



wide variety of conditions. The data collected will be algorithmically fused allowing the operator to discern the presence of suicide bomber IEDs.

We recommend continuing this program to permit the development of a prototype system.

Our joint team has the ability to plan and execute this program to meet all of HSARPA/BomDetec goals. Our integrated approach will establish a timely and effective product to help resolve situations in treacherous environments.

## 4.2 Purpose of Program

The scenarios visualized for the BomDetec system are that of a surveillance vehicle having multi-sensor capability installed for screening suicide bombers and vehicles at the entrance to a protected facility, such as a military base, an embassy or check point.

The program united four existing sensor technologies into a common ruggedized surveillance vehicle, intelligent video, backscatter x-ray, Millimeter Wave Radar (MMW Radar), and Terahertz Wave (THz), creating a sensor suite. The sensors will be tested and evaluated independently within the common hardware platform. AS&E, as the system and hardware integrator, gathered information – mechanical, electrical (power signal, control), thermal, and optical – about each sensor, determined the best locations for mounting the sensors and evaluated the interactions of the sensors. The system integration and hardware integration effort lead to a system configuration and preliminary design. The design provides for and integrated, automated solution using standoff/remote sensors, delivering the sensor data to a central location for evaluation and test.

The system will be organized by an intelligent video and data handling system, which will identify and track every person entering the surveillance zone. It will provide a ground-based coordinate system and motion compensated tracking coordinates for the other sensors. It will alert and provide tracking coordinates for each sensor when a person comes in range. An operator will be able to intervene and direct a Pan-Tilt-Zoom (PTZ) camera for zoomed images or direct other sensors for surveillance of a specific person. The three additional sensors will identify metal, conformation and explosives in the surveillance zone. The tracking system will attach these data to the appropriate person in the zone. Millimeter Wave Radar (MMW Radar), will survey the area and identify people with metal objects at distances up to or >50M. At a closer distance (~10M) x-ray backscatter will be capable of imaging both metal conformation and the presence of explosive materials. At still closer distances (~3M), Terahertz radiation will sense and spectroscopically identify explosives on a person. The radar will continue to improve its information as the person approaches, as will the x-ray. At some point the data will exceed a threshold, and the system will identify the person as a “bomber”. Each modality has a specific role, and each provides specific information. Together they will provide a unique, remote (>10M), real-time, chemical sensing and suicide bomber identification system.

Data from the four sensors will be processed, managed, enhanced and combined in real time. The processed data will be fused to provide the operator with positive identification of a “bomber”. A confirming digital photograph will be presented to the operator along with the sensor identification.

## 4.3 AS&E Project Scope

### 4.3.1 Hardware Integration Design

The ultimate goal of the BomDetec program is to develop a system that can detect suicide bombers using IEDs.

- Hardware Integration Goal