

## **SURVIAC FINAL REPORT For Technical Area Task 99-17**

### **1.0 Task Title**

Threat Warheads and Effects/Battle Damage Assessment and Repair (TWE/BDAR) Training Project Continuation (Phase II and Phase III)

### **2.0 Background**

The TWE/BDAR training project was one of several Live Fire Test and Training Initiatives sponsored and funded by the Office of Live Fire Testing (OSD/OT&E/LFT&E). This project was started as a new initiative seeking to refine and further define known areas where the Live Fire Test & Evaluation (LFT&E) data can be used to improve combat operations and warfighting capability. The purpose of the TWE/BDAR training project is to provide an efficient and effective method to capture, store and retrieve Joint Live Fire (JLF), LFT&E, combat, BDAR and TWE information that can be applied in a variety of innovative training methods and media to enhance the proficiency of combat maintainers and operators. The focus will be placed on providing many different users convenient ways to access and use this information in a variety of media to meet their peculiar training needs.

The first phase of the three-phase joint service effort formulated a concept for identifying and capturing combat and Joint Live Fire (JLF)/Live Fire Test (LFT) threat warheads and effects (TWE) and Battle Damage Assessment and Repair data, established what JLF and LFT data currently are available, established required data formats, defined required capabilities for data input and retrieval, and defined the output media that could best meet the customers' needs. The final result of the Phase I study was a feasibility demonstration of an archival and retrieval system for the information and products required. Phase I effort, under SURVIAC Technical Area Task Number 98-7, Delivery Order Number 0079, was completed on July 31, 1999. Phases II and III focused on the refinement and finalization of the prototype TWE/BDAR Archival and Retrieval (A&R) System and transition to operational use.

**RA Point of Contact:** Major Paul Harvey

**IAC Point of Contact:** Mr. Alfred Yee

**Start Date:** August 2, 1999

**End Date:** October 31, 2001

**Funding:** \$357,517.00

### **3.0 Task as Defined**

**REPORT DOCUMENTATION PAGE**

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| 14. ABSTRACT<br>The TWE/BDAR training project was one of several Live Fire Test and Training Initiatives sponsored and funded by the Office of Live Fire Testing (OSD/OT&E/LFT&E). This project was started as a new initiative seeking to refine and further define known areas where the Live Fire Test & Evaluation (LFT&E) data can be used to improve combat operations and warfighting capability. The purpose of the TWE/BDAR training project is to provide an efficient and effective method to capture, store and retrieve Joint Live Fire (JLF), LFT&E, combat, BDAR and TWE information that can be applied in a variety of innovative training methods and media to enhance the proficiency of combat maintainers and operators. The focus will be placed on providing many different users convenient ways to access and use this information in a variety of media to meet their peculiar training needs. The first phase of the three-phase joint service effort formulated a concept for identifying and capturing combat and Joint Live Fire (JLF)/Live Fire Test (LFT) threat warheads and effects (TWE) and Battle Damage Assessment and Repair data, established what JLF and LFT data currently are available, established required data formats, defined required capabilities for data input and retrieval, and defined the output media that could best meet the customers' needs. The final result of the Phase I study was a feasibility demonstration of an archival and retrieval system for the information and products required. Phase I effort, under SURVIAC Technical Area Task Number 98-7, Delivery Order Number 0079, was completed on July 31, 1999. Phases II and III focused on the refinement and finalization of the prototype TWE/BDAR Archival and Retrieval (A&R) System and transition to operational use. |                             |  |  |  |  |
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The Phase II effort consisted of six tasks, Concept Update, System Development, Completion of the Prototype System, Data Collection, Data Entry, and Status Demonstration/Meeting Support.

The Concept Update task involved conducting research and surveys with potential users of the TWE/BDAR A&R System to determine their source data needs were for the type of training they are doing. These concepts were formulated to meet the needs and capabilities (both current and potential future) of the users identified during Phase I (TAT 98-7). When formulating the concepts particular attention was paid to current training requirements of each agency that will be using the instructional aid. The project concept was designed such that unique requirements required by some agencies can be essentially transparent to the individual users (i.e., Air Force users need not to peruse Army BDAR data unless otherwise specified). Therefore, the need for collecting accurate data and identifying specific user requirements for the system was considered during this portion of the task. There were a variety of systems identified during Phase I as perspective platforms for the TWE/BDAR, ranging from an integrated, interactive system to one based on satellite communications. After performing a cost-benefit analysis, the decision was to formulate and design the system concept such that the systems products supplement those training aids and systems already available as specified by the user. The TWE/BDAR products were developed with priority given to cross service compatibility and growth potential for future systems. Key organizations were contacted by phone, email or in person. For the Army, the list included BDAR training developers from eighteen schools, academies, and organizations. In addition, officers and non-commissioned officers attending courses at Aberdeen Proving Grounds were surveyed. Each of the Air Force's Combat Logistics Support Squadrons (CLSSs, AFSOC, the ABDR Program Office (PO), the Joint Air Defense Lethality Team (JADLT) were contacted as well. The vast majority of the response thought their organization could benefit from potential TWE/BDAR products and/or information stored in the A&R System.

The System Development effort researched means of coupling these concepts to the archival and retrieval system feasibility demonstrator developed in Phase I. The archival and retrieval system was fully developed so that capabilities such as maintenance, data flow, data validation, and access to the system data can be identified and defined to the user community. The concepts resulted in digital and/or hard copy output and in formats suitable for seminar/conference environments, posting on classified and unclassified web sites and other appropriate information media. In performance of this research, key organizations identified in Phase I were contacted, visited or revisited to discuss and distinguish current and projected operating concepts and training methods and needs.

The design of the prototype system was completed with consideration given to the needs of the customers recognized in Phase I and any additional ones identified in Phase II. Comments and reviews from the Phase I proof of concept demonstrations were considered and incorporated into the fully functional TWE/BDAR archival and retrieval system.

Additional data beyond the data gathered in Phase I was used to support demonstrations of the system were identified, collected and entered into the A&R System (Version 2.0). (Phase I Air Force and Navy data included events from the C-17 LFT Program, two combat incidents

and the F-16 Wing LFT Program. For the Army, data collected and entered included Paladin LFT BDAR (45 events), Meppin Trials/BDAR (8 vehicles, 8 events) and BDAR Technical Manual (TM) data.) The total collected data was sufficient to exercise every capability included in the production system delivered at the end of Phase II. Additional data collected and entered from the Air Force/Navy were A-10 Kosovo incidents, selected Desert Storm incidents, B-1 LFT&E Program, AFSOC incidents, and the C-130 JLF Program. From the Army, added information were from Training and Doctrine Command (TRADOC) BDAR training videos, Wolverine data and additional Meppen data. Several other sources have been identified but for various reasons (i.e., awaiting public release, funding) have not yet been able to be entered into the system. Overall, a total of 90 (16 Air Force and 74 Army) incidents, 209 events, 872 damages, 856 repairs and 915 images are stored in the A&R System.

Data was prioritized for entry into the Archival and Retrieval System. The prioritization system was developed in conjunction with the government sponsors and devised to ensure the updated prototype system available at the end of Phase II met the highest priority needs of customers identified in Phase I.

Field demonstrations were conducted at AFSOC (Hurlburt Field), the 445<sup>th</sup> CLSS (WPAFB), the ABDR PO (WPAFB), an ABDR Conference (held at WPAFB), the 4<sup>th</sup> Annual Testing and Training Symposium and Exhibition (Orlando), and the SURVIAC Liason Course (WPAFB). Each demonstration illustrated how the system meets the customers' current and future needs. The demonstrations showcased the objective TWE/BDAR Archival and Retrieval System functionality and products. System products focused on three output methodologies: 1) a hardcopy version of the requested TWE/BDAR data, including an indexed copy of pictures, videos and text contained in the archival and retrieval system and a reference guide to sources of additional information; 2) an inquiry support system that provides the ability to query information from SURVIAC and submit information for consideration of inclusion to the A&R system; and 3) various electronic distribution methods of the A&R System and products (such as the Image Library). The target audience were potential customers (BDAR maintainers and trainers) who could benefit from widespread use of JLF, LFT&E, combat, BDAR and TWE data, pictures and videos.

#### **4.0 Model/Methodology Used or Developed**

The prototype archival and retrieval system was enhanced and upgraded.

#### **5.0 Results of Analysis**

A prototype archival and retrieval system was developed and disseminated to customer organizations. Data on 90 incidents was collected and entered into the system for widespread dissemination.

#### **6.0 Recommendations and Status**

The results of this task have demonstrated the viability of capturing, storing and retrieving of Survivability/Vulnerability information maintained and housed at SURVIAC.

Despite the contacts the TWE/BDAR team has formed, there remains the continual need for program managers, testers and analysts producing combat data to feed information to SURVIAC in order to grow the system.

### **Recommendations:**

The TWE/BDAR Archival and Retrieval System should be sustained by transitioning the project to SURVIAC as a core product. SURVIAC should continue its partnership with the Joint Air Defense Lethality Team (JADLT) to continue the collection of JLF/LFT and combat damage and repair data. In turn, the data can be formatted for entry into the TWE/BDAR Archival and Retrieval System for instruction, training, and field application and can be utilized by battle damage assessment and repair (BDAR) programs in the U.S. Air Force (USAF), U.S. Army (USA) and U.S. Navy (USN). It is recommended an MOU be established to continue the working group, the configuration control board (CCB) and future funding.

### **Status:**

The transition to SURVIAC is under review. The SURVIAC COTR and the SURVIAC director have approved the inclusion of TWE/BDAR into SURVIAC as a core product. Action by the Technical Coordinating Group is required and is pending.

## **7.0 Deliverables Produced**

Monthly progress reports containing financial information.

White paper that provides a top-level description of the project.

Minutes recorded from the Kick-off meeting and TIMs.

Memo For Record (MFR) of visits and field demonstrations conducted.

A list of potential customers for the archival and retrieval system.

Technical report (Data Capture Concept Technical Report) describing data sets provided for the archival and retrieval system.

Demonstrations of the upgraded versions of the archival and retrieval system.

Final summary report.