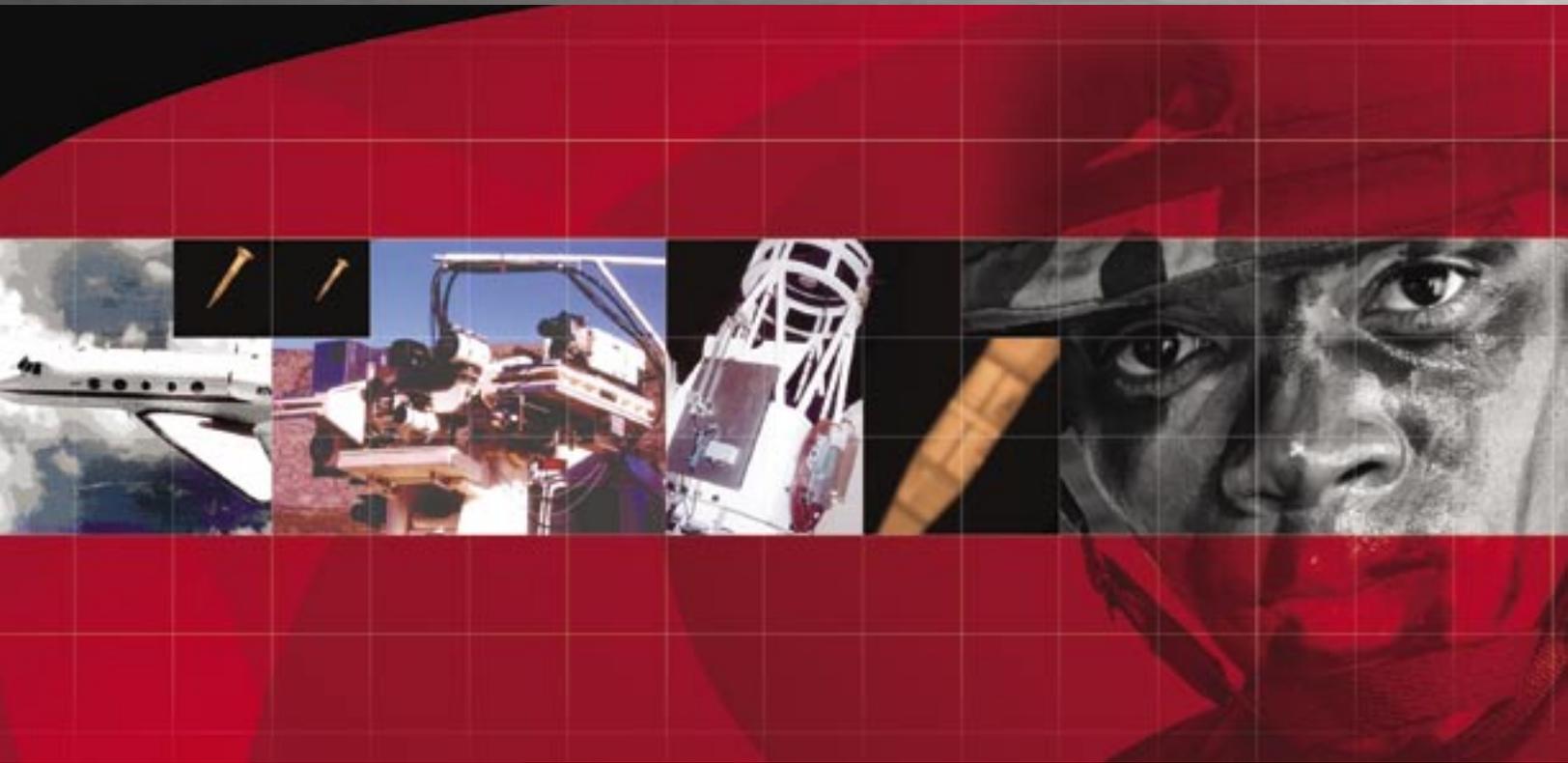




# Kill Assessment

Development and Evaluation of Advanced KA Technologies



## Summary

- Real-time, remote determination of missile engagement lethality
- Evaluation of the success or failure of an intercept attempt
- Development, maintenance, and upgrade of impact flash data collection sensors
- Target intercept engineering model development and evaluation
- Scientific and operational utility evaluation of enhanced kill assessment technologies

**The KA Program collects/analyzes data, and develops, tests, and validates techniques that can determine kill/no kill on BMDS engagements.**

The Kill Assessment (KA) Program supports the Missile Defense Agency (MDA) in the areas of data collection planning, data analysis, sensor development, and evaluation of advanced technologies. Kill assessment is the real-time, remote determination of missile engagement lethality. A multi-organizational KA team provides accurate, timely, and relevant products in support of cost reduction efforts. Kill assessment algorithms and concepts are developed, reviewed, implemented, and evaluated. Based on these analyses, KA analysts make recommendations to improve performance. KA analysts also develop and analyze target intercept engineering models and support operational utility evaluation of new technologies. The KA Program is continuously searching for new technologies that will benefit the kill assessment process.

### Overview

The Kill Assessment (KA) Program supports the Missile Defense Agency (MDA) kill assessment initiatives in the areas of data collection planning, data analysis, sensor development, and evaluation of advanced technologies. Kill assessment is defined as the real-time, remote determination of missile engagement lethality. More concisely, the role of kill assessment is to answer the question, "Do more defense resources need to be committed or was the threat destroyed?"

### Benefits for Tomorrow's Defense

The benefit of kill assessment is to reduce defense system costs by reducing/eliminating salvo or ripple firing doctrines (the firing of two or more missiles to destroy a threat missile). The KA Program utilizes a multi-organization team environment to provide accurate, timely, and relevant products to MDA system components.

Kill Assessment is the architecture component that evaluates the success or failure of an intercept attempt and provides the basis for subsequent engagement decisions. The Kill Assessment Program is currently providing the opportunity to address key issues and is making available analysis results and lessons learned to the MDA system components.

### Technical Concept

The KA Program supports pre-mission data collection planning activities to enhance the collection of high-quality intercept data from gas gun, sled, and flight tests to support the evaluation of kill assessment analysis activities. Products include optimum sensor suite recommendations, mission requirement/test planning development support, and the identification of risks/issues, as well as recommended solutions.

KA Program analysts use data collected and reduced by auxiliary sensors to evaluate KA key observables, i.e., "cloud" expansion rate, intensity-time history, and spectral signatures. These products are then used to determine the source of the radiometric emission. Data analysis products include 48-hour Quick-Look Reports as well as more detailed 90-Day Analysis Reports. Intercept test data analyzed to date includes Integrated Flight Test (IFT), Patriot Advanced Capability—Phase 3 (PAC-3), Theater High Altitude Area Defense (THAAD), and Aegis Ballistic Missile Defense (Aegis BMD).

The KA Program supports development, maintenance, and upgrades to sensors designed to collect impact flash data. KA analysts also provide on-site data collection support for intercept tests of opportunity. These tests include PAC-3, gas gun, sled, Aegis BMD, and Ground-based Midcourse Defense (GMD) intercept tests as well as plume measurements of static test firings. Sensors are maintained and upgraded as required by replacing parts or by adding to the sensor capability through upgrades to the sensor optics, detectors, and data acquisition system.

KA analysts develop, review, implement, and/or evaluate proposed kill assessment algorithms and concepts and provide recommendations to improve performance. A concept currently being evaluated is a hit-point determination technique that was developed by KA analysts and utilizes IR seeker images. Data sets utilized to develop and evaluate this technique have included THAAD, Aegis BMD, GMD, and Arrow.

Engineering models of target intercepts are developed and evaluated by KA analysts. This effort includes the RV Intercept Signature Kill (RISK) Assessment Model. This model predicts optical signatures resulting from target intercepts. Model validation is achieved by comparing the results to flight test data. KA analysts are also evaluating the utility of hydrocode-based approaches to model GMD intercept signatures and debris scenes. Common scenarios are being developed and exercised by multiple hydrocode modelers and the performance of the different models will be evaluated. In the future, KA analyst will develop an empirically based relationship of RCS to mass (using data collected on full scale impacts) to identify radar-derived KA discriminants to provide degree of kill measurements using limited radar resources.

The KA Program also supports the scientific and operational utility evaluation of new technologies that may enhance kill assessment. These technologies may include passive RF and/or electromagnetic sensing techniques. The KA Program is always interested in new technologies that may benefit the kill assessment process.



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