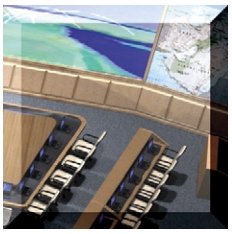


Developing Battlefield-Supportable Systems Through Interactive Seminars: A Biological Defense System Example

Karen Kohri

The equipment, systems, and operational procedures used by warfighters and operators in the field must evolve to meet today's ever-changing operational environment. These changes can result from evolving doctrine or policy, but more often are due to new operational environments or increasing types and numbers of threats in those environments. To help warfighters meet the challenge, new systems are continually being developed and existing systems continually modified or retired. Through interactive seminars, warfighters and developers can be brought together to discuss how technology can be used and adapted into the warfighters' environment. (Keywords: Biological defense, Biological warfare, Interactive seminar process, JBREWS.)

INTRODUCTION

New threats, changing policy and doctrine, and different operational environments all pose challenges to warfighters. In each situation, they rely on available systems to meet these challenges. In general, these "systems" can be thought of as anything that the warfighters use to defend, protect, communicate, transport, etc., in order to succeed. The "users" of these systems can be defined as both those using the information about or from a given system and those operating the system. It is ultimately these users that help to establish the changes needed to the systems to better meet the challenges faced by the warfighters of the future. As a result, new systems are continually being developed and old systems are continually being modified or retired in the face of these changing user needs.

Generally, once new user needs have been defined, developers work to satisfy those needs by applying the latest technology to the problem. The developer's job is to devise new and sometimes innovative ways to meet user requirements. It is not uncommon for a system to be built from the developer's perspective of the user's needs, especially if the developers are working independently of the intended users. Sometimes the developers may not be aware of all the nuances of the user's environment(s). They may, in the interest of building the "best" system, overlook the need to fully integrate the system into the user's operational environment. Often the users of the new system are not involved in its development and may not see it until it is field tested or even deployed. At this point, it may be too late to change the system. The users can then be left with a system which for them is less than optimal. They must either use it as is, modify it or how it is used, or, in some extreme cases, choose not to use it at all.

In the past few years—in an effort to rapidly fill gaps in the operational capabilities of warfighters and circumvent the long, tedious process of traditional research, development, and acquisition—the Advanced Concept Technology Demonstration (ACTD) process was initiated. The ACTD can accelerate the traditional process by applying mature, advanced, and affordable technologies to solve important military problems. It provides an interim capability whereby the user can evaluate, in the field, the ability of new concepts and technologies to adequately solve problems prior to a long, expensive acquisition process. The final system components or "residuals" developed during the ACTD process are then given to the sponsoring Commander(s)-in-Chief (CINCs) at the end of a demonstration. The successes, failures, and lessons learned from the ACTD are then applied to a follow-on process and influence the decision for long-term acquisition. In this scheme, the users have input into the development of the final system should it be determined that it will be transitioned to an acquisition program.

One problem with the ACTD process arises when the system under development is perceived as the only available solution. In this case, the sponsoring CINC(s) may want to employ the residuals from the ACTD as a battlefield-supportable system. Therefore, the residuals must be developed not only to prove the system concept but also to be robust and rugged enough in its design to be truly fieldable. The sponsoring CINC(s) may not be able to wait for the "final" system to be procured through a traditional acquisition cycle.

In order to produce a battlefield-supportable system, the users' input is critical during the development phase of the ACTD process. Through interactive seminars, users and developers can collaborate on significant issues, i.e., the usefulness of the technology to the user and the ways in which the technology can best be adapted to the user's environment. The following discussion illustrates the benefits of these seminars.

A SEMINAR EXAMPLE

Systems used today to detect biological warfare agents were designed to detect specific threats in specific types of scenarios, i.e., coverage of large and general support areas, tactical warning for naval forces afloat, and warning for established high-value, fixed-site assets. However, a more affordable, easily deployed early biological detection and warning capability is needed that is organic to the unit. In particular, a system is required that is designed specifically for troop concentrations in temporary positions that are vulnerable to biological warfare attack. Troop and equipment concentrations such as assembly areas, logistics sites, headquarters, and immature air bases/ports are particularly vulnerable to such attacks during an initial buildup of forces (Fig. 1). The protection of troops against biological warfare agents, specifically the early detection of these agents to warn and hence protect these troop concentrations, is the subject of the Joint Biological Remote Early Warning System (JBREWS) ACTD.

The JBREWS ACTD has three basic components: point sensors, a short-range biological standoff detector, and a sensor network command post (SNCP) and associated communications links. Each point sensor collects and concentrates circulating air particles into a solution and tests the sample for the presence of specific biological warfare agents (Fig. 2a). The short-range biological standoff detector is a combined infrared and ultraviolet laser system that can "interrogate" suspect biological warfare clouds at a distance for the presence of biological material (Fig. 2b). The SNCP is a laptop computer that controls the point sensors and standoff detector within its area of responsibility. It also provides the output displays used to run and monitor the sensors (Fig. 2c). The JBREWS components were designed to operate together as a single system, thereby providing early detection and warning of a biological attack on troops in an assembly area.

The CINC of the U.S. European Command (CINCEUR) is the sponsor and operational manager of the JBREWS ACTD. The Joint Program Manager for Biological Defense (JPM BD) is the demonstration manager and is responsible for developing the system. These ACTD managers recognized from the outset of this demonstration that, because of the urgent need for such a system, the residuals would have to be battlefield supportable immediately. Hence, user input was critical during the development of the system and its concept of operations (CONOPS). To facilitate the development of the CONOPS and provide a forum whereby users could influence the design of the system, CINCEUR sponsored a series of seminars and war games designated Silent Breeze.

Seminar Approach

The Silent Breeze I seminar, conducted in April 1998, was specifically designed to encourage discussion among attendees at a level of detail that would enable the users to affect the design and development of both the system itself and the CONOPS. The following tools and documentation were used in the conduct and support of this seminar:

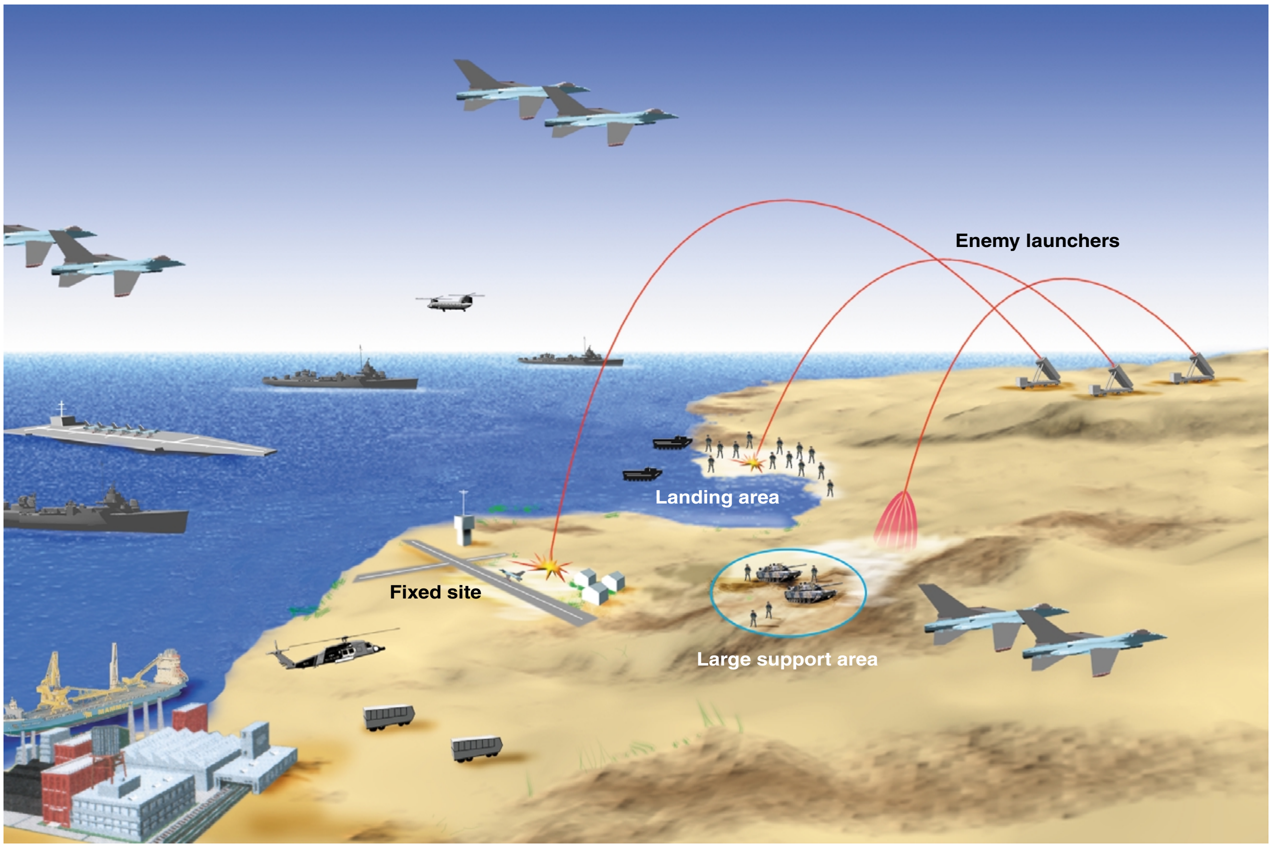


Figure 1. Scenario involving a biological warfare agent attack on Joint Force staging areas.

- Briefing charts provided a basic structure for the seminar and were used to present the system design and background information.
- Computer graphics provided illustrations of scenarios that helped attendees explore key issues for those situations.
- A local network of laptop computers—the Electronic Seminar Support System—allowed participants to record their ideas anonymously, look at ideas suggested by other participants, and communicate with other participants (in addition to normal conversation).
- A reference notebook provided backup material on biological warfare, detection systems, threats, and initial JBREWS ACTD development plans.
- Early prototypes and poster displays of the JBREWS ACTD system provided visual and hands-on knowledge to participants.
- A "strawman" CONOPS document provided data to be used as the starting point for developing the system CONOPS.

Since most of the attendees were not familiar with the JBREWS ACTD and biological warfare itself, the first half day of the 3-day seminar was devoted to giving them

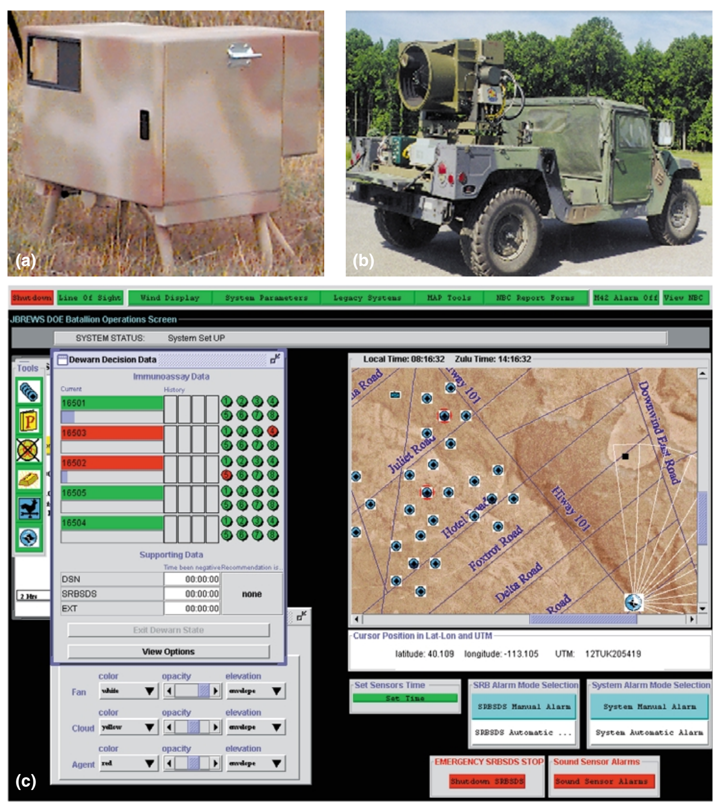


Figure 2. The JBREWS ACTD comprises (a) a point sensor (shown here in field setup), (b) a short-range biological detector mounted on a HUMMWV, and (c) a SNCP (sensor control screen shown here).

background information on the threat, existing biological defense systems, and the JBREWS ACTD. The rest of the seminar was devoted to evaluating and assessing the design of the JBREWS ACTD components and developing the CONOPS.

To focus the discussion at the required level of detail, the issues were divided into four discussion sections. The sections were not presented in operational sequence because it was important to obtain user understanding of the utility of the system prior to discussing the issues associated with its predeployment and sustainment. JBREWS interfaces with users as well as other systems were also explored.

Employment

Issues dealing with the deployment, setup, connectivity, early warning reporting, operation, and transportability of the JBREWS ACTD components were discussed in the context of U.S. forces flowing into large general-support areas in a host nation's territory. Details such as the preferred power source(s), vehicle mount versus ground placement, and weight and size of JBREWS components were reviewed in this section. In addition, the placement of the individual sensor components and the command post was discussed in much detail.

Sustainment

This section covered issues related to maintenance and the logistics associated with deploying and operating the system as forces remained within the support areas or flowed into or out of those areas. The critical issues in these discussions were the frequency and type of maintenance that would have to be performed on the system. In addition, responsibility for the system had to be established as troops moved into and out of the support area.

Predeployment

Here, issues related to the logistics unique to predeployment as well as personnel training for setting up and operating the system in theater were examined. Critical to these discussions were establishing ownership of the system, providing for its storage location, determining its state of readiness prior to deployment, and resolving its means of transportation to the staging area.

Other Issues

Information flow, system displays, planning tools, and archive procedures were also covered in the last part of the seminar. The chain-of-custody procedures for positive agent identification samples was discussed. Addition points in question were also examined, e.g., what information should be passed between the SNCP operating JBREWS and higher headquarters.

The users were also able to give input to the developers on the design of displays for the command post and function indicator lights for system components. They commented on the types of planning tools desired and schemes for automatically archiving the information as well.

Seminar Impact

Input from the users at the first seminar had a significant impact on the design of the system and its CONOPS, e.g.,

- Command and control should be retained at the Battalion headquarters, with information forwarded to the Brigade headquarters as required. This differed from the original plan, which was to direct the command and control from Brigade headquarters (Fig. 3).
- None of the components would be vehicle mounted.
- Certain components would only need simple indicator lights to allow the user (i.e., the soldier setting them up) to verify proper functioning.

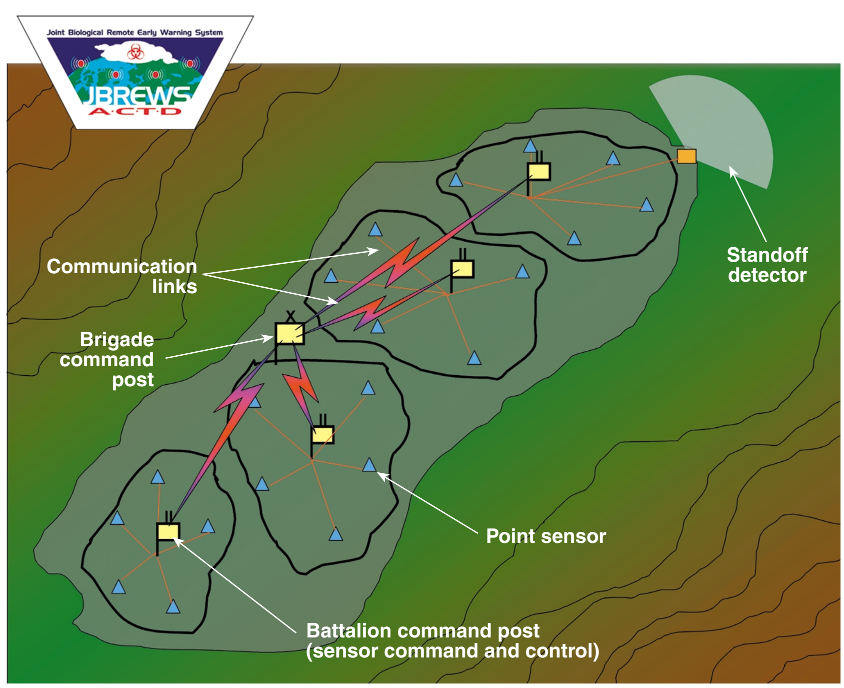


Figure 3. Brigade-sized staging area showing the JBREWS command and control hierarchy.

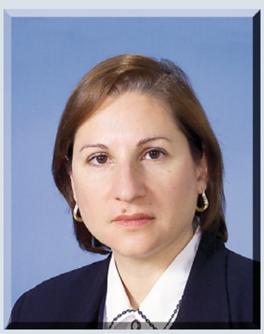
- Warning lights and horns would be located on selected components, and these could be disabled if their location and the operational situation warranted it.
- Some circumstances require that a sensor operate independently from the rest of the system, including the command post.
- Computer displays that included sensor locations and their operational status overlaid on terrain data were desirable.
- Planning tools that aided the Commander in the initial layout of the components were also desirable.
- All data would be archived on CDs.

SUMMARY

The preceding list is only a small example of how the first seminar alone impacted the design of the system and the development of the CONOPS. Changes made as a result of this initial interactive seminar were presented to the users in the context of a war game at Silent Breeze II, held in September 1998. Further refinements were made to both the system and the CONOPS as a result of this war game. A final seminar will be held after the system has undergone several field tests. The objectives of this last seminar will be to present the final JBREWS ACTD design configuration and validate the CONOPS.

Although the example presented in this article demonstrates how the seminar process facilitates open dialogue between future users of an ACTD system and its developers, it can also be applied to the development of systems in a standard acquisition process. Such dialogue results in user "buy in" to the system while emphasizing, to the developer, what is really important to those who will eventually operate and depend on the system. The ultimate result is a warfighter-accepted and battlefield-supportable system.

THE AUTHOR



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