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Air Force pararescuemen during mass-casualty drill to test rescue and emergency care capabilities near Kadana Air Base, Japan

Joint Experimentation Shaping Doctrine and Capabilities

SPECIAL FEATURE



Joint Warfighting Center



1st Marine Division Combat Camera (Andrew D. Young)



U.S. Navy (Damien Horvath)



U.S. Army (Matthew Clifton)



U.S. Navy (Damien Horvath)

By JAMES A. WINNEFELD, JR.

Military experimentation has long played a vital role in the search for new ways to gain advantage in war. Whether developing technologies such as the longbow, submarine, or fighter aircraft, or polishing concepts such as Heinz Guderian's blitzkrieg tactics or the U.S. Navy's War Plan Orange prior to World War II, well-crafted experimentation in advance of conflict has often made a critical difference.

A broad spectrum of experimental activity continues within the U.S. military and its partner agencies, nations, and alliances. The Services conduct an enormous amount of experimentation on their own while developing new systems and operational concepts. However, the center of gravity of U.S. joint warfare experimentation lies in Suffolk,

Virginia, at the U.S. Joint Forces Command (USJFCOM) Joint Futures Laboratory (JFL). There, potential key enablers for tomorrow's joint task force commanders are exposed to experimentation techniques that range from workshops, to limited objective experiments, to complex events conducted within a sophisticated virtual environment that spans the globe.

Part of the Family

The USJFCOM commander is chartered by the Chairman of the Joint Chiefs of Staff with leading the joint concept development and experimentation enterprise. As lead organization for this activity, JFL works closely with the Office of the Secretary of Defense, Joint Staff, Services, Department of State and other interagency partners, other nations, and the North Atlantic Treaty Organization (NATO)

Above left to right: Joint Futures Laboratory, USJFCOM; Soldiers fire mortar from Stryker vehicle during test firing at Combat Outpost Rawah, Iraq; Manta unmanned aerial system launches from experimental boat *Stiletto* during Exercise Howler; Multifunction agile radio-controlled robot tested by Rapid Equipping Force—Iraq; Naval Special Clearance Team prepares to dock in well of experimental craft

Allied Command Transformation to provide three principal products: concepts, prototypes, and an integrating environment for joint experimentation.

The JFL's highest-level concept development involves the family of joint operational concepts (JOCs), which describe how a joint force commander is expected to conduct operations within a military campaign 8 to 20 years in the future. Also, they provide other members of the joint operations concepts family—joint functional concepts and joint integrating concepts—with valuable information.

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The Joint Futures Laboratory recently completed revising the Major Combat Operations and the Military Support to Stabilization, Security, Transition, and Reconstruction Joint Operational Concepts and is now developing a new “shaping” Joint Operational Concept in partnership with U.S. European Command. The JOCs all benefit throughout their life cycle from the broad spectrum of experimental activity that occurs across the joint force, including events hosted by the JFL as well as Service Title 10 experiments, such as the Army’s Unified Quest series or the Air Force’s Unified Engagement series.

Subordinate concept and prototype development activities are largely based on the warfighting challenges that combatant commands, Services, and multinational and interagency partners are trying to solve. These challenges are either solicited directly from USJFCOM partners or brought to light by the command’s Joint Center for Operational Analysis. Subordinate concepts, such as the effects-based approach to operations (EBAO) and the Joint Interagency Coordination Group, are developed and refined through exposure to several levels of experimentation and then positioned for transition into doctrine and training with the assistance of the USJFCOM Joint Warfighting Center. Prototypes for advanced capabilities, which are focused principally on joint warfare at the operational level, are developed on the JFL campus or drawn together from industry and other government organizations. These prototypes are exposed to experimentation in much the same manner as concepts and are then positioned for transition with the assistance of USJFCOM’s Integration Directorate.

The JFL’s third product is an integrating environment (collectively referred to as Joint Command–Future) that enables replication of large-scale joint command and control activity, linking partners through collaborative tools, models and simulations, core operational expertise, and rigorous experimentation standards. The Joint Command–Future is used for both small-scale experiments to meet focused customer requirements and major events sponsored by USJFCOM. This product

F–15C fires missile at tactical air-launched decoy at Kadena Air Base, Japan



Solving these challenges will better enable the U.S. military to contribute to defeating the fourth-generation

is also offered to Service and other partners to enable and bring joint context into their experimentation.

Key to economy of effort within this environment is the robust usage of modeling and simulation, fully interconnected to partners via high-bandwidth experimentation networks. This sophisticated capability includes Joint Semi-Automated Forces, which enable a real-time human-in-the-loop interface with millions of entities fully represented in a high-fidelity, three-dimensional environment that can replicate a real-world location such as Baghdad. Matching the real-time fidelity of Joint Semi-Automated Forces (but in a capacity that is faster than real-time) is the Joint Analysis System. This environment allows the command to study joint- and campaign-level issues in their native setting.

Other modeling and simulation capabilities include a nonkinetic representation known as Synthetic Environment for Analysis and Simulation, which is derived from a system produced by Purdue University. It enables simulation of the impact on local population attitudes, by neighborhood, of actions taken by a commander or other events. JFL is constantly searching for ways to add these tools to joint task force commanders’ capabilities. Joint Semi-Automated Forces have promise as a mission rehearsal tool, and Synthetic Environment for Analysis and Simulation has generated interest as a predictive analysis tool.

Vital Links

Experimentation efforts feature several dimensions that determine the allocation of resources to experimental activity within JFL. These include the command level of warfare (strategic, operational, or tactical); the types of solutions under examination (conceptual or prototypical); the degree of transformation represented in a particular solution (incremental, evolutionary, or disruptive); and the temporal frame (near-, mid-, or long-term). The latter is key; USJFCOM has a clear focus on enabling today’s joint warfighter engaged in the Long War. This focus results in a carefully managed balance at JFL between near- and long-term focus.

JFL activity is governed by a disciplined yet agile cycle that begins with prioritizing challenges identified by the combatant commands and other customers, matching unique solutions to those challenges, exposing the challenge-solution set to experimentation, and then transitioning the solutions that work into either doctrine or acquisition. The laboratory works with a constellation of partners, including the Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics, Joint Staff, Services, combatant commands, multinational military partners and their civilian counterparts, U.S. Government agencies, nongovernmental organizations, industry, academia, and Federally funded research and development centers. Because some of the most valuable experimentation is happening on the frontlines, JFL’s links with the Joint Center for Operational Analysis and a host of liaison officers, including those embedded in the U.S. Central Command area of operations, are vital.

Key transformational issues under examination by the Joint Innovation and Experimentation Enterprise include:

- achieving the Unified Action experiment series, which requires improving methods of rapid planning, coordination, and execution with joint, interagency, intergovernmental, and nongovernmental partners and acknowledging that partner departments and agencies, such as the Department of State, will often have the lead in operations to which the joint force will be a contributor
- accelerating speed of command by fusing intelligence and operations to observe in real time, orient continuously, decide rapidly, and act in near-real time
- becoming an interdependent joint force by building fully integrated systems and training to operate as a single force
- enabling strategic communication—synchronizing and unifying timely messages that span the global strategic level to the local tactical level
- enhancing strategic and operational maneuver to deliver agile and sustainable forces quickly through adaptive planning, rapid projection, and joint sustainment.



Proteus aircraft carries Global Hawk variant of multiplatform radar technology insertion program radar

Northrop Grumman Corporation

SPECIAL FEATURE

warrior while improving capability across the spectrum of conflict.

Recent experiments have capitalized on the capabilities inherent in the JFL infrastructure. The scenario for Multinational Experiment 4 (MNE 4) was set in Afghanistan in 2010. The scenario for Urban Resolve 2015 (UR 2015), held from August to October 2006, was set in Baghdad in 2015. Both were designed to narrow existing capability gaps and those the United States and coalition partners could face during combat and post-combat operations.

Multinational Experiment 4 marked a unique technological milestone because participants achieved success through the first use of a global synthetic environment that networked national modeling and simulations systems to support experimentation. It enabled global participants to collaborate on the same operational situation from five sites and six time zones. As host, JFL coordinated teamwork among the nations and participated in the global partnership that evolved from an effects-based approach to operations.

The eight exercise partner countries and NATO came together to develop concepts and capabilities that used EBAO to conduct military, interagency, and multinational operations. Several insights were derived. For example, EBAO cannot rely on military action only, but needs strong interagency participation to achieve national and coalition aims. Moreover, it requires a knowledge base built on the open sharing of information among civilian and military entities of coalition members.

Next in the multinational experimentation series, MNE 5 will continue to build on the lessons learned from MNE 4 and previous experiments and is intended to produce specific products for use by future multinational civil-military coalitions. It will improve methods to conduct rapid planning, coordination, and execution with interagency and multinational partners to create and carry out a unified, comprehensive strategy. It will mature the effects-based approach to multinational operations and supporting concepts to

integrate full international capabilities across the spectrum of security issues.

On the Horizon

Urban Resolve 2015 was a robust experiment in which U.S. and coalition forces had to maintain major postcombat stability by quelling insurgent attempts to disrupt the nascent government. The exercise included three human-in-the-loop segments, each focusing on specific operations ranging from battlespace awareness to stability and reconstruction operations. Joint information operations designed to deny adversaries access to information that might thwart urban stability were incorporated as well.

Some 1,200 players from 18 sites across the country participated, including members from the U.S. Joint Forces Command, U.S. Special Operations Command, Joint Staff, Institute for Defense Analyses, Defense Threat Reduction Agency, Defense Advanced Research Projects Agency, Services, and multinational partners.

UR 2015 examined solutions to identify current and future warfighting capability gaps to enhance our ability to operate safely and efficiently in an urban environment. Through dynamic wargaming and subsequent detailed analysis of results, solutions will be offered to enable warfighters to conduct urban stability operations and respond to asymmetrical threats when insurgents employ terrorism to influence the urban landscape.

On the horizon for JFL is the Unified Action series, a 3-year umbrella program in which JFL is working with the Departments of Commerce, Defense, Justice, State, and Treasury, as well as the U.S. Agency for International Development, U.S. Institute of Peace, the private sector, several multinational partners, multilateral organizations, and non-governmental organizations. Unified Action 2007 will test shared conflict assessment and integrated planning.

The Services are also taking advantage of, and contributing to, joint experimentation through various exercises and activities. The Army's Unified Quest 2006 in April

was designed to determine how the joint force would conduct irregular warfighting beyond 2017. The Trident Warrior exercise, fueled by lessons learned from Hurricane Katrina, will test the Navy's newest communications technologies, focusing on the integration of information shared between civilian and governmental agencies. The Air Force's Unified Engagement 2006 (UE 06), cosponsored with USJFCOM, explored ways the United States and its partners can create coherent effects across long distances in the Pacific theater to mitigate the significant issues of a fractured state. UE 06 took advantage of the Joint Analysis System simulation to identify potential outcomes to the experiment's scenarios prior to execution and improve campaign planning.

U.S. Joint Forces Command and JFL continually look for ways to gain greater leverage from transformational activity. Accordingly, a number of vectors for improving joint concept development and experimentation efforts are identified:

- gaining better visibility over the domain of potential solutions to warfighter challenges
- improving linkages among joint experiments across the board
- linking even more closely with Joint Staff processes
- strengthening existing partnerships and leveraging new ones
- placing greater emphasis on transitioning capability solutions that are vetted by experimentation
- folding more experimentation into joint exercises.

The strategic principle governing the Joint Futures Laboratory's activity is to "generate unique solutions to the joint warfighting problems our customers are trying to solve." Its dedicated professionals are working on this task every day, building the networked experimentation ability and innovation momentum that will be vital tools for helping the joint community to shape its doctrine and capabilities. **JFQ**