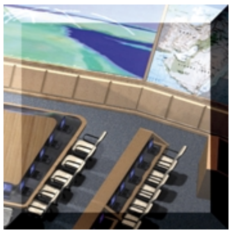

Air Force WALEX Applications

John F. Keane, Karen Kohri, Donald W. Amann, and Douglas L. Clark

A workshop was conducted for the Air Force Command and Control Battlelab (C^2B) in May 1998 to explore the potential use of collaborative tools in the preparation of an Air Tasking Order (ATO) in a geographically and temporally distributed environment. Relying on past Warfare Analysis Laboratory Exercises (WALEXs) and operational expertise, APL developed, designed, and facilitated the workshop to "walk" participants through several vignettes. Each vignette was used to identify issues related to the application of collaborative tools and to develop or examine alternative means to resolve these issues. APL and C^2B staff developed a model encompassing both the ATO development cycle and the Joint Air Operations Center division structure to focus discussion. Comments from subject-matter experts were gathered using the Electronic Seminar Support System. The data provided were incorporated into the C^2B Concept of Operations for the use of collaborative tools in Expeditionary Force Experiment '98. This article presents The "Collaborative Tools" Workshop as an example of Air Force WALEX applications. (Keywords: Collaborative tools, Command and Control Battlelab, Joint Air Operations Center, WALEX.)

BACKGROUND

The Air Force Command and Control Battlelab (C^2B), established in July 1997, is one of six "battlelabs" currently operated by the Air Force (Fig. 1). Although small, the C^2B is highly focused and relies on field ingenuity to identify innovative C^2 operational and logistics concepts for advancing the Air Force's core competencies. It draws upon Active, Reserve, and National Guard capabilities and expertise to measure the potential military worth of these concepts using courses of action ranging from modeling and simulation to actual employment of exploratory capabilities in an operational environment. Successful initiatives may drive revisions to C^2 organization, doctrine, training, requirements, or acquisition efforts.

One such concept, distributed C^2, has been accepted as the C^2 vision of the future by the Air Force. In the past, emerging C^2 technologies that would enable distributed C^2 have been made available to the user without always defining how that technology should be used or providing the required training and familiarization. To achieve distributed C^2, there must be collaboration (the sharing of data, information, and knowledge) across physical boundaries among the various people and groups in the C^2 nodes. Collaborative tools, i.e.,

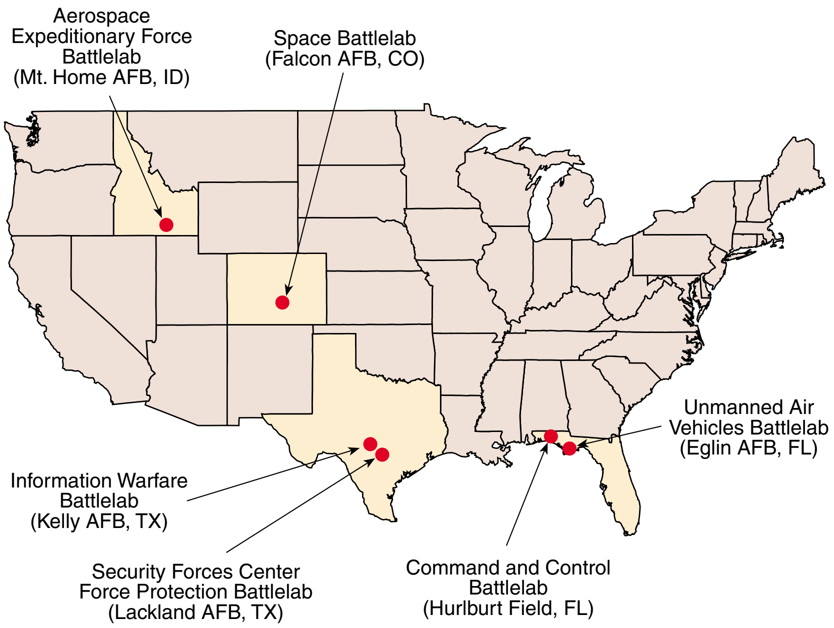

Figure 1. Air Force Command and Control Battlelabs.

those computer technologies that facilitate the transfer of information between individuals and groups, can provide the ability to achieve distributed C^2 if the users have the right tools and know how to use them effectively.

THE WORKSHOP

The C^2B needed to develop a Concept of Operations (CONOPS) that would include collaborative tools and would define how and when those tools might be used in a geographically and temporally distributed Joint Air Operations Center (JAOC). In February 1998, C^2B asked the APL Joint Warfare Analysis Department and Power Projection Systems Department to provide technical support in generating collaborative tool requirements to support this CONOPS for Expeditionary Force Exercise '98 (EFX-98). The exercise was to be conducted in September 1998 and was to be centered around the concept of distributed operations. Prior to EFX-98, it was decided that the process employed by APL for conducting Warfare Analysis Laboratory Exercises (WALEXs) was best suited to meeting C^2B's deadline. As a result, the Collaborative Tools Workshop, sponsored by C^2B, was held at the Okaloosa Island Facility in Fort Walton Beach, Florida, from 18 to 22 May 1998.

Together, APL and C^2B personnel developed a model encompassing both the Air Tasking Order[1] (ATO, Fig. 2) development cycle and the JAOC[2] division structure. Developed over a 72-h period, the ATO is published theater-wide on a daily basis. It includes targets throughout the entire theater and those units scheduled to engage them. Anything that flies within the theater of operations—airlift vehicles, cruise missiles, unmanned air vehicles, fighters, or bombers—is scheduled to do so through the ATO.

Operations in a JAOC are overseen by a director who reports to the Joint Forces Air Component Commander (JFACC). A JAOC comprises four divisions: Strategy, Plans, Operations, and Air Mobility. Each division performs certain functions (e.g., target list development, target prioritization and assignment), some of which are shared. A distributed JAOC is one in which only a portion of the JAOC staff is deployed forward with the JFACC, while the remainder of the staff is positioned in the continental United States or in a rear area clear of the threat. The latter personnel will continue to function as if they were deployed to the appropriate area of responsibility. It was envisioned that collaborative tools would enable the JAOC director to meet operational requirements in a seamless, distributed environment while providing a common operating picture to the JFACC.

Using this model, Laboratory facilitators "walked" a panel of subject-matter experts through several vignettes to identify cultural, operational, and technical issues associated with the use of collaborative tools in a distributed environment. Additionally, these experts were asked to develop or identify alternatives to resolve the issues.

Twenty-six experts from the Air Force and Navy met over a 4-day period. To help them focus on collaborative tools, and not on the technical issues involved with distributing the JAOC, several assumptions were made:

- Robust communications would be in place to facilitate distributed operations.
- Collaboration with both internal and external agencies would be required.
- Collaborative tools would be logistically supportable and interoperable with existing C^2 hardware/software.
- Coalition tools would be compatible with those used by U.S. Forces.

During the workshop, several commercially available and government-sponsored collaborative tools were reviewed, including whiteboards, e-mail, audio, chat, and application sharing. However, during the

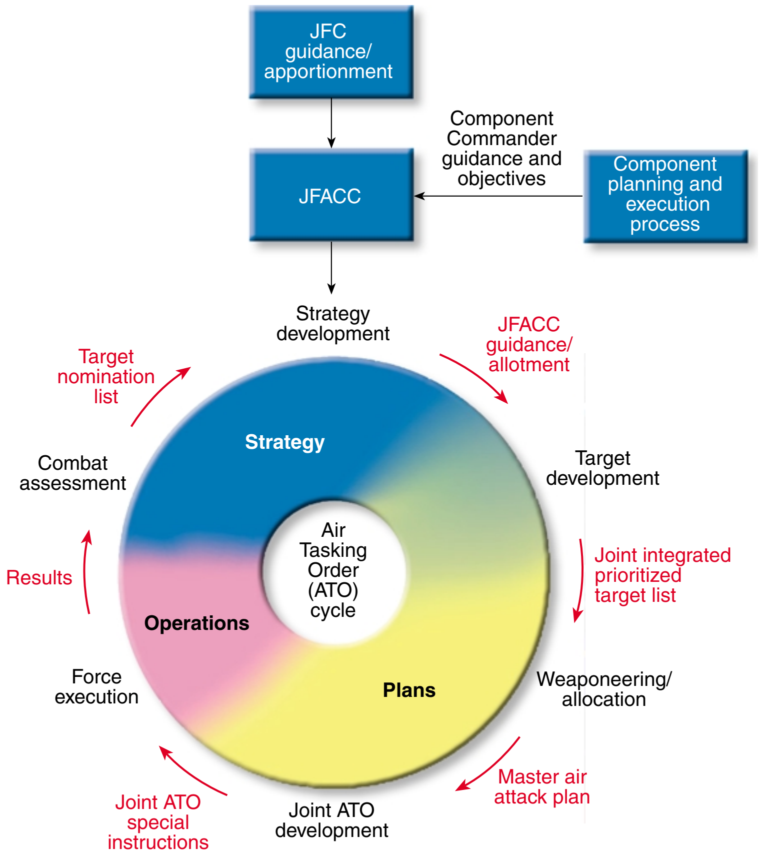

Figure 2. Air Tasking Order cycle (JFC = Joint Force Commander, JFACC = Joint Force Air Component Commander).

vignette discussions, emphasis was placed on the functions provided by collaborative tools. Several significant issues were addressed:

- Ability of collaborative tools to enhance C^2 in a distributed JAOC environment
- Operational requirements for collaborative tools and recommendations regarding their fielding and incorporation into the baseline JAOC
- Perceived risks of relying on collaborative tools for distributed JAOC operations
- Requirements for the use of collaborative tools between external agencies (superior, lateral, and subordinate) and the JAOC
- Warfighter preference for type, location, access, and control of collaborative tools in the JAOC (co-located and distributed)
- Impact (positive or negative) of collaborative tools on JAOC operations, coordination, and collaboration

Background information was presented to workshop participants using computer-generated visual aids. The original vignettes developed for the workshop consisted of four elements: (1) a JAOC structure in which all divisions were co-located, (2) a distributed JAOC structure, (3) the JFACC en route to the area of responsibility, and (4) crisis action planning. Because of the flexibility of the process, and based on information gained from the participants, the originally planned vignettes for the last sessions were combined and modified. Each subject-matter expert was given a portable laptop computer equipped with networked voting and seminar support software (see the articles by Dean and Nolen, this issue). Three session were held.

Session 1: The vignette for this session consisted of all JAOC divisions deployed forward and co-located, in much the same manner as they are deployed today. The organization might be in the same building or the same geographic area. The purpose of this scenario was twofold: (1) to establish a baseline relative to the JAOC structure in its current form, and (2) to identify areas where collaborative tools might be employed. Most believed that collaborative tools would enable staff members to perform their required functions in a more timely fashion, allowing them to both "push" and "pull" data from internal and external agencies.

Session 2: This vignette depicted a modification to the distributed JAOC structure planned for EFX-98, i.e., both the Strategy and Operations divisions were considered deployed forward while the Air Mobility and Plans divisions remained in the continental United States. The purpose of this discussion was to force the experts to explore the potential use of collaborative tools in a "virtually co-located" JAOC. Several issues, including a smaller Force structure and the desire to limit the number of personnel deployed to the area of responsibility, drove this concept. It was felt, however, that this move might actually increase the normal JAOC manning requirements owing to the need for a liaison officer in each division, and that the "human effect" would be lost when planners could no longer interact with what were formerly internal entities.

Session 3: The last session consisted of a free-form discussion centered on both the JFACC "en route" concept (another scenario to be tested during EFX-98) and crisis action planning.[3] The en route concept requires the JFACC to be airborne and transiting to the appropriate area of responsibility. The purpose of the discussion was to determine what, if any, collaborative tools the commander would need in order to maintain situational awareness. The scenario involved the forward deployment of both the Strategy and Operations divisions, while the Plans and Air Mobility divisions remained in the continental United States. The crisis action planning discussion centered on tools to enhance already established formal procedures and on a means to determine whether these procedures could be performed in a distributed environment using collaborative tools.

SUMMARY

Through the application of seminar support and networked voting software, collaborative tools were identified for use throughout the ATO development cycle. Several issues were common to all vignettes, e.g., the risks associated with the use of collaborative tools, multilevel security issues, the need for strict standards compliance and training, and the requirement for persistence of data.

The data provided by the subject-matter experts and analyzed by APL were incorporated into the C^2B CONOPS for the use of collaborative tools and were successfully exercised in EFX-98. The qualitative results and findings of this exercise are described below.

Computer-embedded collaborative tools were the distributed operations enabler for EFX-98. MITRE Corporation's prototype Collaborative Virtual Workspace was used to connect forward, rear, and various other operating locations across the United States. Operators from Senior Airman to Lieutenant General were able to communicate in real time across temporal and spatial boundaries from their desktop computers. The CONOPS developed during the workshop proved its value during EFX-98 and was modified to match the collaborative tool usage in an operational environment. Operators unanimously felt that distributed JAOC operations would not be possible without a persistent and flexible collaborative capability.

A robust collaborative tool suite is essential to support distributed JAOC operations and will greatly enhance efficiency in co-located operations. The Air Force should take advantage of recent strides in collaborative technology and field collaborative tools for the warfighter as quickly as practical. Such tools must be fully compliant with the Defense Information Infrastructure Common Operating Environment and interoperable with C^2 systems architecture, from the Global Command and Control System level down. While no single government off-the-shelf/commercial off-the-shelf (GOTS/COTS) product meets all warfighter collaborative needs, the most capable GOTS/COTS product (or combination thereof) providing the closest approximation to warfighter requirements could be implemented. Daily implementation of these tools in the workplace is needed to improve warfighter proficiency and lessen future training requirements. (See Ref. 4, the C^2B Web site, for additional information.)

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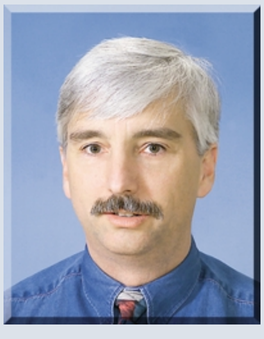

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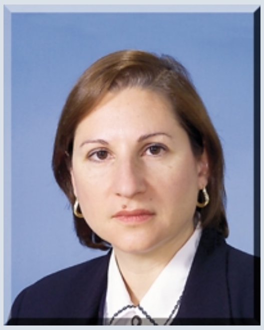

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