

**SBIR Topic Number:**

AF03-055

**Title:**

Cognitive Battle Damage Assessment (CBDA) Tools for Nuclear, Biological and Chemical (NBC) Threat Data Analysis

**Contract Number:**

FA8650-04-C-6451

**Company Name:**

Bevilacqua Research Corporation, Huntsville, AL

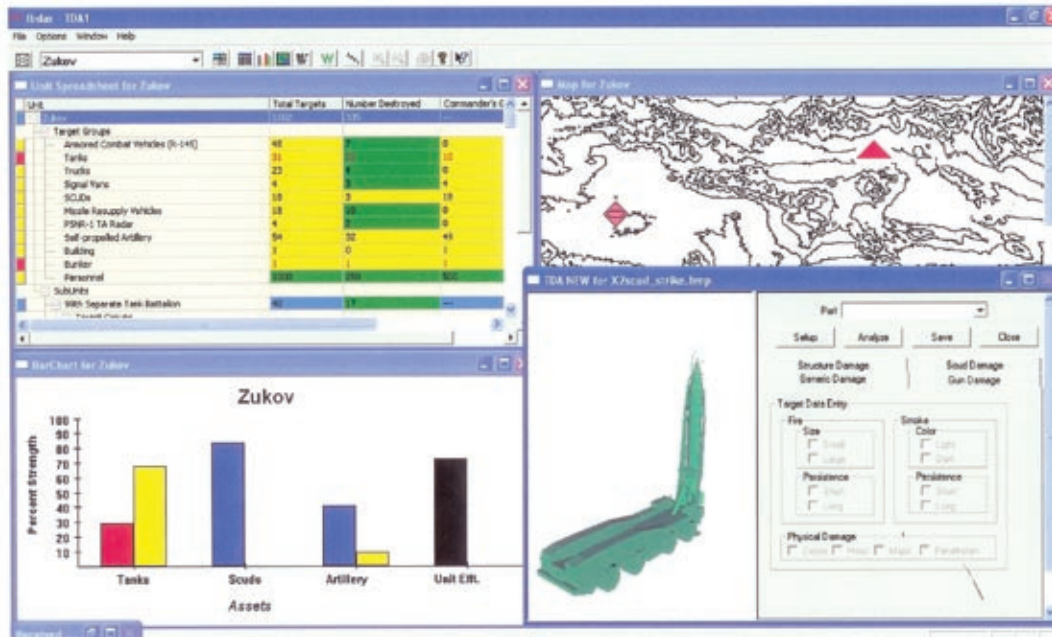
**Technical Project Office:**

Mesa AFMC, AZ

**Transition Office:**

AFRL Rome, NY

An example of Air Force supported SBIR technology that has been transitioned into an Air Force or other DoD system or subsystem or used by Air Force test ranges and facilities or maintenance depots.



## Cognitive Battle Damage Assessment (CBDA) Tools Developed for Nuclear, Biological and Chemical (NBC) Threat Data Analysis

- **Current battlefield information is critical to combat assessment and deployment**
- **Software is being transitioned as a new component of the Joint Targeting Toolbox (JTT)**
- **New software developed to provide near real-time correlation of asynchronous data from numerous sources**

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 Approved for public  
 release; distribution  
 unlimited.

## Air Force Requirements

United States forces rely on information superiority and information dominance on the battlefield to stay inside the operational tempo of their adversaries. Critical target lists with platform, weapon and navigation information are generated before a battle ever starts and decisions are made beforehand about what to do as each target is destroyed. This combat assessment doctrine of "Decide-Detect-Deliver" was modified slightly in the last decade to add "Assess". What this means is that during the Information Preparation of the Battlefield (IPB) process decisions are made concerning what to do if a target of opportunity is acquired so that when US assets detect them, they can instantly deliver their ordnance. Unless, however, the damage inflicted is assessed, a re-strike recommendation cannot be made. Thus, battle damage assessment (BDA) came to the forefront as a major factor in the overall combat assessment (CA) process. From the time of the Gulf War, BDA analysts have not had a system that would allow them to correlate and share the knowledge necessary to accomplish Phase I, II, and III assessments in a timely, accurate, and reliable way.

## SBIR Technology

Bevilacqua Research Corporation (BRC) used SBIR contracts to develop an innovative software program that makes use of conceptual graphs to provide deep cognitive perception and qualitative and quantitative reasoning within and between distributed agents. This is made possible in part by specialized actors that read those graphs as the bases of a correlation schema that can correlate large amounts of asynchronous inputs. This technology automates the military combat assessment process using cognitive processing schemes. The Phase I program concentrated on using cognitive reasoning as a correlation/classification scheme to accomplish rapid accurate damage assessment for incoming ballistic missiles. The need for rapid knowledge management, however, is much broader than this. Through the use of the new hybrid cognitive processing

techniques developed in Phase I, the Phase II program is building on Phase I research to develop a rapidly re-configurable and maintainable decision support architecture that can correlate large amounts of asynchronous data from disparate data sources in near real time for all phases of tactical and strategic battle damage assessments.

## Air Force Technology Payoff

The BDA tools and the underlying correlation/classification engine developed in this program will be capable of correlating asynchronous data from disparate data sources in near real time making it a valuable tool for real time damage assessment and operational assessment within the joint command and control structure. In an upgrade of the Phase I version, the current platform will operate in a collaborative environment, allowing BDA analysts at separate locations to have easy access to the same informational database. In this way, the basic product developed under the program will have a much wider application throughout the Air Force and the rest of the Department of Defense (DoD) as a contributor to the Joint Targeting Toolbox (JTT) being developed under the auspices of the Office of the Secretary of Defense (OSD). This project has a great deal of user support from several DoD organizations.

## Company Impact

Even though BRC has been very successful in the SBIR program, all of its SBIR products to date have been used in research and development (R&D) and prototype development programs. This program represents the first time a BRC SBIR product has been transitioned into an operational DoD system for use by soldiers in the field. BRC is now a part of the JTT program product development team and could realize increased sales as a result for many years to come.



U.S. AIR FORCE

# SBIR/STTR

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