



Tactical Technology Office Programs

DARPA Tech 2000

Dr. David Whelan

Director

dwhelan@darpa.mil



Tactical Technology Office



Global Surveillance

**Land
Systems**



**Aerospace
Systems**

Embedded Processing & Control



Global Surveillance



Objectives:

Birth-to-Death Track
Moving Target ID

Enabling Technologies:

Space-Time Adaptive Processing
Thinned ESA Antennas
Low Power Processors
Geographic Data Bases

Challenge:

“Eyeball-on-Target” from Space

New Efforts:

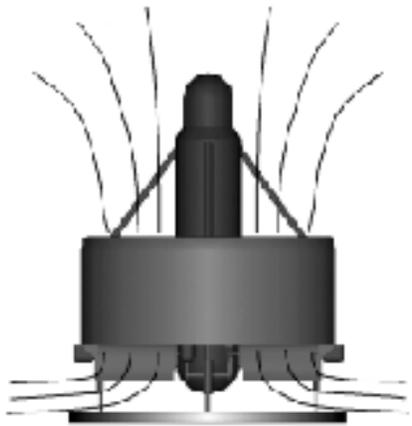
**Coherent Communications,
Imaging and Targeting**



*Agile Space-Based Radar
Validates Birth to Death Tracking
of Ground Targets*



Micro Air Vehicles



Technical Challenges:

- Increase endurance/payload
- High wind operation
- Perch/stare
- Operate under canopies

Accomplishments:

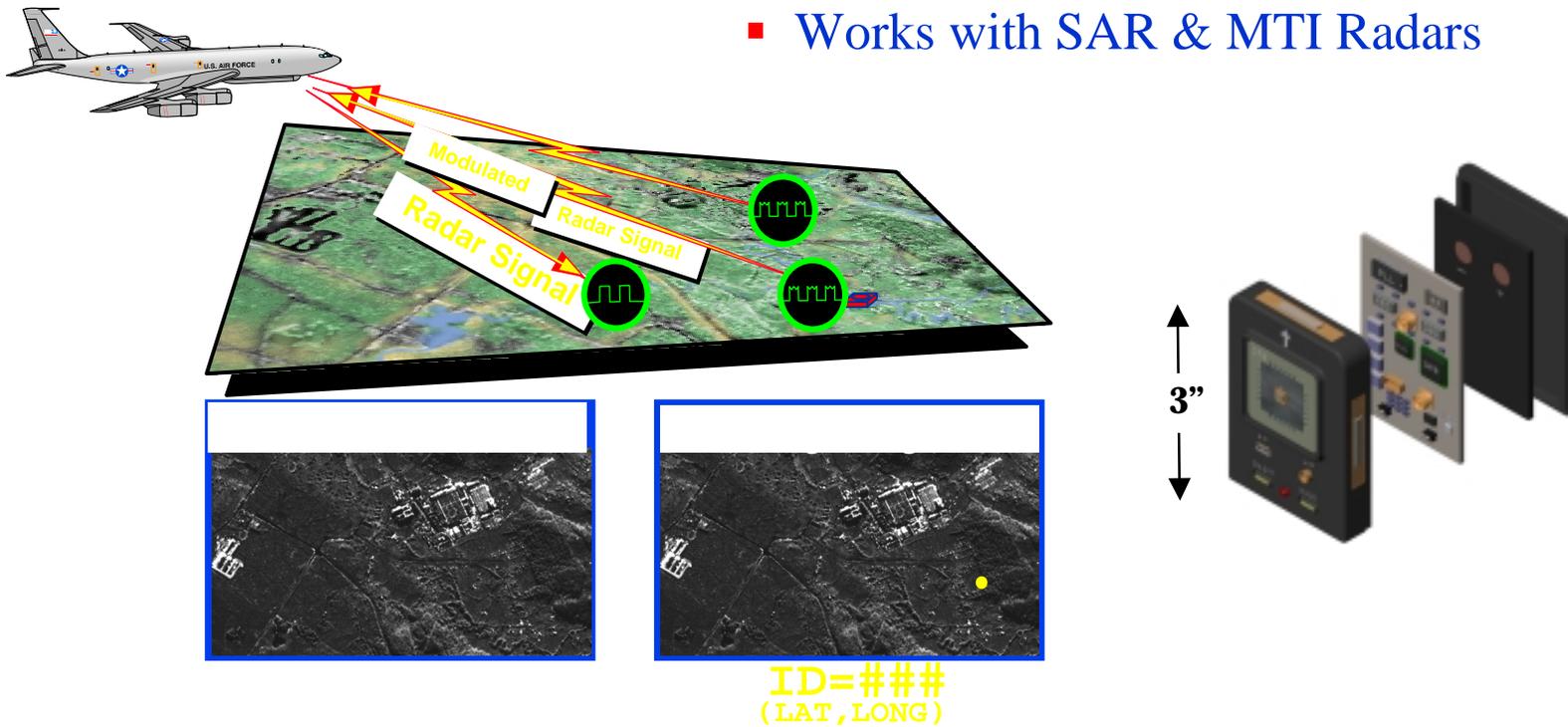
- Successful flight tests
- Full motion video
- Miniature IMU



Digital RF Tags Program



- C³ Information Embedded in Radar Signal Modulation
 - High Bandwidth Communications Capability
 - Works with SAR & MTI Radars





Aerospace Systems

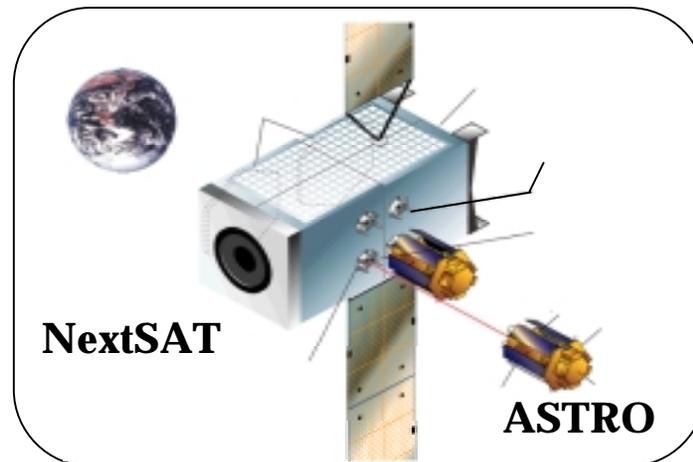


Objectives: Prompt Precision SEAD
Space Force

Enabling Technologies:
Autonomous Control
Active Aerodynamics
Flow Manipulation
High Strength Materials for Airfoils

Challenge: Tactical Maneuvering Satellites

New Efforts:
**Supersonic Miniature Air-
Launched Interceptor**
UCAV-N



Orbital Express



Unmanned Combat Air Vehicle

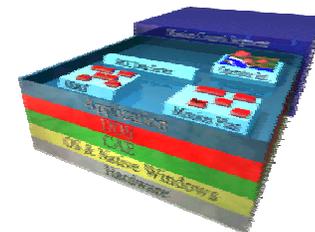
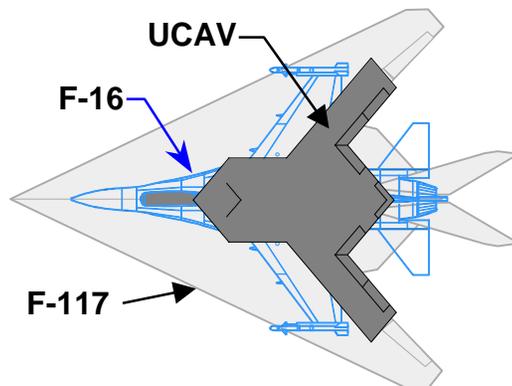


A Revolution in Air Power:

- 4:1 vehicles per operator
- Dynamic mission replanning
- 20% of current O&S costs
- Affordable stealth to the next level
- AT3 & onboard SAR targeting
- Flexible transporter
- Self-deployment
- *1/3 of JSF cost*

Program Status:

- Initial demonstrations successful
- Toolkit under construction
 - System Integration Laboratory online
 - MCS software build in work
 - Air vehicles & containers being built
- T-33 Surrogate UCAV flies this summer
- First UCAV flies next spring

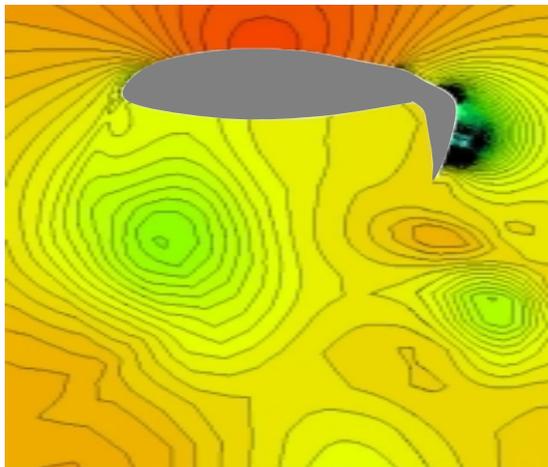
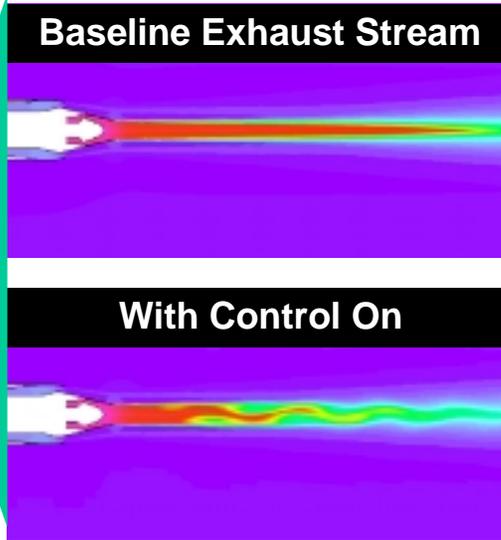




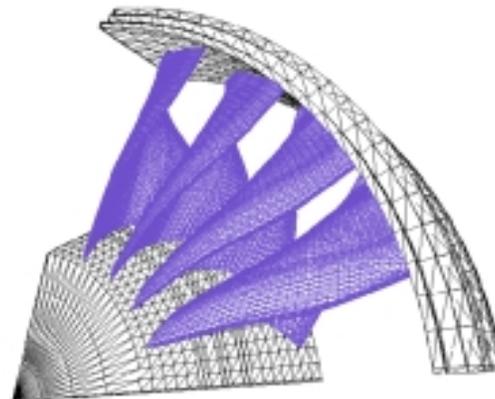
Micro Adaptive Flow Control



C-17 Active Control of Exhaust



Advanced CFD Codes



Aspirated Compressor Blades



Hummingbird A160



- **Demo Advanced Rotorcraft Technology**
 - Advanced hingeless rotor design
 - Reduced acoustic signature
- **Significant Increase in VTOL Range & Endurance**
 - 3000 nautical mile range with surveillance payload
 - 30-48 hours endurance

High Capability Surveillance Payloads

- SAR/MTI Radar
- EO/IR Search/Designator
- FOPEN Radar
- ELINT



Land Systems



Objectives:
Faster Deployment
Reduced Logistics

Enabling Technologies:
Unmanned Vehicles
Networked Remote Fires



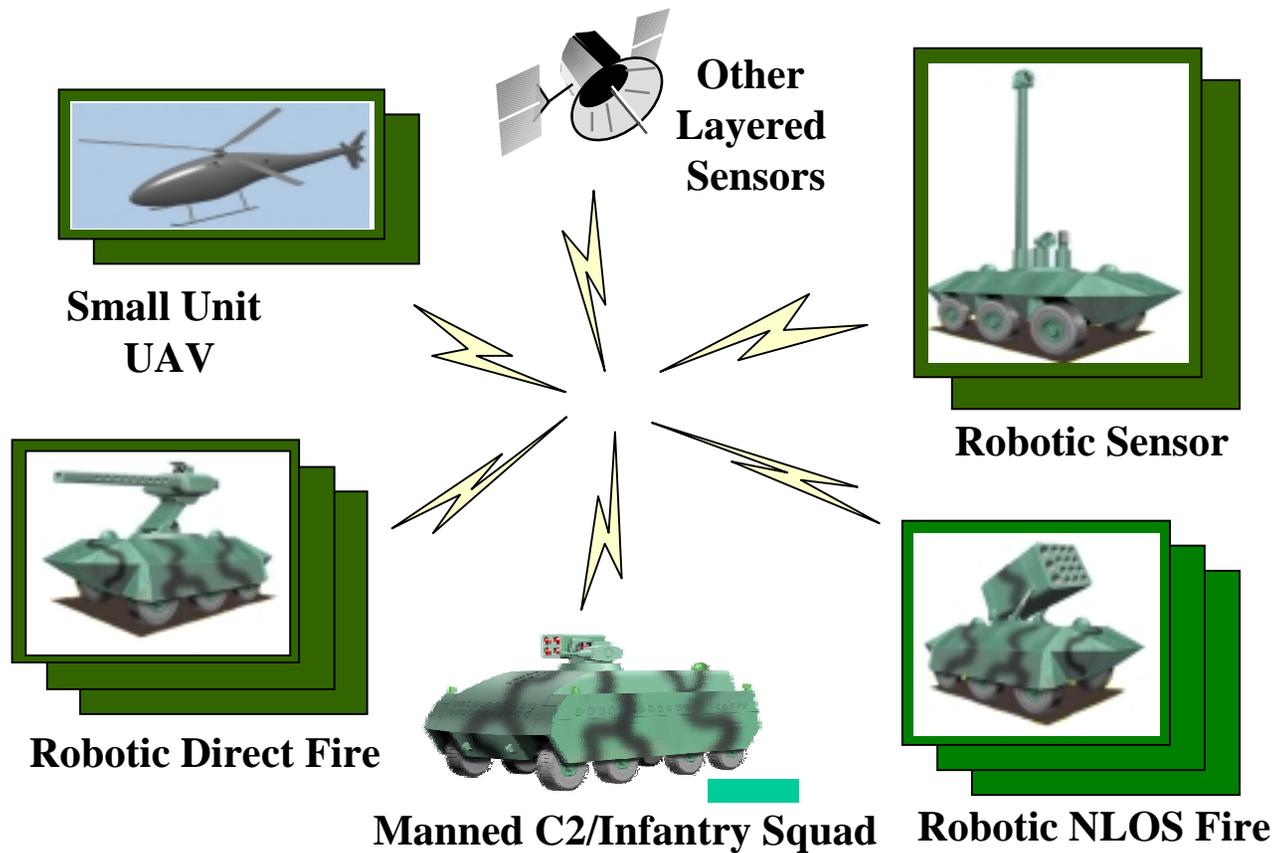
Challenge:
Distributed Functions

New Efforts:
Future Combat System

Net Fires



Future Combat Systems Network Centric Force





Embedded Processing and Control



Objectives:

Multi-Sensor Organic Processing/Fusion
Real-Time Response

Enabling Technologies:

Bit Systolic Processing
Wideband Space-Time Adaptive Processing

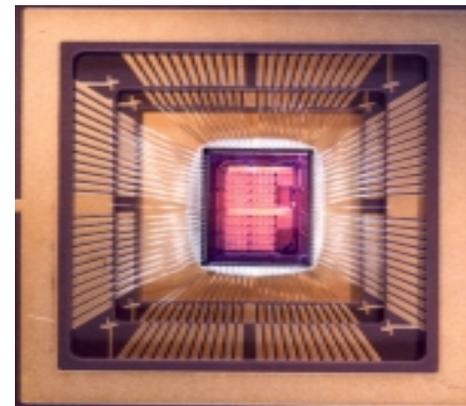
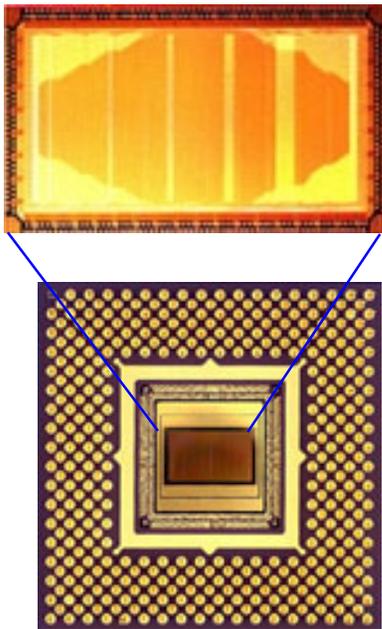
Challenge:

Mission Specific Processors
(Throughput/Power)

New Efforts:

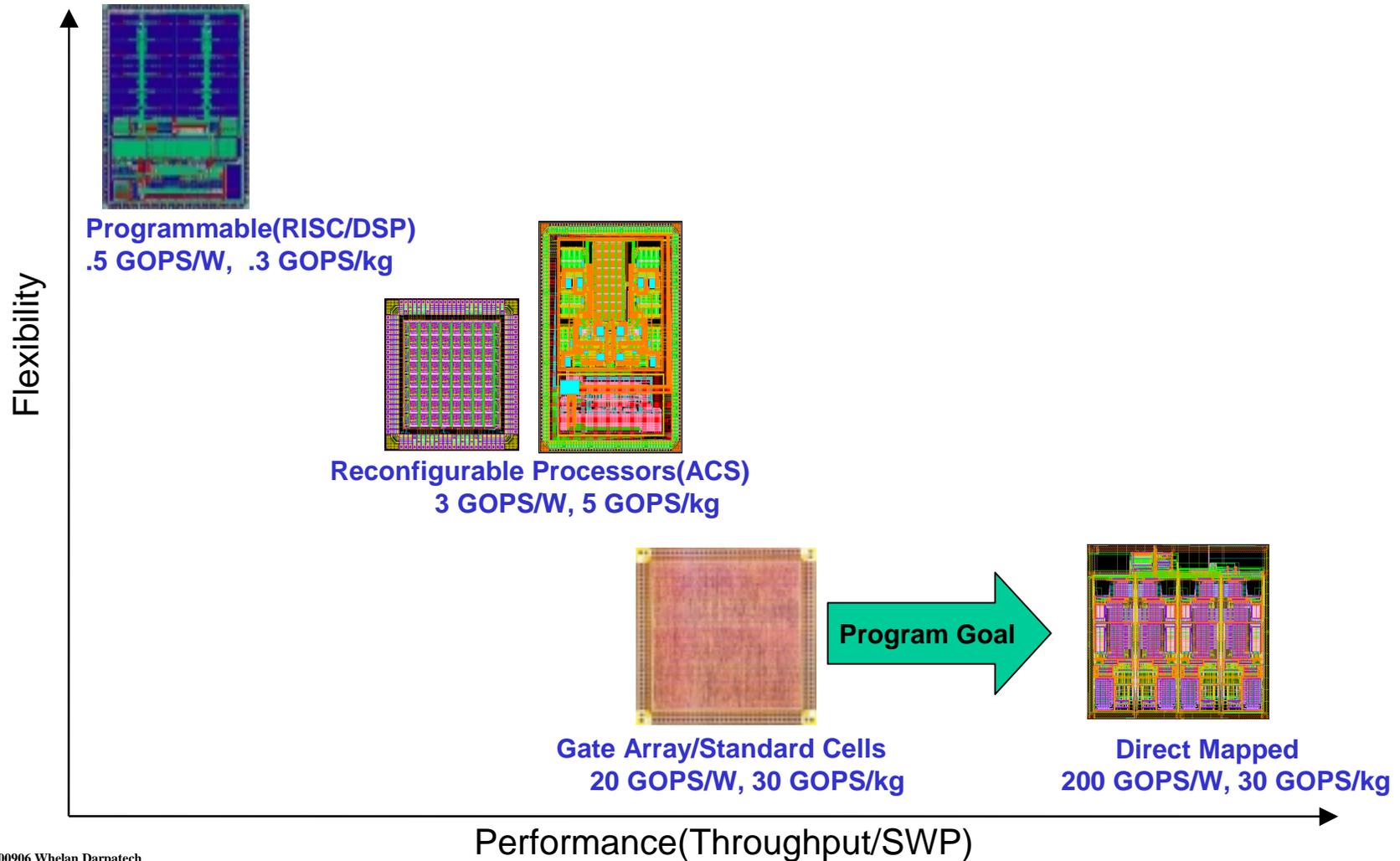
Mission Specific Processors

MITLL Polyphase Filter





Flexible Processing Systems Do Not Satisfy DARPA Platform Requirements

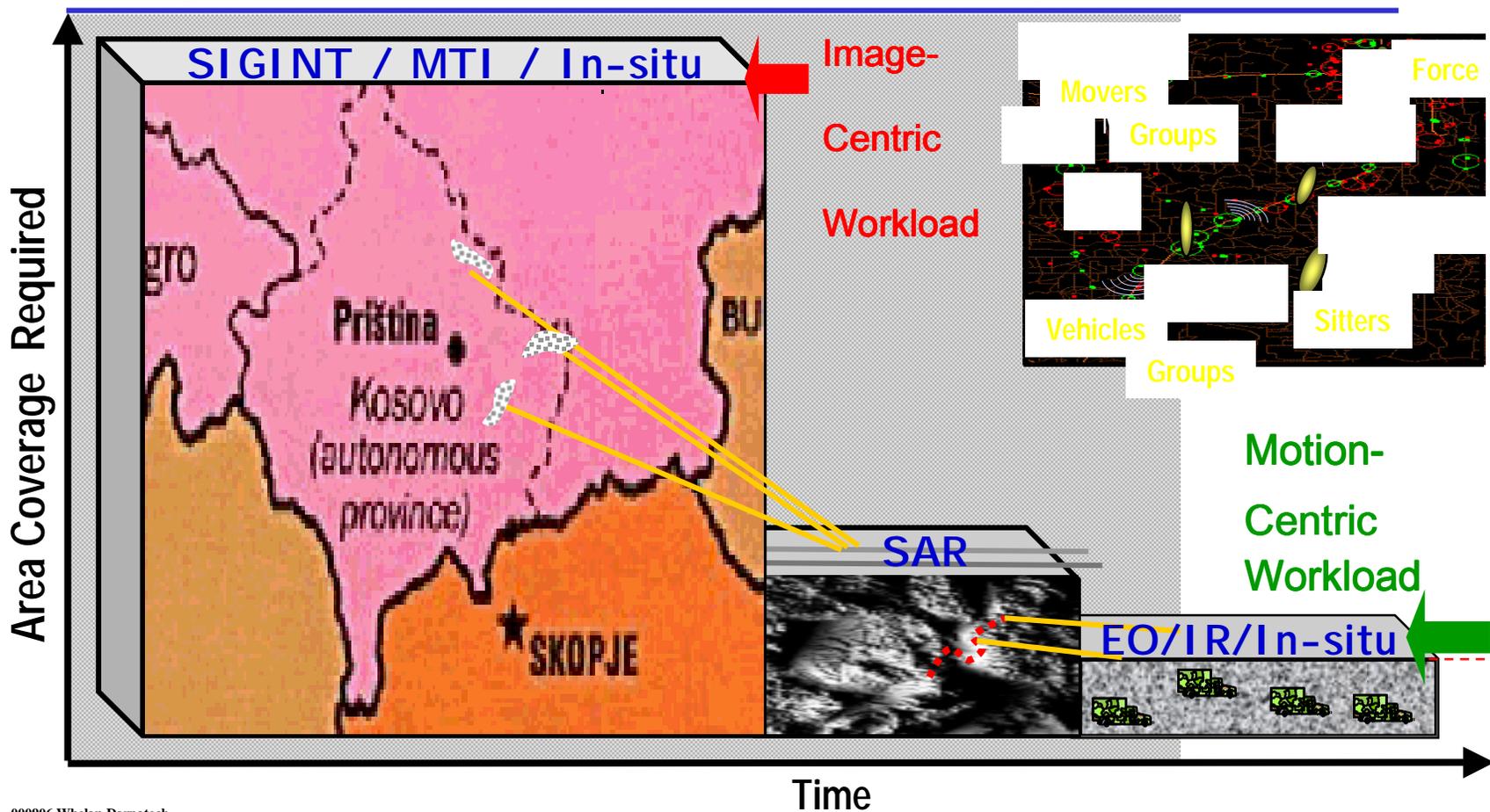




DDB Objective



Filtering all movement indicators on the battlefield to derive operational significance - motion centric solution to battlespace awareness





Video



Football thrown past crowd in background