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Advanced Sensors

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Advanced Sensors Collaborative Technology Alliance



Consortium Partners

- BAE SYSTEMS
- Northrop Grumman
- DRS Infrared
- Quantum Magnetics
- General Dynamics Robotic Sys
- U. New Mexico
- Clark-Atlanta
- MIT
- U. Maryland
- Georgia Tech
- U. Michigan
- U. Florida
- U. Mississippi
- U. Illinois – Chicago
- JPL

Objectives

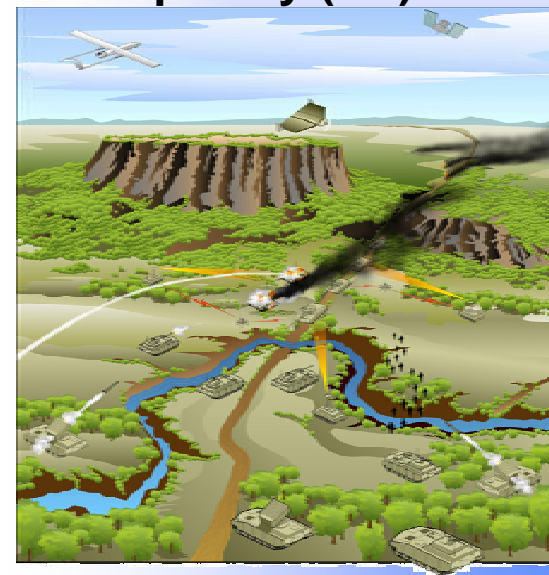
Technologies that increase sensor performance and utility, and techniques to combine many types of data to provide timely and meaningful information to the soldier.

Affordable sensors that provide:

- Continuous situation awareness
- Rapid, precise detection and ID of camouflaged targets
- Environmental sensing for navigation and self-defense

Technical Areas

- Microsensors
- Electro-Optic (EO) Smart Sensors
- Advanced Radio-Frequency (RF)





Advanced Sensors Collaborative Technology Alliance

ARL CAM: Dr. Dan Beekman
BAE Systems CM: Mr. Steve Scalera

Microsensors

ARL: Nino Srour
BAE Systems: Mark Falco

Multi-Target
Detection,
Classification,
& Tracking

Multi-sensor
Fusion

Autonomous
Sensor
Management

System
Performance &
Analysis

EO Smart Sensors

ARL: Dr. Arnie Goldberg
BAE Systems: Dr. Parvez Uppal

High Operating
Temperature
Infrared Detectors

Innovative
Components for
Laser Radar

Hyperspectral
Imaging
Components

Automatic Target
Recognition and
Image Fusion

Advanced RF Concepts

ARL: Ed Viveiros
BAE Systems: Dr. Norm Byer

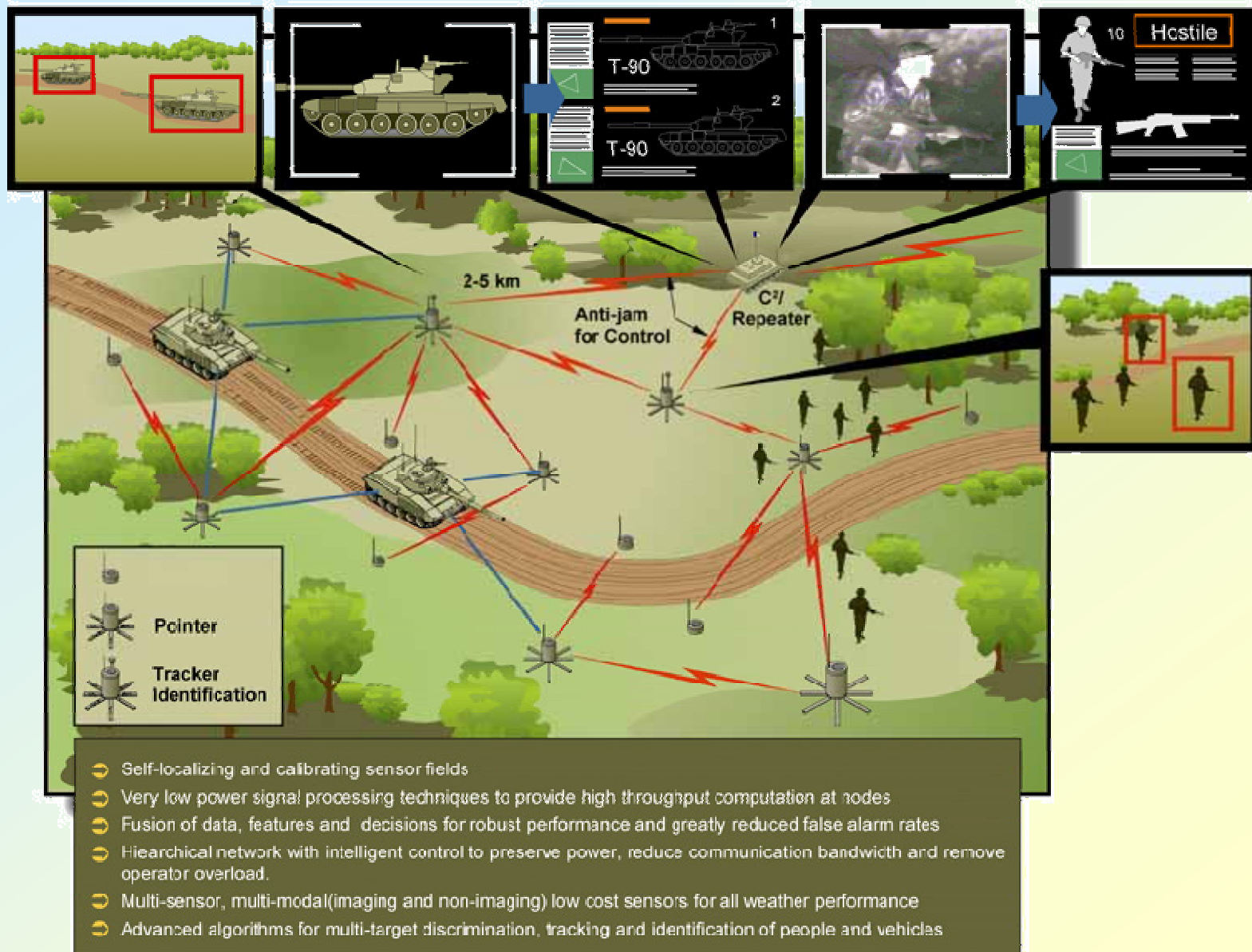
Devices and
Materials

Electronically-
Scanned
Antennas

Systems Study

Microsensors

"The Vision"





Microsensors

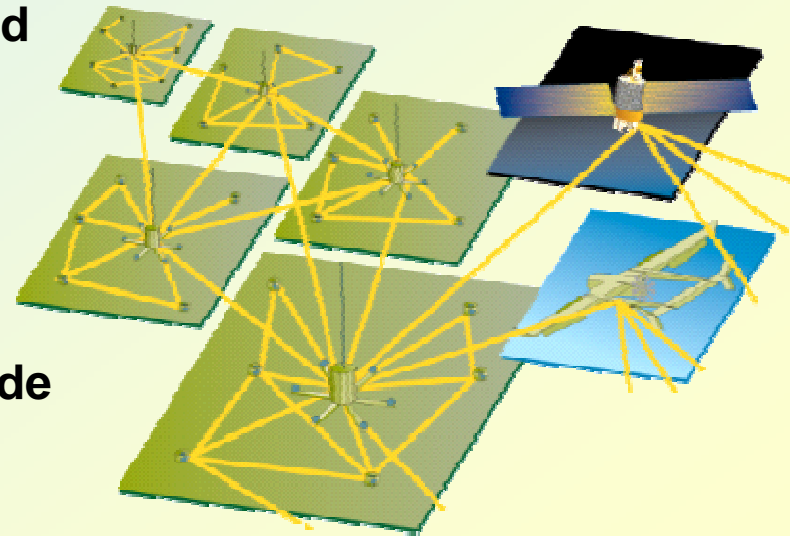
The Focus



Objective: Develop the theory, algorithms, and sensor improvements needed to realize an environment for the autonomous collection, processing, and control of information from networked heterogeneous microsensors to aid in the development of situational awareness and decision making for U.S. Military and Homeland Defense applications.

Challenges:

- Robust multi-sensor fusion over constrained communications bandwidth networks
- Affordable detection, classification and tracking of multiple ground targets (people and vehicles) in high clutter environments
- Automated / aided sensor network configuration and management so that a wide area can be covered with minimum support from the warfighter
- Analysis of networked microsensors for the selection of sensor types and numbers, sensor improvements, architectures and low energy signal processing





EO Smart Sensors

"The Vision"





EO Smart Sensors

The Focus

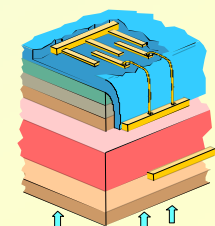
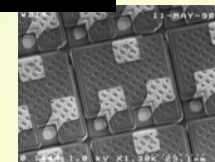


Objective: Develop multifunction EO/IR components for next generation Army Systems, which will

- Allow exploitation of information in the full EO spectrum
- Allow rapid detection and identification of targets under all conditions

Challenges:

- High performance higher operating temperature infrared detectors to provide effective fire control in diverse battlefield conditions
- Active/passive imagers to afford highly integrated fire control in a compact form factor extending identification range and allowing the soldier to act first
- Hyperspectral imaging to afford target detection under low contrast and camouflage
- High speed optical interconnects for massive data transmission
- Multi-modal algorithms for remote surveillance & motion detection



Multifunction RF Systems

Vision - With a single system and antenna, perform target acquisition and tracking, high data rate communications, combat ID, weapons guidance and active protection functions

Command Vehicle

- Active Protection
- Target Acquisition
- High Data Rate Comms
- Combat ID

UAV's

- MTI/SAR Target Acquisition
- Wind profiles/remote sensing
- High Data Rate Comms
- Combat ID MMW

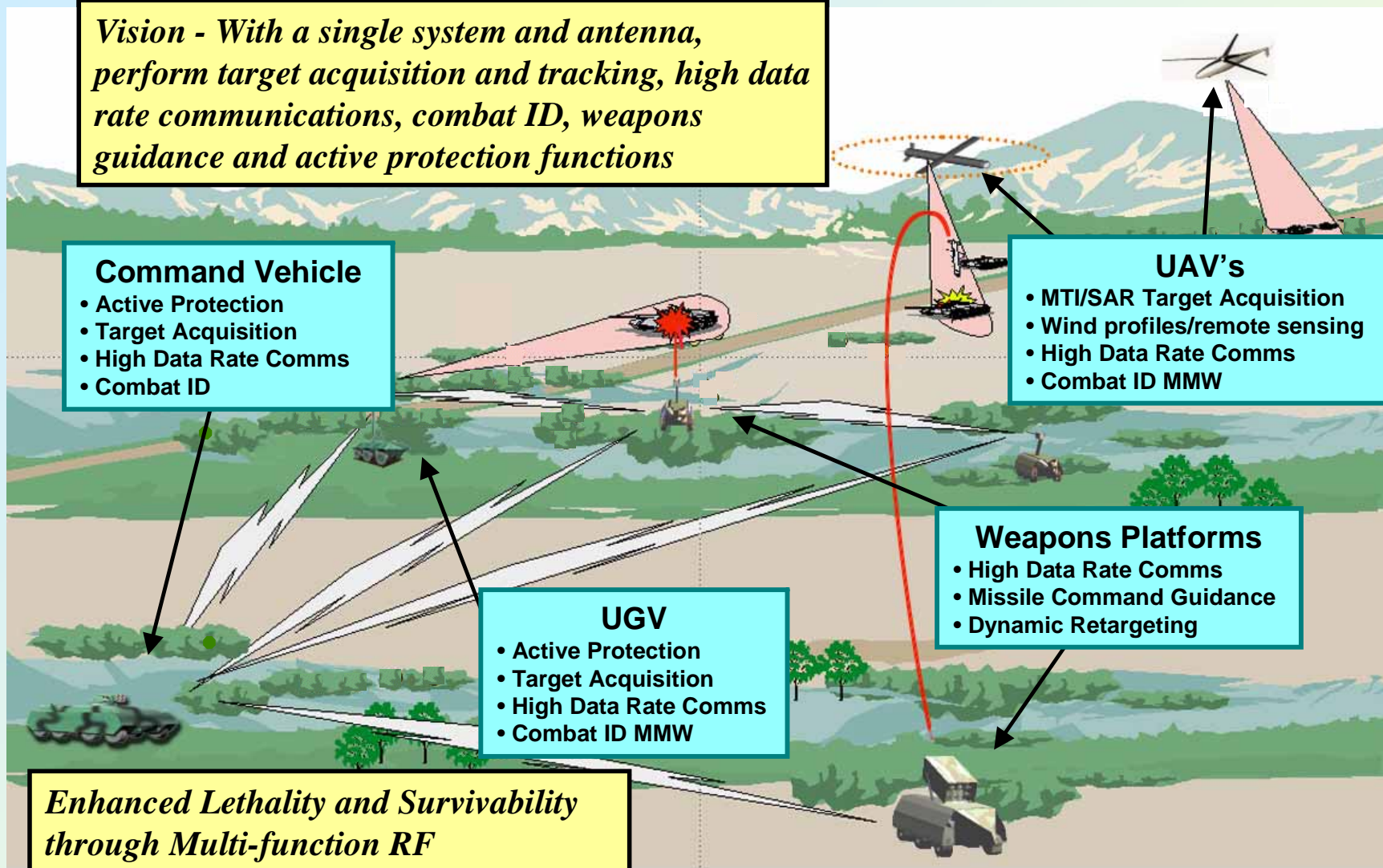
Weapons Platforms

- High Data Rate Comms
- Missile Command Guidance
- Dynamic Retargeting

UGV

- Active Protection
- Target Acquisition
- High Data Rate Comms
- Combat ID MMW

Enhanced Lethality and Survivability through Multi-function RF





Advanced RF Concepts

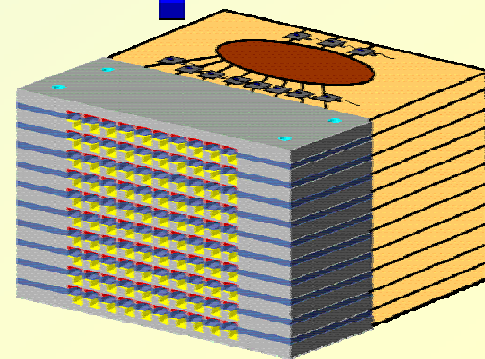
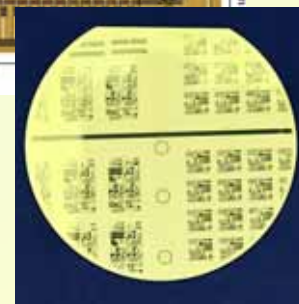
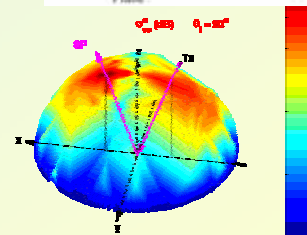
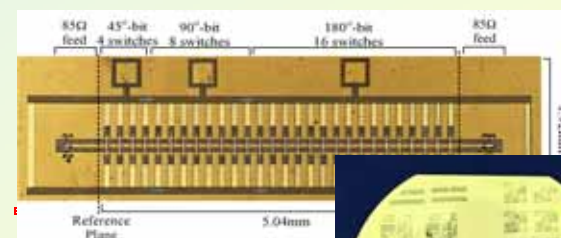
The Focus



Objective: Provide enabling subsystem, component and systems studies for low cost multifunction 27-40 GHz RF systems that provide Future Combat Systems with longer range all-weather operation for radar, communication, combat identification, and electronic warfare/signals intelligence functions.

Challenges:

- Affordable millimeter-wave Electronically Scanned Antennas (ESAs)
- Low-loss phase control elements
- Efficient, high dynamic range wide bandgap power devices for transmit/receive modules
- Propagation and scattering studies and phenomenological data for multistatic RF systems

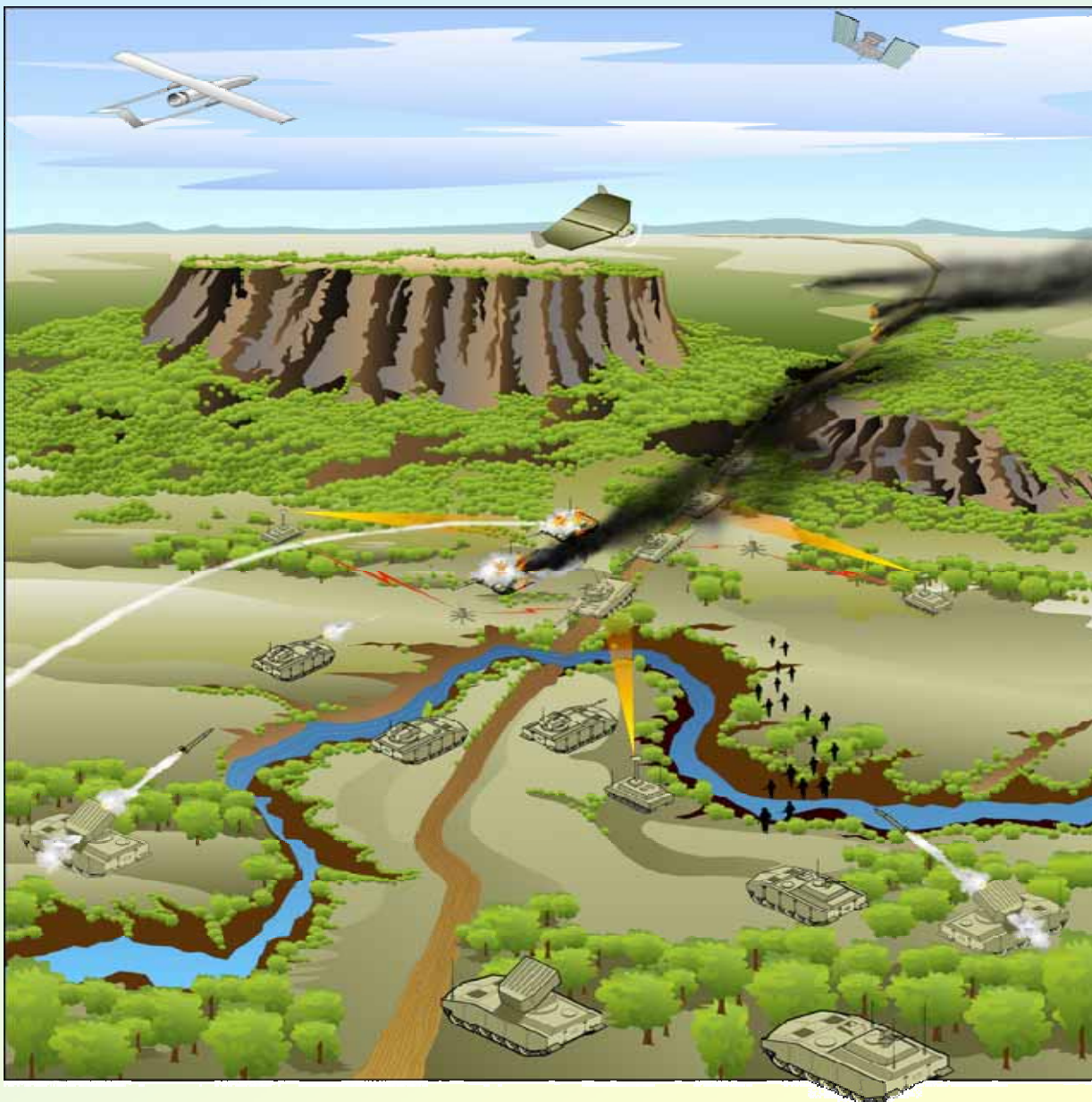




The Advanced Sensors CTA is Developing the Critical Technologies to Enable the Future Force to See First, Shoot First, & Finish Decisively



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