

FCS Multinational Network Interoperability Experimentation — Tactical Coalition Interoperability Concepts and Solutions

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The Future Combat Systems (FCS) program is the U.S. Army's promise to provide Soldiers with the best equipment and technology as soon as practicable. FCS is not just a technology development program; it is the development of new brigade combat teams (BCTs). These new brigades — with more infantry, better equipment, and unmatched situational awareness (SA) and communications — will change the way the Army fights.

Army Evaluation Task Force Soldiers test FCS technologies during a demonstration. (FCS(BCT) photo.)

The heart of the FCS(BCT) is its network. With its logistics and embedded training systems, the FCS network connects 14 different systems, enabling Soldiers to perceive, comprehend, shape, and dominate the future battlefield at unprecedented levels. The network is a layered system of computers, software, radios, and sensors — all interconnected with each variant in the FCS(BCT). There are five network layers: sensor/platform, application, services, transport, and standards. These layers provide diversity in waveform, frequency, and environment to ensure multiple paths are available to transport data. When a layer of FCS communication becomes unavailable because of increased range, obstructions, etc., the next best layer is selected to support connectivity, providing seamless information delivery.

The capability for vertical and horizontal information exchange is vital if network operators are to maintain data currency and receive and then distribute pertinent intelligence to a commander and staff. This capability also maximizes flexibility to exchange data from various U.S. and multinational sources. Toward that end, the FCS program entered into bilateral memorandum of understanding (MOU) agreements with the United Kingdom (U.K.) and Australia, and recently ratified an MOU with Canada. The FCS program also has a Five Powers net-centric project arrangement (5P-NC-PA) with the four other 5P nations: the U.K., Germany, Italy, and France.

The FCS Joint Interagency Multinational Interoperability (JIMI) team works with joint and coalition partners to understand their network migration strategies and negotiate a suitable approach to interoperability. The FCS JIMI team also participates in various joint experiments to ensure

both intra-agency and multinational interoperability across network layers. Each experiment must meet certain assessment objectives to ensure that its intended and threshold levels of system interoperability are achieved and demonstrated in a live environment with current system software and hardware.

Multinational interoperability experiments provide high payoff in the form of knowledge, insight, and understanding of the FCS program development and execution. Early exploration of interoperability capabilities and development of requirements will improve the functionality of systems.

Multinational Interoperability With the U.K.

In December 2004, the U.S. and U.K. signed the Land Battlespace Systems MOU. Under that MOU's authority, the FCS(BCT) program manager (PM) established a bilateral command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR) interoperability PA to deliver significant improvements in C4ISR capability and interoperability through a 2-phased program. The PA established a comprehensive and focused framework for determining and implementing tactical C4ISR interoperability between the U.S. Army and U.K. Joint Forces (Army and Royal Marines).

Phase one was a systematic review of planned U.S.-U.K. C4ISR interoperability to assess options for improvement. Phase two, which is currently underway, completes U.S.-U.K. program planning to deliver improved interoperability across all U.S. and U.K. defense lines of development. The experiments in phase two will evaluate the delivery of capabilities defined during phase one and

develop the interoperability requirements for current U.S. and U.K. programs of record.

Multinational Interoperability With Australia

In July 2006, FCS(BCT) entered into an MOU with Australia in the area of land forces capabilities modernization. Under that MOU's authority, a future force networks interoperability PA between the U.S. and Australia was signed in the third quarter 2008 to enable C4ISR interoperability and integration between U.S. future forces and Australian land forces in a combined and joint environment. The PA also supports integrated coalition operations in the network-centric paradigm.

The U.S.-Australia agreement focuses on the development and implementation of Future Force interoperability solutions by aligning ongoing actions with planned studies and experimentation. The first phase, which began in the fourth quarter 2008, is evaluating the network platform and Soldier waveforms, battle command applications, and middleware systems. Second phase plans include using U.S. FCS radio-programmable capabilities as part of Battle Communications System (Land) development.

Multinational Interoperability With the 5P

The Deputy Assistant Secretary of the Army for Defense Exports and Cooperation is the proponent for a 5P senior national representative (Army) MOU with the U.K., Italy, France, and Germany. Under that MOU's authority, the FCS(BCT) PM developed a net-centric interoperability PA. The objectives are to enhance C4ISR interoperability among the participating nations' ground forces through synchronization and alignment of net-centric migration plans;



Soldiers review their screens at a Non-Line-of-Sight Cannon demonstration at the Pentagon in June 2008. (U.S. Army photo.)

to increase interoperability within NATO by establishing net-centric operational concepts, service specifications, and technology standards; and to leverage ongoing and planned national and multinational (NATO, Multinational Interoperability Program, etc.) analyses, studies, modeling and simulation efforts, and experimentation to the maximum extent possible. The 5P-NC-PA's 3-year plan is to complete system alignment and concept-of-operations documentation and experimentation to define brigade-and-below interoperability.

SEELEX

The Systems Engineering and Experimentation Lab Experiment (SEELEX) events used a mix of high-fidelity C4ISR system simulations, real-time models, real systems with computer-generated force, and comprehensive analysis and reporting tools. SEELEX 5, the latest in the SEELEX series and conducted in January 2007, investigated brigade to brigade-and-below-brigade interoperability using a range of direct point-to-point options to inform interim transformation capability options. U.S. and U.K. systems were fully integrated to support the operational construct, waveform simulation, and bidirectional SA message exchanges across

echelons in both the Current and Future Force brigade structures.

SEELEX 5 established the framework for future bilateral U.S.-U.K. C4ISR interoperability experimentation. The multinational experimentation team broke new ground through the integration of required message exchange models, providing an accurate exchange of all message sets. The combined information path for blue and red SA messages transported through various waveforms and computer information software infrastructures provided an excellent first look at the complexities and capabilities associated with U.S.-U.K. interoperability solutions.

Coalition Warrior Interoperability Demonstration (CWID)

The CWID is the Chairman of the Joint Chiefs of Staff annual event enabling discovery and investigation of C4ISR solutions that consider relevant and timely objectives for enhancing coalition and combatant commander interoperability and information sharing. The CWID focuses on net-centric solutions to identified C4ISR gaps that the traditional DOD acquisition process is not addressing.

The FCS interoperability trial for CWID 08 supported the goal to improve a coalition and Joint C4ISR architecture. It focused on SA data exchange, collaborative operations (including chat and white-boarding), and network fire missions between the FCS System-of-Systems Common Operating Environment (SOSCOE) middleware and battle command surrogates and the U.K. land command and control information system (LC2IS). This involved investigating the Web-based interoperability between U.S. and U.K. land forces.

Successful FCS participation in CWID 08 provided detailed technical feedback to the FCS lead systems integrator — feedback that can be applied to the development of future SOSCOE and battle command products. The U.K. experimentation team also collected valuable information for improving their LC2IS. The CWID 08 was the first step in evaluating network fires missions. It will serve as a baseline for future experimentation and cooperation between FCS and the U.K. acquisition organizations.

Multinational Experiment (MNE) 2.0

Although peripheral planning and integration activities of the MNE 2.0 — the most recent MNE (conducted during the fourth quarter 2007) — were completed virtually, the main experiment was conducted out of the FCS Network Analysis and Integration Laboratory (NAIL) at Fort Monmouth, NJ. The aim was to exchange position location information (PLI) with strategic reachback to the U.S. Mission Management Center using a service-oriented approach, tactical-level (battalion-to-battalion) message exchange over the U.S. Joint Tactical Radio System (JTRS)-U.K. Bowman High-Capacity Data Radio gateway, collaborative planning,

and brigade-to-brigade voice-over-Internet-protocol modeling over the U.S. Army's Joint Network Node/Warfighter Information Network-Tactical (WIN-T) to U.K. Ministry of Defense's Skynet 5 and FALCON. MNE 2.0 analyzed the end-to-end performance of this complex exchange, including cross-domain security solutions and overall network quality of service.

MNE 2.0 successfully demonstrated that using a Web services approach to PLI message exchange improved performance and collaborative planning enhancements could increase functionality and lower bandwidth requirements. Improvements were also demonstrated by moving the cross-domain solution to a U.S. tactical point of presence, allowing direct information exchange across domains. While the focus of this experiment was interoperability for bilateral collaborative operations, the experiment's conclusions have been relevant to information exchange between any logically distinct but interconnected information domains.

MNE 3.0

MNE 3.0 will be executed as part of the partnership between the Joint Program Executive Office JTRS, the

U.K., and FCS. MNE 3.0 planning is underway, with execution scheduled for the second quarter 2009.

The experiment will be conducted at NAIL in a closed-network environment using actual hardware. The MNE will test the exchange of SA information through the JTRS-Bowman link and explore configuration management, message exchange and translation, and mission management load for that gateway. The service capabilities to exchange basic command and control, targeting, and voice data will be evaluated using the WIN-T-to-FALCON link. MNE 3.0 will be an opportunity to evaluate ways to reduce risk for U.S. JTRS and U.K. Bowman programs.

Over the past few years, the FCS program team has worked diligently with our multinational partners to identify areas for experimentation within the C4ISR arena, and it continues to build upon the results of each test. Participation in PAs and experiments provide an early opportunity to investigate and assess interoperability of FCS platforms and network products with products being developed by our coalition partners. The PA participants maintain close relationships with all stakeholders

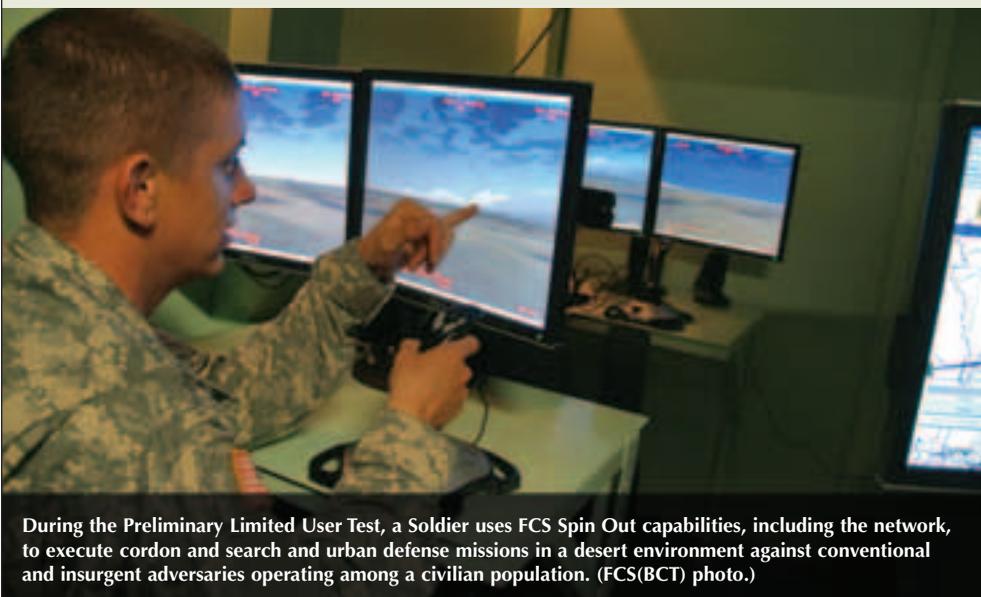
within their country, with the goal of a seamless coalition battlefield. All things considered, multinational network interoperability experimentation provides tactical coalition interoperability concepts and solutions that will increase the communication capabilities of FCS and, ultimately, the safety of our warfighters.

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During the Preliminary Limited User Test, a Soldier uses FCS Spin Out capabilities, including the network, to execute cordon and search and urban defense missions in a desert environment against conventional and insurgent adversaries operating among a civilian population. (FCS(BCT) photo.)