil-military coordination may be necessary either with or without the presence of an ongoing armed conflict in the region. The resources available in the military have essentially guaranteed that the military has and will play a key role in the disaster response. The international humanitarian system has a very limited standby capacity (even through contractors), such as for airlifting. It looks likely that the military, despite the high cost, will continue to play a role in global international disaster response. There is, however, little joint planning and training between the military and traditional humanitarian actors—and coordination between them was notably weak in the response to the tsunamis. [15]

MCDA may be requested in cases of disaster relief, for instance, or during a war that generates a humanitarian crisis. The UN defines Humanitarian Civil Military Coordination (CMCoord) as "the essential dialogue and interaction between civilian and military actors in humanitarian emergencies that is necessary to protect and promote humanitarian principles" [26, 61-62]. Guidelines governing the use of MCDA and rules about the ethical conduct of warfare are two complementary elements of International Humanitarian Law (IHL).

Both the adoption of shared guidelines and the designation of a lead organization rely on "buy-in" from the acting community. These solutions are only effective in improving standardization if each contributing HA group assents to them. To the extent that they do work, though, these solutions are plainly applicable to CMCoord situations. Different types of documents or agreements may be needed, but the fundamental ideas of shared standards and appointed leads extend to combined civil-military efforts just as they do to work conducted only by NGOs. Similarly, even members of industry who can contribute to the JLEnt in HA/DR efforts could choose to adopt the Sphere Project standards or a similar code.

Recommendations

Based on the observations from AGILE 17 and post-game analysis, CNA presents the following recommendations as potential next steps for improving the interoperability across the entire JLEnt:

- Information sharing will be an integral component in realizing a unified and timely response to a crisis. Plans only survive first contact with the enemy; a robust response in a complex emergency requires a robust communication network throughout the crisis in addition to appropriate planning beforehand. JLEnt partners should consider the following:

  o All partners need a central communication and coordination focal point to ensure that efforts are not unnecessarily duplicated or hampered by misunderstanding and to create a clear operational picture of the situation as it unfolds. One key element to a unity of action within the JLEnt is for all participants to understand how the communication and coordination system should and would likely work. Rather than a command center with a commanding authority, the JLEnt community may benefit from a coordination, discussion, or working group to serve this purpose. In particular for a humanitarian crisis in which each organization may have different objectives and capabilities, all partners need to be continuously updated on the situation in order to make effective asset deployment choices.

  o Furthermore, we recommend that JLEnt partners use these communication pathways to share information about each organization's assets and capabilities and to provide visibility of those assets in theater. Leveraging existing information systems, such as ReliefWeb, APAN, and UNHRDs, can provide information about assets and capabilities across the entire JLEnt. An alternative solution is to foster a deeper knowledge of the types of capabilities JLEnt partners have (air/ground transportation, commodities, services, etc.) and, during an ongoing operation, to reach out to the partner with the approximate capability profile to ascertain the specifics of what that partner can provide.

- o Creating a LogCOP to provide asset visibility will reduce the risk planners and logisticians assume when making global asset reallocation decisions with an incomplete picture of theater/global-wide assets.

- One of the clear findings from the game was a general lack of familiarity with the functions, capabilities, and assets of other JLEnt participants. To more efficiently coordinate and collaborate, it is incumbent on each organization to have a base knowledge about the major JLEnt responders and how they can interact and interoperate with them.

  - o At a minimum, there are courses offered by the major logistics JLEnt participants (e.g., UN, USAID, DOD, and FEMA) that provide an overview of each organization and how other organizations can interoperate with them.

  - o Ideally, new courses in which all JLEnt partners are invested in course creation and execution should be developed with training specific to JLEnt partners and operations. More consideration should be given to training and exercising with other JLEnt partners, particularly in areas where there is frequent need for HA responses or where ample warning of potential complex emergencies is occurring.

- Deliberate planning would ideally occur prior to a crisis response, particularly for operations coordinated across organizational or national boundaries. Incorporating the inputs and capabilities of industry, IO/NGO, and multinational partners with DOD, Operational Contract Support (OCS), and federal agency planning prior to a crisis will enable a more effective JLEnt response. The OCS process is a powerful tool at the disposal of the military and, when used effectively, can enable an increase in capacity. To fully leverage both deliberate planning and OCS during a crisis event, the following actions will be necessary:

  - o Proper training of personnel in all echelons of the services who can work with commanders and staff.

  - o The establishment of B2C2WG for contingency operations to coordinate and communicate regarding joint contracted capabilities.

  - o Incorporation of OCS planning during the deliberate and Phase 0 planning with OCS-trained personnel, especially for commonly contracted commodities. The OCS process becomes a cost-saving, enabling capacity if all relevant partners are dedicated to understanding and incorporating the appropriate policies, procedures, and mechanisms to joint operations planning, logistics, and operations.

- In a resource-constrained environment, there may be competition for assets and capabilities. When that occurs, it is important either to know how the prioritization and adjudication process works for different organizations or to participate in those processes. We recommend that a guideline or framework for adjudication and prioritization of assets across the JLEnt be developed.

- Many of the larger JLEnt partners have established procedures for prioritization and adjudication. It would be beneficial for JLEnt participants to familiarize themselves with these procedures to ensure that they know how to fully participate in the process.

- The DOD may benefit from considering what information can be shared at an unclassified level before and during a crisis. Providing a COP using unclassified information for the HA community and industry partners in the JLEnt will enable them to provide additional solutions and capabilities as a part of the response.

- Relief agencies and host nation governments may benefit from evaluating border protection and customs policies prior to the occurrence of a crisis to prevent bottlenecks at borders.

- Standardization of requirements, so that they can be shared among the many agencies and organizations providing HA in a region, can improve interoperability, quality of assistance, and accountability.

Appendix A: AGILE 17 Organizations

Table 2.   List of AGILE 17 participating organizations

DOD	Joint Staff J-1	**DOD**	U.S. Navy	**Multinationals**	Australia	
	Joint Staff J-3		U.S. Marine Corps		Canada	
	Joint Staff J-4		U.S. Forces Korea		New Zealand	
	Joint Staff J-6		U.S. Forces Japan		United Kingdom	
	Joint Staff J-7		U.S. Army Pacific		Germany	
	Joint Staff Surgeon General		Marine Corps Forces Korea		South Korea	
	Office of the Under Secretary of Defense (Acquisition, Technology and Logistics)		7th Air Force		Japan	
	Office of the Under Secretary of Defense (Policy)		1st Signal Brigade		Sweden	
	U.S. Pacific Command		U.S. Army North		Finland	
	U.S. Northern Command/North American Aerospace Defense		National Guard Bureau	**Industry/Academia**	Business Executives for National Security	
	U.S. European Command		U.S. Army Corps of Engineers		Institute for Defense and Business	
	U.S. Transportation Command		Center for Joint & Strategic Logistics		National Defense Industrial Association	
	U.S. Cyber Command		All Partners Access Network		National Defense Transportation Association	
	U.S. Africa Command	**Interagency**	Department of State		Bennett International	
	U.S. Central Command		US Agency for International Development/ Office of US Foreign Disaster Assistance		Crowley Logistics	
	U.S. Southern Command		Department of Homeland Security		Tropical Shipping	
	U.S. Special Operations Command		Federal Emergency Management Agency		Union Pacific Railroad	
	U.S. Strategic Command		U.S. Coast Guard		University of North Carolina	
	Defense Health Agency		Department of Health and Human Services		Lockheed Martin Center for Innovation	
	Defense Logistics Agency		General Services Administration	**Facilitators**	Center for Naval Analyses	
	U.S. Air Force	**IO/ NGO**	World Food Programme		Johns Hopkins University Applied Physics Laboratory	
	U.S. Army		Team Rubicon		DLA Office of Operations Research & Resource Analysis	

Appendix B: Social Network Analysis

Table 3.　　AGILE 17 social network data for both CONUS and OCONUS

Figure 5.   Graphical representation of Table 3

Table 4.   AGILE 17 social network data for CONUS

Receivers across/ Initiators below	CYBERCOM	EUCOM	NORTHCOM	ARNORTH	STRATCOM	TRANSCOM	USAR/Fuels	USAR/JLOTS	USAR/UAS	USAF/WRM Distro	USAF/Vehicles	USAF/Log Plans	USAF/EM	USN	7 AF/ACC	7 AF/NCC	USFJ	USARPAC	DLA	NGB	USACE	Army MEDCOM	USCG	GSA	DHS	FEMA	HHS	Industry	Press	CAN	J4	J3/GFM	DHA	J1	ROK	JFC	MED Log	USAR/Watercraft	SEC DEF	CENTCOM
CYBERCOM		1	2			2																3			6			2	1										1		3
EUCOM	1					4													2		3		1					2		4									1		1
NORTHCOM	2					6				4		1	2					4	6	6	5	6	6	4	5	6	4	6			4		1						2	1
ARNORTH						3							1							6	3				2	1	6			1										
STRATCOM																			1																					
TRANSCOM	2	4	6	3			3	6	1			4	1		4	3	6	4	4	5	5	2	4		3	3	4	6		3	6	4	2	2		1			1	1
USAR/Fuels						3														1					2			1												
USAR/JLOTS						6			2									2		2	1		3		3			3			1	1				5				
USAR/UAS						1		2																				1												
USAF/WRM Distro		4									4	2	6		2				4						3															
USAF/Vehicles										4		4	6		2				2						2															
USAF/Log Plans			1			4				2	4		6					1		6		2			1	4					2					1				
USAF/EM			2	1		1				6	6	6		1						4	4																			
USN													1													2														
7 AF/ACC						4		2		2	2							4																					1	
7 AF/NCC						3												1																					1	
USFJ						6												6	2		2		4		1	1	3			2	1		1		1					
USARPAC		4		1	4					1			4	1	6	4		4		3		4	5	4	3		6	1									1			1
DLA	2	6			4								2	4	6	2	6	3	3	5	6	2	5		4			1												
NGB		6	6		5		2		4	2	6	4				6	6	5	6	4	5	6	5	6		2	3	4					5							
USACE	3	5	3		5	1	1			4					2	6	5	2	5	6	2	5		2	4								2							
Army MEDCOM	3	6			2			2				2	4	6	5	1	6	6	6		1	4		1																
USCG	1	6		4	3						3	6	5	1	1	6	6	2	6	1	1	3						4												
GSA	4									3	4	2	1	6	6	5	4	2																						
DHS	6	5		3				1		4	3	5	5	5	6	6	6	6	3	3	4																			
FEMA		6	2	3	2	3		3	2	4			6	6	6	6	6	6	6	6	4																			
HHS		4	1	4							1	4	2	5	2	6	2	3	6	1	1	4	1	4	2															
Industry	2	2	6	6	6					2	1	5	5	6	5	6	5	3	6	1	5									2	2						1	1		
Press	1															1					2	1																
CAN				3								4	2	2	1	1	2	1																						
J4	4	4	1	6	1	3	1		2	3	3	4	3	4	1	3	4	4	4	5	2	3		1	1	2														
J3/GFM				4															1			3																		
DHA		1		2										4	4	2		4																						
J1				2								2	6					2																						
ROK					1							1	1										2	1	1															
JFC	1	1		1		1		1		1	1		1		1		1																							
MED Log												1																												
USAR/Watercraft		2		1	5									5	2		4					1		2																
SEC DEF	3	1	1		1							1		1								1																		
CENTCOM												1																												

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Figure 6.   Graphical representation of Table 4

Table 5.   AGILE 17 social network data for OCONUS

	CYBERCOM	EUCOM	PACOM	SOCOM	STRATCOM	TRANSCOM	JTF PO	USAF/Log Plans	USN/ARG	USFK	USMC	GCC	USFJ	USARPAC	DLA	NGB	USACE	Army MEDCOM	USCG	GSA	Humanitarian Aid	Industry	DOS	Press	U.K.	CAN	AUS	NZ	J4	NCA	J3/GFM	DHA	J1	ROK	JFC	MED Log	USAR/Watercraft	SEC DEF	CENTCOM	China	KIHAC	Orange
CYBERCOM		1	3	1		2			4	6								3			6	2	1	1											1			3				
EUCOM	1		1			4			4	1	1	1		2		3			1		1	2	1						4				2	1	1			1			1	
PACOM	3	1				4			1	2	1	2	2	4		2		1			6	3			1	1	1	1	4				2	4	1			2			1	
SOCOM	1					1				3	1		1	1			1				2								3					3	1							
STRATCOM								1	1											1																						
TRANSCOM	2	4	4	1			1	4	5	4	3	4	6	4	4	5	5	2	4		6	6			5	3	3	3	6	3	4	2	2		1			1	1			
JTF PO						1			3				1				1	6			1													4				1			1	
USAF/Log Plans						4			4			1				6		2			6								2									1				
USN/ARG	4	4	1		1	5	3	4				2		4	4	3	6	4	4	5						2																
USFK	6	1	2	3		4					1	2	2	4	2	2		1			6		1		1				2					4	1			2			1	
USMC		1	1	1		3			1				1	1	1		1				3				1															1	1	
GCC		1	2			4	1		2				2	1	2		1	1			2	1							2									1				
USFJ		2	1			6			2	2	1	2		6	2			2			2	1			1	3							2	1				1			1	
USARPAC		4	1	1		4		1		4	1	1	6		4			4			4	5	1		4	4	4	4	3					6	1				1			
DLA		2		1		4			4	2	1	2	2	4		6	2	6	3	3	3	5			4				1									1				
NGB						5		6	4				6				6	5	6	4	3	6				2			3					4				5				
USACE		3	2			5			4			1			2	6		5	2	4	5				1	2	1	1	4					1				4			2	
Army MEDCOM	3			1		2		2	3	1	1	1	2	4	6	5			1		2								1					4				1				
USCG		1	1			4	1			6				3	6	5	1			6			1		1				3											4		
GSA								4					3	4	2		1	1			1	5							4					2								
Humanitarian Aid	6	1	6	2		6	1	6	4	6		2	2	4	3	3	4	2		1		6	6	6	6	6	6	6	4	6				6	1			1	1	1	2	2
Industry	2	2	3			6	6		5			1	1	5	5	6	5		6	5	6				1	5												1	1			
DOS	1	1							1				1								6			1										3							1	
Press	1																				6		1											2	1							
U.K.		1				5			1		4			1			6				6					2	2	2			2			1							1	
CAN		1				3		2			4				1			6			6				2				2					1							1	
AUS		1				3					4				1			6			6				2									1							1	
NZ		1				3					1	4			1			6	1		6	1			2									1							1	
J4		4	4	3		6	1	2		2	1	2	3	3	4	3	4	1	3	4	4	5				2				4	3			1	1		2					
NCA						3															6								4													
J3/GFM						4																							3													
DHA						2								4		4		2																								
J1		2				2	4						2	6																												
ROK			4	3				4			1	1						6						3	2	1	1	1	1												2	
JFC	1	1	1	1		1	1	1		1	1		1		1		1				1		1						1													
MED Log											1		1																													
USAR/Watercraft						1							5	2		4		1				1							2													
SEC DEF	3	1	2			1	1			2		1	1								1	1																				
CENTCOM													1								1																					
China																					1																					
KIHAC		1							1												2		1		1	1	1	1						2								
Orange																					2																					

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Figure 7.   Graphical representation of Table 5

Appendix C: SoCal Mission Assignments

Table 6.   Mission assignments during the SoCal earthquake response by week

Week	Area	Request #	Mission Assignment (MA)/Resource Request (RRF)
1	Supply transportation	MA01	Transport approximately 2,000 tons of supplies per week
1	DCO/DCE activation	MA02	Activate DCO/DCE (FOS) and provide staff to key C3 nodes (IOF/JFO, NRCC, state EOC, county EOCs, federal D/A EOCs)
1	Bottled water	MA03a	Procure, transport, track, and deliver 21.6 million liters of bottled/bulk potable water
1	Shelf-stable meals	MA03b	Procure, transport, track, and deliver 13,046,400 shelf-stable meals
1	Packaged ice	MA03c	Procure, transport, track, and deliver 48 million pounds of packaged ice
1	Personnel transportation	MA07	Move response personnel into the affected area
1	POD supply transportation	MA08a	Transport equipment and supplies needed to establish points of distribution (PODs) in the affected counties
1	USAR	MA10	Provide Urban Search and Rescue (USAR) Augmentation Forces
1	Clear roads	MA11	Clear major roads for emergency response by removing up to 1.5 million cubic meters of debris and verifying the status/accessibility of bridges and tunnels near fault line
1	Fuel distribution	MA13	Establish Fuel Distribution Points for ground vehicles for 1st Responders
1	NDMS patient movement	MA14	Activate National Disaster Medical System (NDMS) elements to evacuate critical care patients from 6 damaged hospitals
1	DOD staging areas	MA15	Determine primary DOD staging areas and deploy Base Support Installations

Week	Area	Request #	Mission Assignment (MA)/Resource Request (RRF)
2	Communications	MA04	Provide communications solutions for a staff of 75-150 personnel – User Communications Package (FOS)
2	POD supply transportation	MA08b	Transport heavy equipment needed to establish PODs in the affected counties.
2	Fuel provision and distribution	MA17	Provide capability to conduct retail fuel distribution (1.5 million gallons per week) for 1st Responder operations
2	Civil authority information support	MA22	Provide personnel and equipment for Civil Authorities Information Support (CAIS)
2	Hazmat response	MA24	Provide oil and hazardous material (hazmat) field response (due to tsunami)
2	Shelter supply transportation	MA28	Locate, transport, and distribute equipment needed to establish shelters within 72 hours
2	Ground transportation vehicles	MA42	Provide 64 vehicles with drivers for moving supplies and personnel arriving at federal staging areas to small, medium, and larger shelters and points of distribution
2	JLOTS	MA46	Assist with moving cargo from ships to land after the tsunami damages the port of Los Angeles/Long Beach
3	Maritime staging	RRF05	Provide maritime staging of disaster response capability and delivery of capability ashore as required to support FEMA missions
3	1st responder berthing	RRF06	Provide berthing for up to 5,000 federal response personnel
3	Airflow management and augmentation	RRF12b	Increase air support for managing capacity in damaged areas by providing contingency airflow management services and airfield augmentation
3	Ground transportation of personnel	RRF18	Provide trucks/drivers for moving personnel (and their supplies) arriving at LAX on commercial flights to federal staging areas
3	Medical staff augmentation	RRF19	Provide medical staff to augment state and local hospitals and federal medical stations
3	Port security	RRF21	Provide security assessments and 24-hour security detail to the Port of Long Beach/Los Angeles
3	Engineering support to DMORTs	RRF29	Engineering and construction support to DMORTS: Provide cold storage structures and for DMORT teams given that local and HHS resources are exhausted

Week	Area	Request #	Mission Assignment (MA)/Resource Request (RRF)
3	Bottled water	RRF36	Procure, transport, track, and deliver X million liters of bottled/bulk potable water
3	Shelf-stable meals	RRF37	Procure, transport, track, and deliver X shelf-stable meals
3	Packaged ice	RRF45	Procure, transport, track, and deliver X million pounds of packaged ice
3	Veterinary support	RRF50	Provide veterinary support augmentation at shelters
4	Emergency power	RRF09	Provide emergency power for 14 hospitals in the eight-county area
4	Airfield assessment	RRF12a	Provide survey teams to conduct airfield assessment
4	Aerial damage assessments	RRF16	Conduct aerial damage assessments through the United States Air Force Auxiliary, Civil Air Patrol (CAP)
4	Medical ground transportation	RRF20	Provide medical ground ambulance vehicles and personnel support for Medical Patient movement missions (mission caused by aftershock?)
4	Government facilities	RRF25	Provide temporary government facilities essential for government operations
4	Repair facilities	RRF26	Provide engineering personnel and support, including design estimating and construction supervision, for repair, reconstruction, and restoration of eligible facilities
4	Field medical capabilities	RRF27b	Provide field medical capabilities to areas lacking adequate medical care
5	Water purification	RRF27	Provide water purification (reverse osmosis systems)
5	Fuel trucks	RRF31	Provide fuel trucks to support refueling of general public privately owned vehicles by county
5	Airfield repairs	RRF32	Support airport repairs to increase capacity
5	Road repair	RRF48	Assist with debris removal and road repair along I-10 from San Gorgonio Pass to Coachella Valley
5	Bridge inspection and repair	RRF51	Assist with inspection and repair of 30 bridges along I-10 from San Gorgonio Pass to Coachella Valley
5	Support power restoration	RRF52	Transport personnel and equipment to support power restoration activities
6	Temporary roofing repair	RRF30	Provide temporary roofing tarps, and coordinate roofing activities out of county PODs

Week	Area	Request #	Mission Assignment (MA)/Resource Request (RRF)
6	Fuel security	RRF39	Provide security to protect fuel tanker trucks stationed at county PODs
6	Cleaning and debris removal materials for individuals	RRF40	Provide "self-help supplies" to individuals to help them clean up and remove debris from their residences
6	DRCs	RRF43	Support activation and operation of 50 disaster recovery centers
6	Neighborhood/ residence debris removal	RRF52	Provide DOD personnel and equipment to help remove debris from personal property and neighborhoods
6	Force protection	RRF53	Social media movement (#americansfirst) against DOD for perceived preference for overseas missions versus taking care of those at home results in attacks on DOD members and other uniformed service members operating in the affected areas

Appendix D: CONUS-Based Asset Movement

Table 7.   Asset movement to the SoCal area

Week	Mission Assignment/ Resource Request	Assets Used (quantity)	Place of Origin (if applicable)	Agency
1	MA03b	Trucks (1810)	CA, NV, AR, UT	DLA
1	MA07	C-17 (8)		US-TRANSCOM
1	MA10	HH-60 (32)	Naval Base Ventura Naval Air Station North Island	USN
		CC-177s (2)	Canadian Forces Base Trenton	RCAF
		"Cyclone" CH-148 helicopters	Canadian Forces Base Shearwater	
		"Chinook" CH-147F helicopters (5)	Canadian Division Support Base Petawawa	Canadian Army
1	MA14	C-130 (8)		ANG
2	MA42	Ground Transport	JBLM Lewis-McChord	Army & Navy Reserve
2	MA46	Cargo Handling Battalion 14	Port Hueneme	USN
3	RRF05	LCU (4)	3 from Pt. Hueneme 1 from Tacoma	USN
		LSV (1)	Tacoma	
		Berthing Barge(1)	San Diego	
3	RRF12b	15th Air Mobility Squadron	Travis AFB	USAF
3	RRF19	FMS (10)	Joint Base Andrews, NW US, Frederick, MD	DHHS
		C-5 (3)	Joint Base Andrews	
3	RRF21	Maritime Safety and Security Team	San Diego	USCG
3	RRF29	53-ft Tractor Trailer (2)	Rancho Cordova, CA	DHHS
4	MA04	63rd ESB	Fort Gordon, GA	USAR-NORTH

Week	Mission Assignment/ Resource Request	Assets Used (quantity)	Place of Origin (if applicable)	Agency
4	RRF16	RQ-1 (4) (Cal. Wing CAP)	Creech AFB, NV	USAF
4	RRF26	SeaBees Prime BEEF (Base Engineer Emergency Force) USACE		USN USAF USACE
4	RRF27	Water Purification and Distribution Companies: Active (1) ARNG (12) USAR (11)		Army
5	RRF27	Reverse Osmosis Units (5)	Holloman AFB	USAF
5	RRF31	Fuel Trucks (210)		DLA
5	RRF52	C-5 (4) C-17 (1) Commercial 747		US-TRANSCOM

Appendix E: DLA Estimated Support

Table 8.   DLA estimated support for SoCal disaster response

Time Period	Resource	Quantity	Transportation Assets Utilized	Vendors	Support Duration/ Cost
First 72 Hours	Fuel	1.125 million gallons			
		6 fuel points est.			
	Meals	1.8 million commercial shelf-stable meals	85 trucks	14 commercial vendors	
		2.55 million meals, ready-to-eat (MREs)	120 trucks		
	Water	7.2 million liters 600,000 cases	379 trucks	40 vendors; 1 vendor in AOI	
	Genera-tors	10x 600 kW generators		West Regional contract levied	
		4x 400 kW generators			
96+ Hours	Fuel	375,000 gal/day 15,000 gal/day			2 weeks
		2 fuel points est.			
	Meals	2.17 million commercial shelf-stable meals	102 trucks per day	14 commercial vendors	4 days
		1.2 million commercial shelf-stable meals	57 trucks per day	14 commercial vendors	21 days
	Water	3.6 million liters 300,000 cases	190 trucks per day	40 vendors; 1 vendor in AOI	4 days
	Ice	5 million pounds (lb)	120 trucks per day (42,000 lb/truck)	40 vendors; 1 vendor in AOI	21 days
TOTAL	Fuel	6 million gallons 8 fuel points	210 trucks		$48.5 million
	Meals	38.25 million meals	1,810 trucks		$147.1 million
	Water	21.6 million liters (1.8 million cases)	1,139 trucks		$12 million
	Ice	105 million lb	2,520 trucks		$39.3 million
	Genera-tors	14 generators			$150,000
		SUMMARY:	**5,679 trucks**		**$247.05 million**

Appendix F: Standardization During Collaborative Operations

Setting and meeting requirements

The absence of a fixed command-type relationship between the many entities that may participate in the JLEnt during a humanitarian crisis allows for various actors to adopt different requirement standards, even when working toward one or more common overarching goals. Interoperability suffers without mutually agreed upon standards or the designation of a consistent adjudicating body or process to determine which requirements will be met and which will not. Even in a collaborative atmosphere, this adjudication process takes valuable time away from carrying out the mission.

A lack of formal standards, requirements, and expectations of humanitarian organizations can delay or prevent a successful humanitarian response to an evolving crisis. Historically, this concern was brought to the forefront in cases such as the 1994 genocide against the Tutsi in Rwanda. The genocide was perpetrated while the UN peacekeeping force, the UN Assistance Mission for Rwanda (UNAMIR), whose mandate included aid "in the coordination of humanitarian assistance activities in conjunction with relief operations" [64], was already installed in Rwanda. Despite an eventual expansion of UNAMIR's mission to provide additional support to refugees and for relief operations [65] as well as the implementation of Operation Turquoise with similar objectives, specific requirement standards for the humanitarian efforts were never issued.

Furthermore, the international response to the situation in Rwanda was underwhelming [66]. Left to cope with the crisis using primarily UN peacekeeping forces, the UN suffered from their own staff system, which is unable to rapidly organize and deploy a large staff in support of military operations. UN operations had no formal authority over the NGOs and other relief organizations in the region, and the lack of leadership and collaboration hampered HA efforts. While it is unclear to what extent the tragedies there could have been prevented, the international HA community considered the relief efforts as a failure in this case [66] and took that failure as an impetus to reflect and improve going forward.

Development of common standards

People In Aid was an NGO founded in 1995 with headquarters in London and an intent to "improve organizational effectiveness in the HA sector by supporting good practice in management of people" [67]. Its strategy focused on developing a Code of Good Practice, based on seven principles, and certifying member organizations as either "committed" or "verified compliant" with regard to the code. Though only groups based in Northern Europe ever appeared on the compliant list, People In Aid had members spanning several continents, and it represented the first major standardization effort in a movement that has grown enormously in the decades since.

Entering the scene soon after was the Sphere Project, launched in 1997 by the Steering Committee for Humanitarian Response (SCHR), a Geneva-based alliance of (at the time) seven of the world's leading humanitarian organizations, and InterAction, an alliance based in Washington, D.C., of well over 100 NGOs focused on relief and development [68]. The Sphere Project was created to elaborate on the Code of Conduct for the International Red Cross and Red Crescent Movement and NGOs in Disaster Relief [69], put forth in 1995 as a "voluntary code, enforced by the will of organizations accepting it" to "guard our standards of behavior." What was still needed, in the eyes of the SCHR, was a "beneficiaries charter" and a set of "minimum performance standards articulating what a disaster victim is entitled to and what standards of assistance s/he has a right to expect the assisting agencies to deliver." The Sphere Handbook [70], first published in 2000, combines those two elements.

Also in Geneva, Humanitarian Accountability Partnership (HAP) International rose up in 2003 to become the sector's "first international self-regulatory body" [71]. HAP International promulgated a standard featuring six accountability benchmarks by which to certify member organizations.

HAP International, the Sphere Project, and People In Aid began collaborating directly in 2012, creating the Joint Standards Initiative as a way to "seek greater coherence for aid workers and humanitarian agencies through a process of convergence of their standards" [72]. This project was later replaced when HAP International and People In Aid set out to develop the Core Humanitarian Standard on Quality and Accountability (CHS) and form the CHS Alliance to maintain it. The CHS "describes the essential elements of principled, accountable and high-quality humanitarian action" in the form of nine "commitments" [73].

Some examples will illustrate the kinds of benchmarks expounded by these organizations. The Sphere Handbook begins with a Humanitarian Charter affirming the principles of "the right to life with dignity," the "distinction between civilians and combatants," and non-refoulement for refugees [60]. Subsequently, the Sphere Core Standards focus on processes including people-centered humanitarian response, assessment, and transparency. CHS pairs each commitment, such as "Communities

and people affected by crisis are not negatively affected and are more prepared, resilient and less at-risk as a result of humanitarian action," with a quality criterion: in this case, "Humanitarian response strengthens local capacities and avoids negative effects" [73].

This brief historical overview of the accountability and standardization movement in the international HA community has been only a selection. Many other organizations and collaborations have contributed and continue to do so. The thrust of this subsection has been to introduce the Sphere Project, along with its handbook, and the CHS Alliance, along with its standard, because these two initiatives work together closely [74] and are among the leaders in the movement. Though exploring the origins and goals of all of the leaders in this sector is beyond the scope of this part of the report, these can stand as examples of what ongoing work can be used by HA organizations today and built on for the future.

Civil-military coordination

Since defense forces can either conduct their own HA operations as leaders or support NGO efforts via MCDA, it benefits them to clarify their own doctrine and philosophies as well. For example, the U.S. Navy has released guidance for its commanders and staff who may be involved in planning and executing HA and Disaster Relief (HA/DR) missions [75] and has sought analysis in support of designing playbooks for sustainable operations [76-77]. At the joint level in the United States, the JCS have issued several relevant documents, including publications on Foreign Humanitarian Assistance and Interorganizational Cooperation [59, 78], and the DOD has released an instruction specifically dealing with Humanitarian and Civic Assistance [79].

Past examples of "failures" by the international HA community have highlighted a lack of common standards, leading to decision-making without general guidance based on established humanitarian principles and without coordination between actors. Far-reaching canons of international law ensure that fundamental humanitarian principles will not be intentionally and directly violated without the opportunity for a designated authority to bring the perpetrators to justice. But prioritization of principles, especially in a crisis context where resources and information are limited, remains a difficult problem, and the large number of players in the HA community cannot always coordinate effectively.

Standardization of requirements, so that they can be shared among the many agencies and organizations providing HA in a region, can improve interoperability, quality of assistance, and accountability. This is the strategy underlying, for example, the Sphere Project. Common guidebooks, formally adopted by all operators participating in a relief mission, can provide a basis for efficient collaboration.

Another approach to standardization that can be used aside from or in addition to humanitarian handbooks is the establishment of a single lead organization for a given mission. Historically, the lead has often been an organ or operation of the UN, or the military of the host nation, though it could also be the International Committee of the Red Cross (ICRC) or any particular NGO with special expertise relevant to the situation. So long as the lead organization has its own principles and guidelines to follow, these would become the de facto common code of conduct for all those groups who assent to its leadership. Centralization might create greater flexibility of response if the lead is willing to bend or break its rules to allow for creative approaches that might be more effective in a specific scenario. At the same time, there is a risk that the establishment of one authority could reduce the freedom and agility of the many smaller actors providing relief in the region.

At the coordination level, the sorts of standards and codes of conduct adopted by NGOs (such as the CHS) can also be adopted by military actors, so that even in these situations a common philosophy and goals can be shared among all cooperants. In addition, instructions such as the Oslo Guidelines [80], published by the UN Office for the Coordination of Humanitarian Affairs (OCHA), can emphasize the principles that must be followed and set standards in order to ensure that IHL is not violated. Additional OCHA-issued materials include a comprehensive CMCoord reference package and a Guide for the Military [81-82].

From the NGO side, the International Federation of Red Cross and Red Crescent Societies (IFRC) has promulgated guidelines for international disaster relief [83], asserting that MCDA should be deployed "only at the request or with the express consent of the affected State, after having considered comparable civilian alternatives." A 2010 position paper by the SCHR [84] affirms the Oslo Guidelines as a "leading international instrument" in this domain.

Appendix G: Humanitarian Aid Needs

This appendix documents how we calculated humanitarian aid needs per person during the game. Information is drawn from The Sphere Project's, "Humanitarian Charter and Minimum Standards in Disaster Response" [70]. The Sphere Project is a collaboration between many of the largest NGOs involved in humanitarian aid, with the goal of improving the quality of humanitarian assistance by establishing uniform "best practice" standards.

In Table 9 we list the HA standards in four categories as taken from the Sphere handbook. Failure to meet these standards greatly increases the chances of disease outbreaks, especially cholera, dysentery, and typhoid.

Table 9. Humanitarian Aid Standards

Category	Sphere Standards
Food	2,100 kcals/person/day (10% from protein, 17% from fat).
Water	7.5-15 liters/person/day. 2.5-3 liters for basic survival, the rest for basic cooking and hygiene. There is a range in volume due to cultural differences and expectations.
Shelter & Non-Food Items	For planning a camp, estimate 45 m^2/person, with a minimum of 3.5 m^2/person for sheltered space. The remainder is used for roads, latrines, cooking areas, etc. This can be squeezed to 30 m2/person if communal services can be provided separately. In addition to space for shelter, other non-food items needed include: clothing, stoves, cookware, fuel, tents, plastic sheeting, toolkits, building materials, plates, utensils, toothpaste, soap, and other hygiene products.
Health/Medical	At least 22 qualified health workers per 10,000 population, including at least 1 medical doctor per 50,000, 1 nurse per 10,000, and 1 midwife per 10,000. Although these are guidelines and can change depending on context.

Source: Sphere handbook [60].

Food & Water

For the game, we grouped together Food and Water into a single category called "Sustainment". The mass of food can be derived from the energy density of protein, fat, and carbohydrates. We assumed 9 calories per gram for fat, and 4 calories per gram [85] for protein and carbohydrates. With these conversions, the food requirements from Table 9 can be broken down to 53g of protein, 40g of fat, and 380g from other sources, for a total of 473g.

Most of the mass in the sustainment requirements comes from water. One liter of water has a mass of 1 kilogram, so even the bare minimum of water for basic survival for one person (2.5 liters) has a mass 5× larger than the food for one person (0.473 kg). Because water is so heavy, the UN opted to deliver water purification tablets and empty water bladders. We assumed a mass of 100g for the mass of water purification tablets and bladders, regardless of the amount of water used per day.

Shelter & Non-Food Items

When setting up camps, The Sphere Handbook gives some guidance about types of supplies necessary, but does not provide mass estimates. In Table 10 we provided rough mass estimates for different categories of supplies, and derived a total mass per person of 20 kg.

Table 10.   Breakdown of Shelter and Non-Food Items by Mass

Item and Discussion	Mass per person (kg)
Tent or building supplies (plastic sheeting, tarps, poles, etc).	5
Clothing, bedding, and small toiletries.	5
Household shared cooking supplies	2.5
Plate, utensils, and a mug for each person	0.5
Supplies shared by multiple groups	7
Total	20

Source: Sphere Handbook [60].

The masses in Table 10 were derived as follows. To derive the mass for a tent or building supplies, we started with the mass of a standard large tent for backpacking and camping, which has a mass of 10 kg [86]. We assumed arbitrarily that supplies provided would be double this mass, and that it is shared by a family of four. Clothing, bedding, and small toiletries should include 2 sets of clothing and a blanket, as recommended by Sphere standards. Note that in winter, additional clothing and blankets would be needed. We assumed a mass of 5 kg per person. Household shared cooking supplies should include 2 family-size cooking pots and serving spoons, a bucket for water collection, and a basin for food preparation. We assumed 10 kg in total, shared by a family of four. We added 0.5 kg to account for a plate, utensils, and drinking mug per person. Finally, we assumed 7 kg per person to account for supplies shared among multiple families, such as toolkits, stoves, fuel, or possibly private latrines.

Medical

The Sphere Handbook provides lots of guidance on rough numbers of health workers needed, and measures of success in providing adequate care based on morbidity and mortality rates for various diseases. It does not provide a mass estimate per person for medical supplies. Therefore, we used the World Health Organization Interagency Emergency Health Kit (IEHK) as a baseline [87]. This standardized kit is designed to meet the primary health-care needs of 10,000 persons for 3 months. The mass of a basic kit is 1,133 kg [87]. The kit contains basic medicines, bandages, gloves, and

basic medical equipment. This kit does not cover immunizations, reproductive health services, or major surgeries.

Needs by Person Type

In the game we modeled three different populations. These are described below in order of increasing Humanitarian Aid needs.

Affected

Affected populations are those who can still live at home, but need other humanitarian assistance. We assumed these people needed all of their food supplied, but only the bare minimum of water (3 liters/day), because they are still able to obtain some water locally. These people do not need shelter, but we assumed they do need the full amount of medical supplies, i.e. one IEHK per 10,000 people per 3 months.

Displaced

These people live in camps. Thus, in addition to needing all of their food supplied, they need additional water for cooking and hygiene, shelter supplies, and additional medical care. We assumed 10 liters/person/day as a rough estimate which is within the range we quoted in Table 8. We increased the medical care needed relative to Affected population because these people are in camps and we wanted to account for medical tents, cots, shelter supplies for health workers, and additional supplies for reproductive health and immunizations. Thus, we assumed a mass of 2,000 kg per 10,000 people for 3 months.

Expectant

Expectant populations are those people about to die. We modeled these as Displaced persons with increased water and medical costs. For water, we assumed 20 liters/person/day to account for increased water usage in the hospital. Sick people could potentially require even more. For example, the Sphere handbook recommends budgeting 60 liters/person/day for cholera patients. We arbitrarily assumed 50% higher medical needs, or 3,000 kg per 10,000 people for 3 months.

Summary

In Table 11 we summarized the humanitarian aid needs of the three classes of people as metric tons per week per 50,000 people. To convert Medical and Shelter into on-going needs, we divided the masses by 12, since the IEHK is designed for three months of use. We list the amount of sustainment needed both with water and with water purification tablets.

Table 11.   Humanitarian Aid needs for each type of populace in metric tons per week.

Population (50,000)	Sustainment (water)	Sustainment (tablets)	Medical	Shelter
Affected	1216	200	0.472	0
Displaced	3666	200	0.833	83
Expectant	7331	200	1.25	83

Appendix H: Interagency and Federal Crisis Response Processes

FEMA Logistics Management Directorate

In natural disasters and catastrophic incidents, the supply of life-sustaining goods and services is a critical aspect, involving adaptive, flexible logistics capabilities. The Logistics Management Directorate (LMD) in FEMA is responsible for managing the logistical capabilities to procure and deliver goods and services in order to support a population affected by a disaster [20]. LMD has distribution centers containing commodities commonly needed in disasters, including food and water, blankets, and generators. The logistical responsibilities can be considered by functionality, requiring the management of materials, transportation, facilities, and personal property as well as the coordination, policy, and procedures for those groups [18].

Because of the complex nature of any individual disaster response, FEMA must maintain relationships with a range of federal, state, and local agencies as well as NGOs and other aid groups. The relationship of FEMA with the American Red Cross, in particular, highlights a strong level of coordination with NGOs. The American Red Cross is the only nonfederal agency with a role listed in the Emergency Support Functions (ESFs), and specifically is a colead for ESF 6: Mass Care, Emergency Assistance, Temporary Housing, and Human Services [88].

Subsequently, the role the DOD plays in a disaster response is only one piece of a large-scale, interagency collaboration. Coordination between federal agencies, local and state governments, NGOs, and the private sector occurs at the JFO, while senior leadership representing local, state, federal, and tribal organizations coordinate through the Unified Coordination Group (UCG) [6]. The UCG manages the integration of local, state, and federal operations for planning, information, and logistics capabilities. The following authorities are an important aspect in adjudication and prioritization at the federal level [6]:

1. President of the United States: leads the federal government's response; a Major Disaster Declaration or Emergency Declaration authorizes assistance to be provided under the Stafford Act.

2. Secretary of Homeland Security: coordinates the federal government's response; ensures unity of effort and mutual support across federal agencies.

3. FEMA Administrator: serves as principal advisor to the President; supports all ESF missions; operates the NRCC.

4. Secretary of Defense: maintains authority over the DOD response; DOD resources requested by other federal agencies will be approved by SecDef.

5. Local and State Elected Officials: provide initial response to emergencies; coordinate response with local police, National Guard, and other emergency response personnel; request federal assistance as needed; provide strategic guidance and resources for the jurisdiction affected by the disaster.

Adjudication and prioritization during a disaster response are dynamic processes, which require flexibility from responding agencies to deploy or divert assets appropriately as priorities shift. The overall priorities of any disaster response are to save lives, to protect property, and to provide basic care for the affected population [6]. As individual issues are addressed, the primary areas of effort will shift to align with the overall priorities.

DOD Prioritization and Adjudication Process

At the strategic level, the National Security Council is responsible for planning and coordinating the whole of government efforts. Based on this strategic plan, the Chairman of the Joint Chiefs of Staff (CJCS) will produce the Unified Command Plan at least every other year. This document provides guidance to the Combatant Commanders (CCDRs) when developing plans and operations.

Joint operations are planned by a Joint Planning and Execution Community (JPEC). Each operation will have its own JPEC. The Secretary of Defense, in consultation with the CJCS, will organize a JPEC, which includes establishing the command relationship between relevant CCMDs. One command will be designated as the Supported Combatant Command, which is responsible for preparing the plans for the joint operation. In addition, the supported command will develop Annex V "Interagency Coordination" for all concept plans and operation plans. Figure 8 illustrates the organization of the JPEC.

Figure 8.   Joint Planning and Execution Community
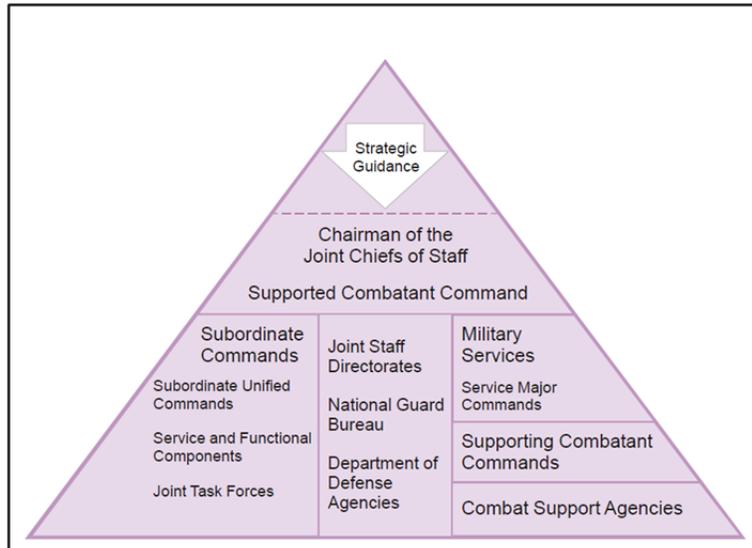
Source: Figure II-4 from Joint Publication 5-0 [89].

The JPEC operates within the Adaptive Planning and Execution (APEX) system, a set of DOD policies, procedures, and reviews used when planning and executing joint operations. The APEX system is a continuous cycle of plan development, plan approval by the SecDef or a designated representative, and receiving feedback and advice to develop the plan. One cycle is called an In-Progress Review (IPR). APEX is a DOD process, but it does have the option of including feedback and reviews from other U.S. government agencies. Although these non-DOD reviews are a valued part of the process, they are advisory in nature and do not have veto authority. A simplified diagram of the APEX system is shown in Figure 9.

Figure 9.   Schematic of the APEX system
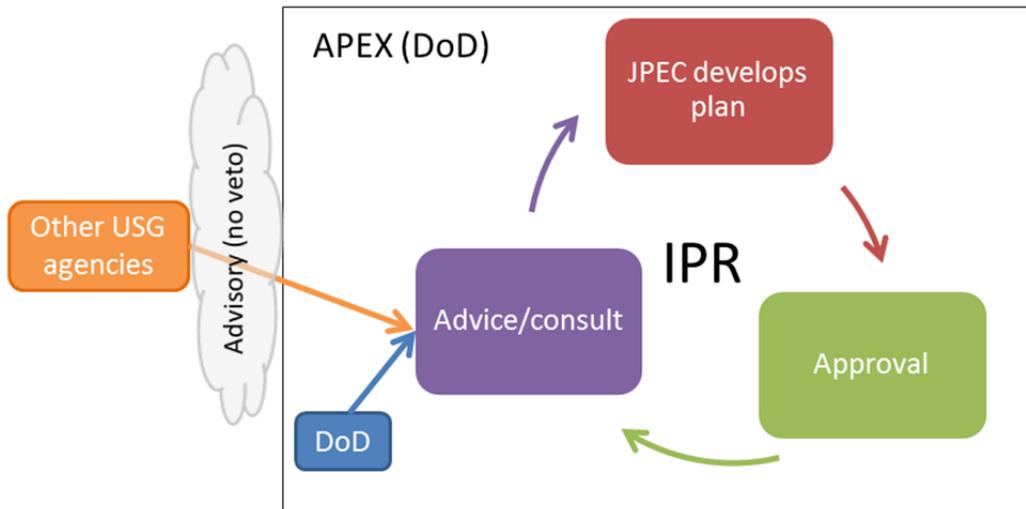
Source: Joint Publication 5-0 [89].

Because APEX is a DOD system, there is a gap when planning joint operations with non-DOD agencies. This gap is less significant when the other participating agencies are still U.S. government, but becomes larger when NGOs or foreign governments are involved. Also note that JPEC includes only commands and agencies involved with the use of military forces. As a result, the APEX system is not well designed to support planning of HA/DR joint operations with civilian and military agents.

There are some existing policies for working with multinational forces (MNFs), as discussed in JP 5-0. Each MNF will develop their own procedures for planning operations. For example, the Multinational Force Standing Operating Procedures are used as a starting point within the Asia-Pacific region. These procedures were developed by USPACOM and other Asia-Pacific Rim nations. As part of an MNF, a commander of U.S. forces will serve two roles. First, he or she will have a role within the MNF, supporting or leading operations. Second, he or she will still develop plans within the DOD framework. Given the multinational nature of these joint operations, senior leadership (e.g., the President, SecDef, or CJCS) will provide requirements to the U.S. commander.

Joint Operations with NGOs are also briefly covered in JP 5-0. At the CCMD level, the CCDR should integrate with NGOs through the USAID senior development advisor assigned to them [89]. Another way CCDRs can coordinate with NGOs and other nations is through the Combatant Commander Logistics Procurement Support Board (CLPSB). The CLPSB is a standing board with a mission to coordinate with NGOs and host nations to develop Operational Contract Support policies [35]. It is expected that JFCs or CCDRs will have knowledge of the organizations available and work to

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build relationships with them. During the APEX process, they should communicate these resources to other members of the JPEC.

The primary body for prioritizing the allocation of materiel at the strategic level is the Joint Materiel Priorities and Allocation Board (JMPAB) [90]. When convened, this board is chaired by the Joint Staff J-4, with representatives from J-3, J-5, J-6, J-8, service logisticians, the DLA, and other agencies when relevant. JMPAB is convened when the relevant DOD components cannot resolve the allocation among themselves.

For example, if the CCDR of USPACOM wanted some materiel from USCENTCOM, the first step would be to talk to the CCDR of USCENTCOM and request the materiel. If USCENTCOM also had need of the requested asset, both sides would submit analyses stating their case for needing the asset and the risks of not having it. JMPAB would convene and then adjudicate who would get the asset. This process is not quick, typically on the order of weeks, and a time-sensitive response may become an issue.

OCS for domestic and foreign emergency response

There is already comprehensive information regarding the doctrine, policy, and implementation of OCS processes for numerous types of operations [32, 34, 36-40]. Although the majority of contracted support is related to logistics, the other primary and special staff members must plan and coordinate for OCS related tasking for their staff functions [36]. Regardless of the level of available guidance for OCS procedures, the process of interagency contracting during complex, large-scale operations is bounded by regulations, the availability of OCS-trained personnel, and the geographical regions in which contractors are operating.

Contracting for federal agencies and the DOD is specified in the Federal Acquisition Regulation (FAR) System and the Defense Federal Acquisition Regulation Supplement (DFARS), both under the general procurement legal framework [42]. Much of the existing policy/doctrine was designed to address cost, fraud, waste, and risk management; however, some aspects of acquisition law (including the Berry Amendment) were designed to protect American industrial manufacturing [41]. Successful OCS planning will enable cost-effective, expedient contracted support for commodities and services in a manner that is in alignment with federal regulations [36]. In addition, contracts may be written in theater, awarded externally but providing in-theater support, or written in the United States by service program managers. Each of these types of support (theater, external, and system) has different guidelines and regulations.

Generally, contractors are responsible for their own sustainment and logistical support and do not receive housing or subsistence from the military. However, Contractors Authorized to Accompany the Force (CAAF) may require military support, which should be specified in each contract, especially in resource-

constrained or difficult environments [91]. When theater restrictions prevent a contractor from being able to fulfill a contract, the contracting officer and contracting officer's representative must be alerted. Commanders must understand how to mitigate the risks of prematurely losing services provided by contingency contractor personnel, especially for essential contractor services [38].

To be an effective part of a CONUS-based disaster response, "contracting units must practice regularly for responses to domestic emergency incidents and create standardized procedures for local response efforts" [34]. A DOD response to a domestic incident is typically a temporary augmentation to the FEMA, state, and local response efforts, with the DOD returning all emergency functions to civilian authorities as soon as possible.

Furthermore, DOD assistance can be requested for scenarios in which the Stafford Act has or has not been enacted, with each event requiring a different set of procedures and authorities. During an emergency, the timeline is significantly accelerated, requiring a more intense level of communication between responding agencies in order to prevent duplicated efforts or duplicated contracts for supplies. Contracting officers should be aware of the policies that grant more flexibility for emergency acquisition processes [45].

Appendix I: Johns Hopkins University/Applied Physics Lab Contribution[16]

The primary task for Johns Hopkins University's Applied Physics Laboratory (JHU/APL) during AGILE 17 was to provide global strategic realism by adjudicating competing demands on the strategic logistics network while the Joint Logistics Enterprise (JLEnt) confronted simultaneous crises in separate theaters. To execute this task, JHU/APL developed a separate but integrated strategic-focused model to work in tandem with CNA's operational-tactical game design. JHU/APL's objective was to deconflict confounding variables and synchronize tactical/operational activities with strategic metrics.

The JHU/APL model provided a global perspective and a software application to assist with data collection and analysis. During the wargame, players came to the JHU/APL game board to request allocation of strategic transport assets to meet their needs, and then the players representing USTRANSCOM determined which requests could be filled based on assets available at that time. Software tracked the positioning and availability of each transport asset across the globe, and the White Cell displayed this information on the game board so players could visualize the global logistic situation. Figure 10 provides a systems engineering perspective of this approach.

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[16] This appendix is a contribution of Joe Buche and Scott Simpkins of Johns Hopkins University's Applied Physics Laboratory.

Figure 10.   Systems engineering overview: JHU/APL approach for integrating strategic perspectives in AGILE 17
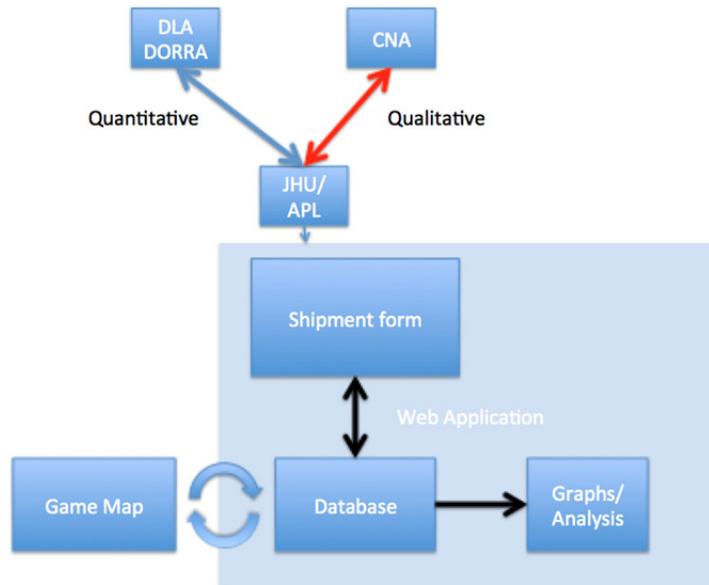
Source: JHU/APL.

Strategic Game Components and Game Flow

The JHU/APL model tracked worldwide locations for ships and aircraft that could be used to sustain U.S. forces, allies, civilians, and refugees simultaneously in all scenarios. Users created, modified, and managed transportation assets from a user interface (see Figure 11). In addition to knowing all asset locations by turn, the software model was responsive to player requests for logistic support. It could identify what supplies or units were en route, what aircraft or ships were carrying them, and expected arrival forecasts.

Figure 11. Game User Interface (GUI) input form for transportation resource commitments with an example showing some transport options

The world map included air and sea transit boxes connecting all of the Combatant Commands as well as separate boxes for Guam, Hawaii, the Gulf Coast, U.S. Forces Korea (USFK), and U.S. Forces Japan (USFJ) (see Figure 12 and Figure 13). Transit times were tracked in the software and counters representing the various transport assets were moved on the map in response to this information.

In addition to the maps, several hundred cardboard counters were created by the JHU/APL team to be used in the game (see Figure 14). These counters were placed upon the map in starting locations suggested by the sponsor or by the team's own research and were used to keep track of the locations of the units and their cargo. Every unit placed on the map was also recorded in the JHU/APL software database, specifically noting position, destination, cargo, and date of arrival. This information was available to players upon request. Having the units on a large (approximately five feet by three feet in size) map in the middle of the main game area was also an asset to players and White Cell members. This allowed them to check on the locations of

aircraft and ships at any time during the game without interrupting any other activities.

Once a maritime vessel or air unit arrived in a specific location, its counter was placed on the map, the players were informed of its arrival, and the supplies or units it was carrying were recorded in the JHU/APL database as now being at that location and available to the players. At the same time, players from DORRA were recording consumption of a number of different classes of supply by organization.

Figure 12.   JHU/APL world map showing key locations and transit routes
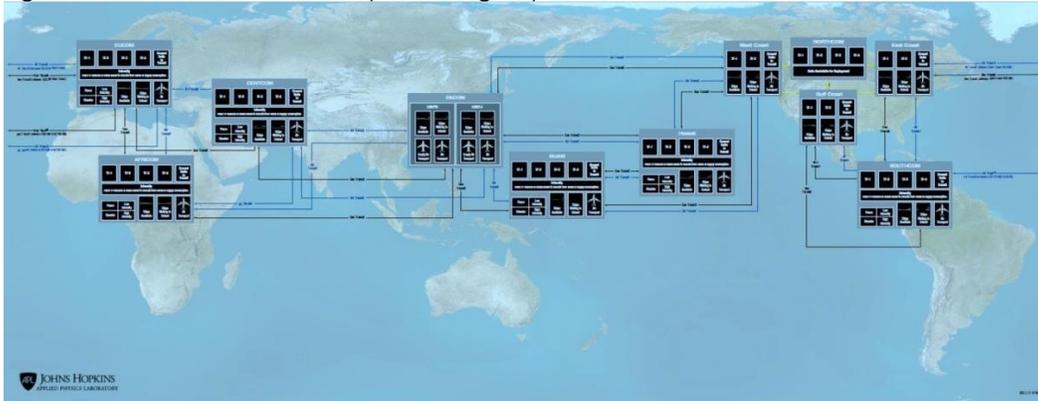
Source: JHU/APL.

Figure 13.   JHU/APL world map detail showing transit points for USFK, USFJ, and Guam
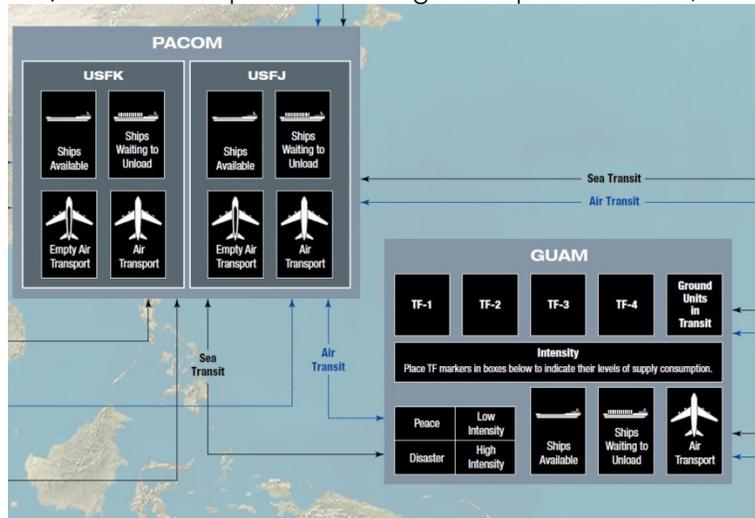
Source: JHU/APL.

Figure 14.   Unit counters for the global game map

Source: JHU/APL.

Execution

JHU/APL provided two recorder/analysts during the wargame to monitor theater requests, account for resource locations, and capture data associated with global demands. JHU/APL tracked assets, resources, and commodities by CCMD with added granularity within the USPACOM and USNORTHCOM AORs. This process aligned strategic resource requests with theater support resource commitments.

The APL global logistics Common Operating Picture (COP) was populated via a user interface. The interface allowed users to see which transportation assets were available by location in real time and to view a density map of utilization (see Figure 15).

Figure 15.   Use of military transport and heavy lift aircraft by turn
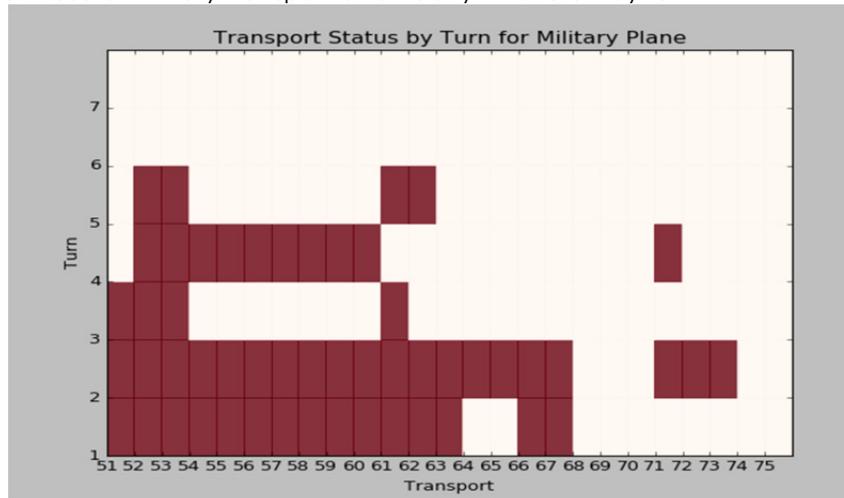
The X axis shows aircraft usage with 100 aircraft filling each block; the Y axis shows this usage by turn. Earlier turns are displayed at the bottom.
Source: JHU/APL.

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During the course of the wargame, it became apparent that there was a need to synchronize between various game rooms and inform players at different locations when supplies arrived in theater. To facilitate this need, DORRA created a Movement Request Form (see Figure 16). After players completed the form, JHU/APL entered it into their game application (see the following paragraph), carried it to the appropriate player cell, and ensured the White Cell received it. White Cell members at the other boards could then change their supply levels based on this input. The process was repeated over the course of the wargame.

Figure 16.   DORRA Movement Request Form brought to the JHU/APL table by players when requesting supplies or strategic transportation assets

Source: JHU/APL and DORRA.

JHU/APL used an unclassified computer application to adjudicate global resources and wargame logistics demands. This unique software application was designed for AGILE 17 to provide perspective on the strategic resource allocation and to capture essential metric data during game play. This software provided both statistical and graphical data summaries for assessment and decision making. This software application employed a structured architecture to relate data to primary/key fields for post-event analysis. Figure 17 depicts some of the automated data analysis the application provided.

Figure 17.   Output demonstrating the built-in analytic capabilities of the JHU/APL software application
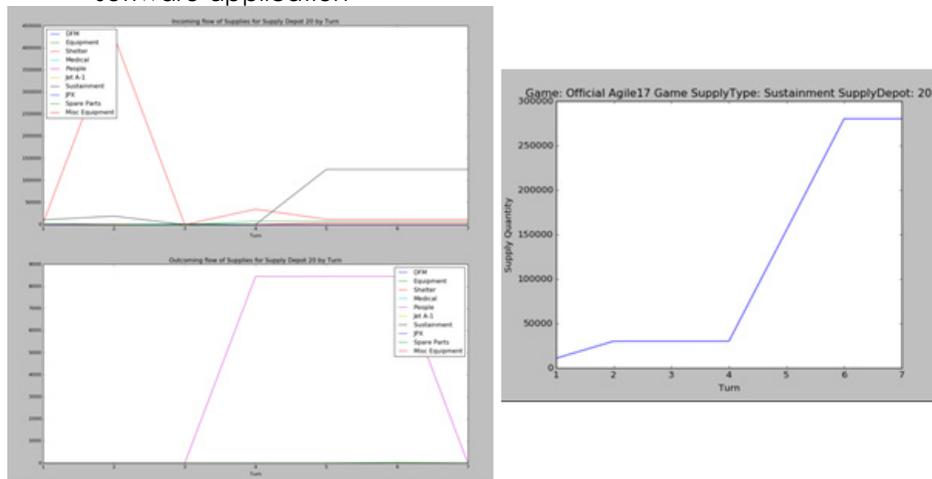
Source: JHU/APL.

Observations

The following game observations are provided to frame strategic-level insights.

1. <u>Global Asset Positioning</u>. When the game began, no global logistics assets were in transit—every strategic logistics asset began wargame play stationary at its home port or station.

   • There were no sea vessels with game-relevant cargo en route to USPACOM at the start of the game. This generated a demand signal at USPACOM that could only be satisfied via airlift for the first two turns.

   • Starting on Turn 1 of the game, the entire sustainment effort was being done via airlift.

   • On Turn 2, players requested that 136,000 metric tons of supplies be delivered to USPACOM within 1 week. This quantity is nearly five times the entire air lift that is available to USTRANSCOM.

2. <u>Wargame Scenario</u>. The wargame scenario did not require significant prioritization or adjudication between CCMDs and crises. Players at the global game board did not have many decisions to make and did not see competition for resources between different theaters or significant global competition for strategic logistics assets.

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- This was partially due to the relatively short timescale of seven weeks played during the game. The scenario also did not significantly play demands of other CCMDs during this time. If the game play had lasted longer and played other CCMD requirements more significantly, it would have resulted in the need to prioritize and make other decisions.

- The type of strategic lift assets needed for the two crises in the USPACOM and USNORTHCOM theaters did not overlap much. The CONUS portion primarily required tactical assets while the OCONUS portion focused almost entirely upon strategic lift.[17]

- Air transport was the only transportation asset that experienced insufficient supply compared to demand during the game. As discussed above, transport resources that would likely have been in transit at the beginning of the crises were not. Consideration for other CCMD requirements would also affect global transportation decisions.

3. Strategic Transportation Asset Readiness and Availability. At the start of the game, all USTRANSCOM aircraft were available for use. This was an unrealistic availability rate. JHU/APL later reduced the percent availability of assets to a more realistic level.

- Both domestic and international components of the Civil Reserve Air Force (CRAF) were activated during Turn 4 of AGILE 17, where they conducted a non-stop NEO from Japan to CONUS. CRAF is a significant national resource program, the use of which would have a severe impact upon commercial air travel. In game terms, this had the effect of increasing the categorical airlift capacity available to players by about 50 percent.

Summary

AGILE 17 provided an excellent venue to bring together a wide variety of the JLEnt and explore how to effectively accomplish the JLEnt's mission when two simultaneous crises took place in two different CCMDs. With some modifications to the design and execution, AGILE 19 can be more effective and provide a significant opportunity for the JLEnt to examine global logistical challenges and generate key insights.

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[17] Other than a minor dispute over some amphibious vehicles and a competing interest in cargo airlift, there was not any significant competition for transport capacity between the two crises/CCMDs.

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