



Transitioning High-Payoff Technology

**Dr. Tony Tether
Director**

6 March 2003

DARPA Organization



Director, Tony Tether

Information Exploitation

Steven Welby
Robert Tenney

Sensors

Exploitation Systems

Command & Control

Tactical Technology

Art Morrish
Gary Graham

Air/Space/Land Platforms
Unmanned Systems
Space Operations
Laser Systems
Future Combat Systems
Planning / Logistics

Special Projects

Amy Alving
Joe Guerci

Chem/Bio Def Systems
Counter Underground
Facilities
Space
Sensors/Structures
Navigation/Sensors/
Signal Processing

Advanced Technology

Dave Honey
Larry Stotts

Assured C3ISR

Maritime

Early Entry/Special
Forces

Information Awareness

John Poindexter
Robert Popp

Asymmetric Threat

Prediction

Behavior Modeling

Defense Sciences

Michael Goldblatt
Steven Wax

Bio Warfare
Defense
Technologies
Biology
Materials &
Devices
Mathematics

Information Processing
Technology

Ron Brachman
Zach Lemnios

Cognitive Systems
Computational -
Perception
Representation &
Reasoning
Learning
Natural Communication

Microsystems Technology

Robert Leheny
John Zolper

Electronics

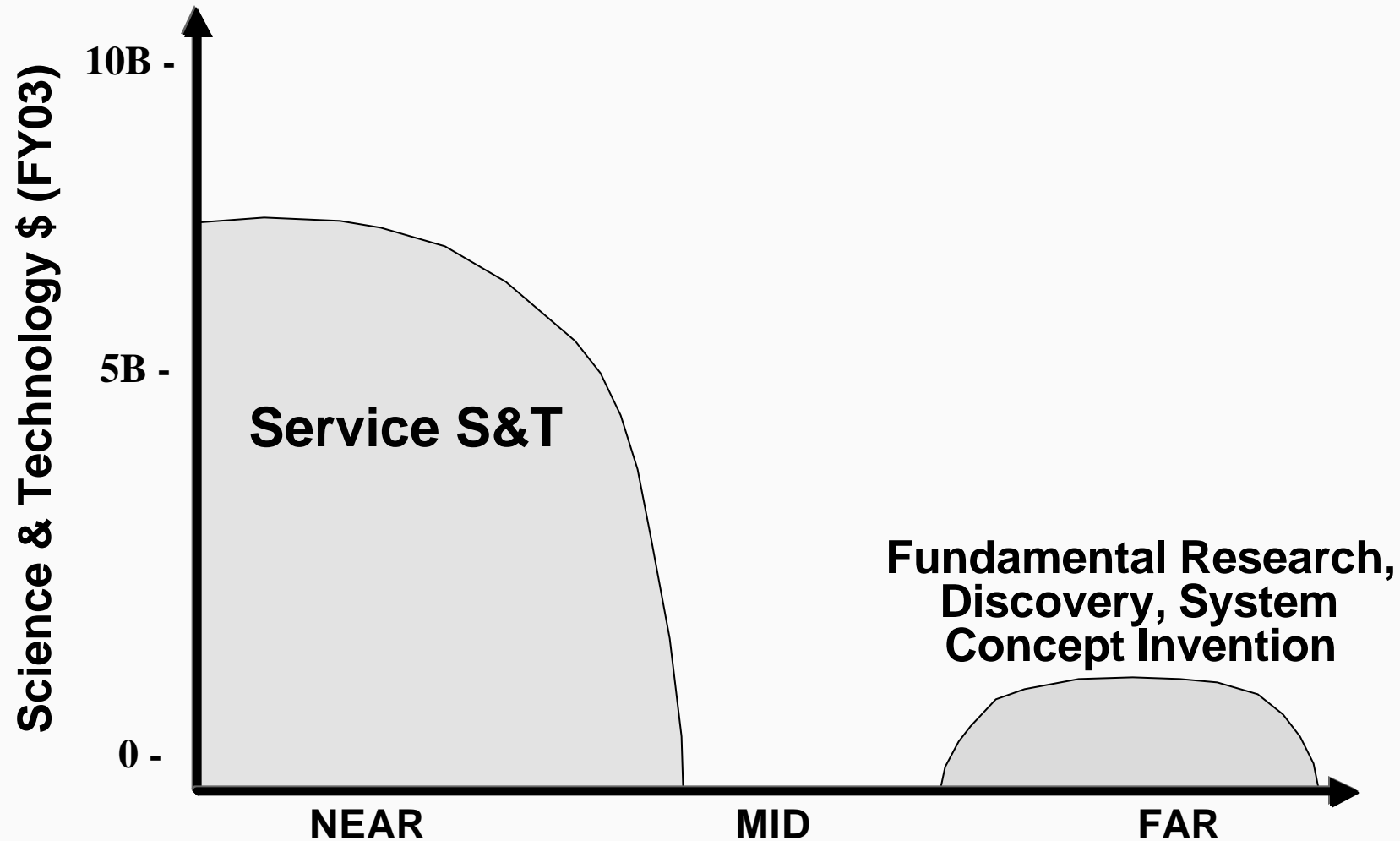
Optoelectronics

MEMS

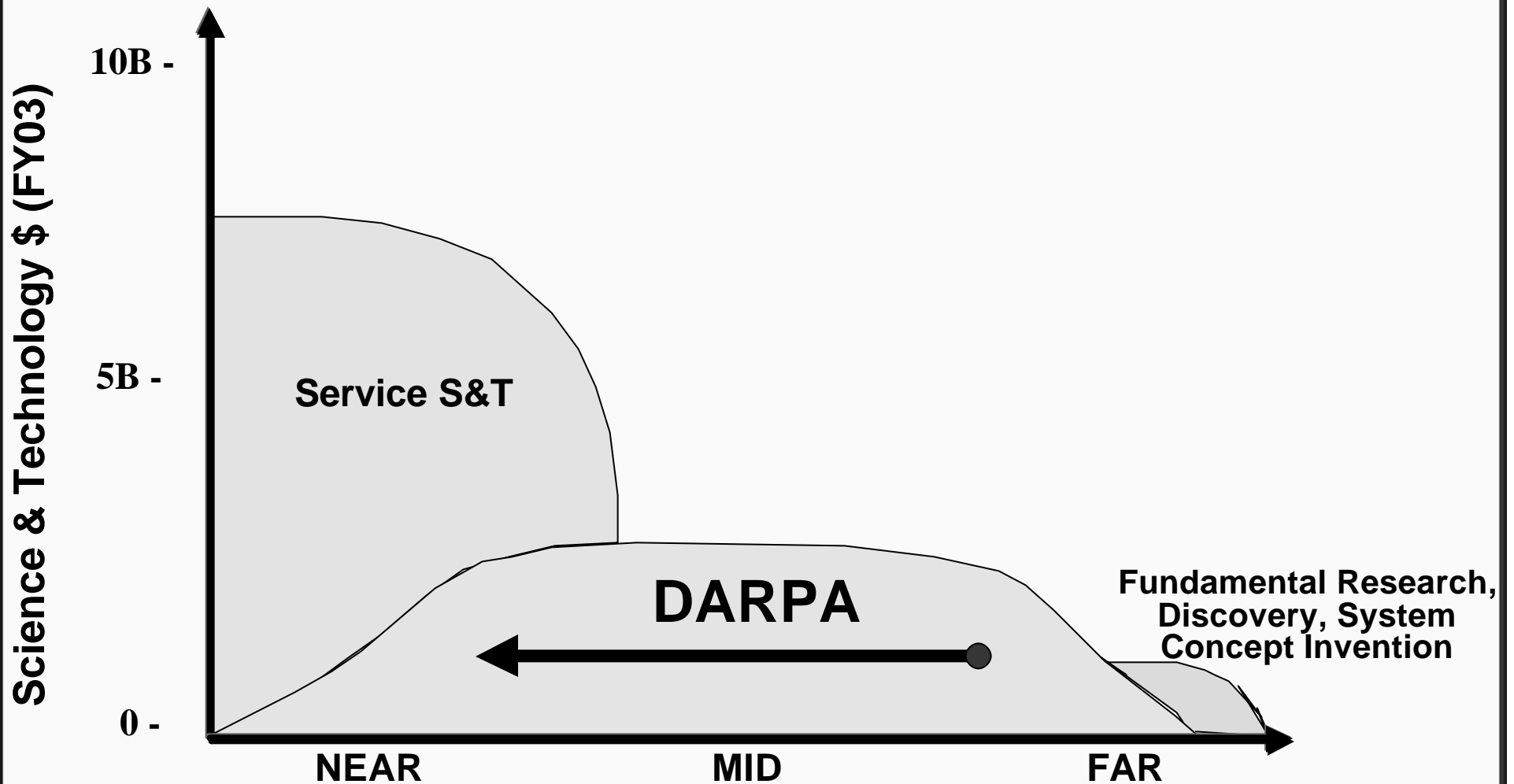
Combined

Microsystems

DARPA Role in Science and Technology



DARPA Role in Science and Technology



DARPA Accomplishments



Saturn



M-16 Rifle



Ground Surveillance Radar



Stealth Fighter



Sea Shadow

1960



Vela Hotel



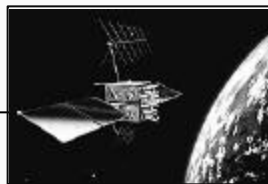
ATACMS



Arpanet



JSTARS



GPS

1970

1980



UCAV



TMR



JSF



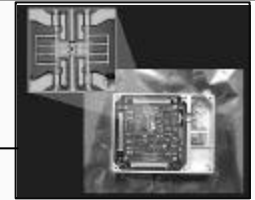
Uncooled IR



Taurus Launch Vehicle

2000

1990



MEMS



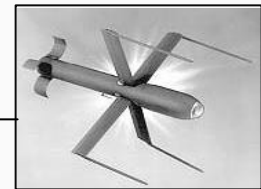
MALD



Global Hawk



Predator



BAT

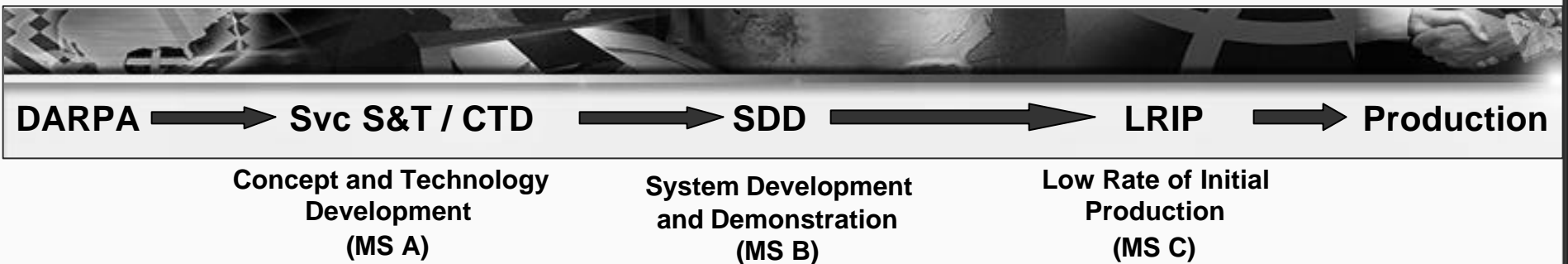
DARPA Transition Paths



Components, tech base



Components, small systems



Prototypes



Recent & Pending Technology Transitions



- Phraselator
- Unmanned Combat Air Vehicle(UCAV)
- Small Unit Operations-Situation Awareness System(SUO-SAS)
- Decontamination Pen
- A160
- Network Modeling and Simulation
- MEMS Micromechanical Gyro
- GPS Guidance Package
- Wideband Agile Receiver
- Unattended Ground Sensors
- Future Combat System (FCS)
- Tactical Mobile Robots
- Synthetic Multi-Functional Materials
- GENOA
- Frequency Agile Materials
- Spintronics
- SensIT
- Airborne Joint Communications Node ACTD
- Autonomic Distributed Firewall
- Self Healing Minefields
- Unconventional Pathogen Countermeasures
- TIDES
- AMSTE
- CoABS
- Active Templates
- HyFly
- Unmanned Combat Armed Rotorcraft (UCAR)
- MEMS Optical Cross-Conduct Switch
- OASIS
- Foliage Penetration Radar
- Netfires

Decontamination Pen

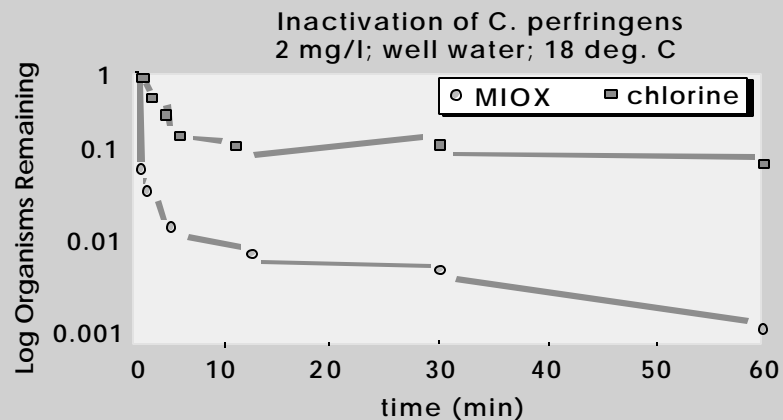


- Purifies 300 liters of water with existing batteries (one soldier/one month)
- Fast acting, no bad taste, outstanding performance
- Marines to purchase through POM

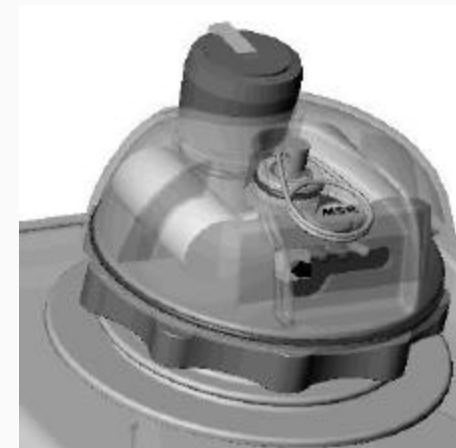


*Performance**

MIOX is many times more effective than chlorine.



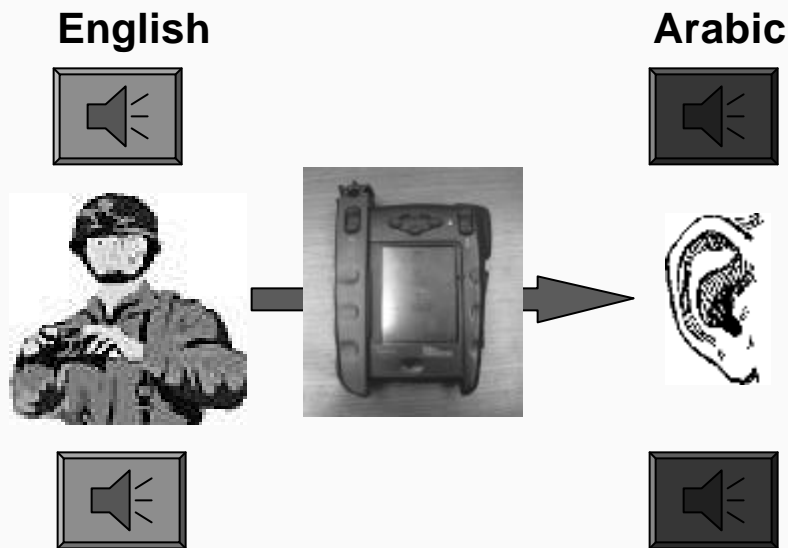
*Dr. Linda Venczel, Centers for Disease Control (CDC)
Mixed Oxidant System Evaluation for Waterborne Disease Prevention in Bolivia, 1993



Phraselator



- Militarized PDA now providing unidirectional phrase translations in multiple languages and domains.



Available in 14 Afghan, Pacific Rim, and European languages.

- Prototype for *bi*-directional natural language translation available in 18 months.

DARPA Delivers to Afghanistan



- Force Protection
- Medical Triage
- Refugee Processing

Small Unit Operations – Situation Awareness System



Highly Adaptive Radio

- Frequency Agility (20 MHz – 2,500 MHz)
- Data Rate (10 bps to 4 Mbps)
- Anti Jam, Low Probability of Detection



Precision Navigation

- 1m Accuracy With GPS in Open Terrain
- 2m Accuracy Inside Buildings, Urban Canyons Etc. With Radio Ranging and Auxiliary Sensors



Mobile, Ad Hoc, Peer-to-Peer Networking

- Self Forming Mobile Networking
- Scalable to 2500 Nodes and 7500 Sensors



Distributed Information Management

- Situation Report/Data Aggregation and Reduction
- Relative Situational Awareness Data Disseminated by Organization, Tasks, Position and Threat Status

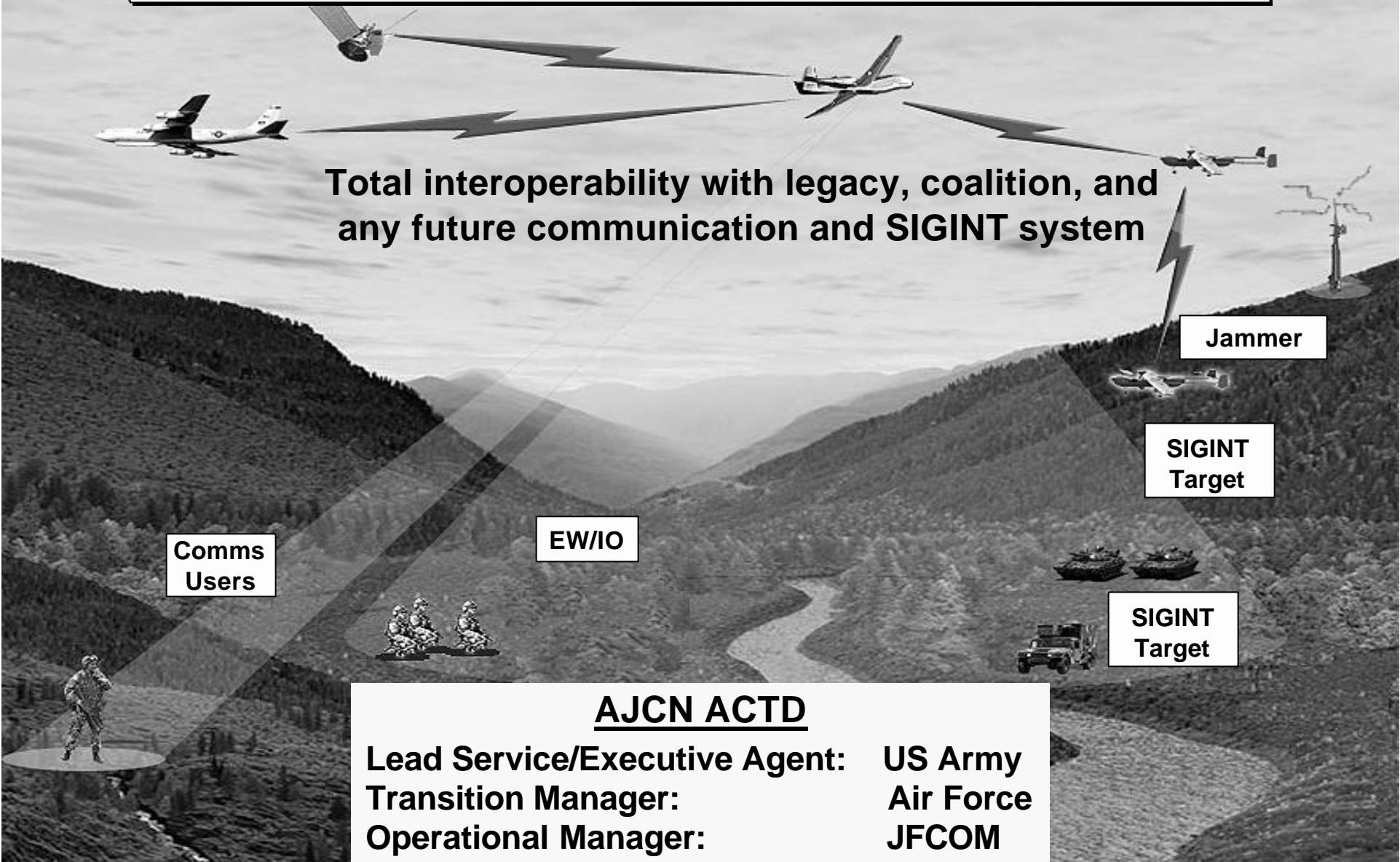
Software Programmable Radio with Integrated Features to Support Small Unit Operations

Adaptive C4ISR Node - ACTD



Platform Independent, Multi-mission RF Payload (Comm. SIGINT, EW and IO)

Total interoperability with legacy, coalition, and any future communication and SIGINT system



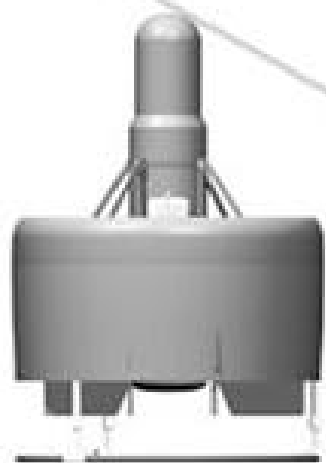
AJCN ACTD

Lead Service/Executive Agent:	US Army
Transition Manager:	Air Force
Operational Manager:	JFCOM

Organic Air Vehicle (OAV) – Private Jones



Flight Proven



29i

SCALEABILITY

Flight Proven
Autonomous



9i



6i

0

ISTAR-110



19-Inch OAV FCS Vehicle

- Low cost manufacturing
- Full autonomy
- Common components

Flight Proven Vehicles

72-Inch Dia.

Large Vehicles



29-Inch Dia.

Small Vehicles

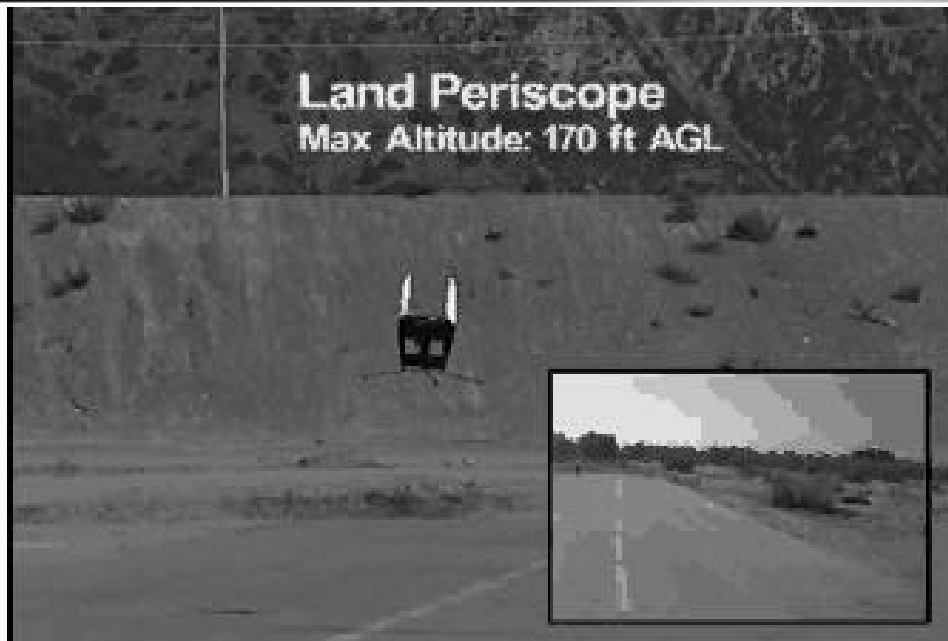


9-Inch Dia.

Micro Vehicles



Organic Air Vehicle - Private Jones



9-Inch Dia. (3.2 lbs)

Robotic hover
vehicles for real time
reconnaissance and
surveillance in
difficult terrain

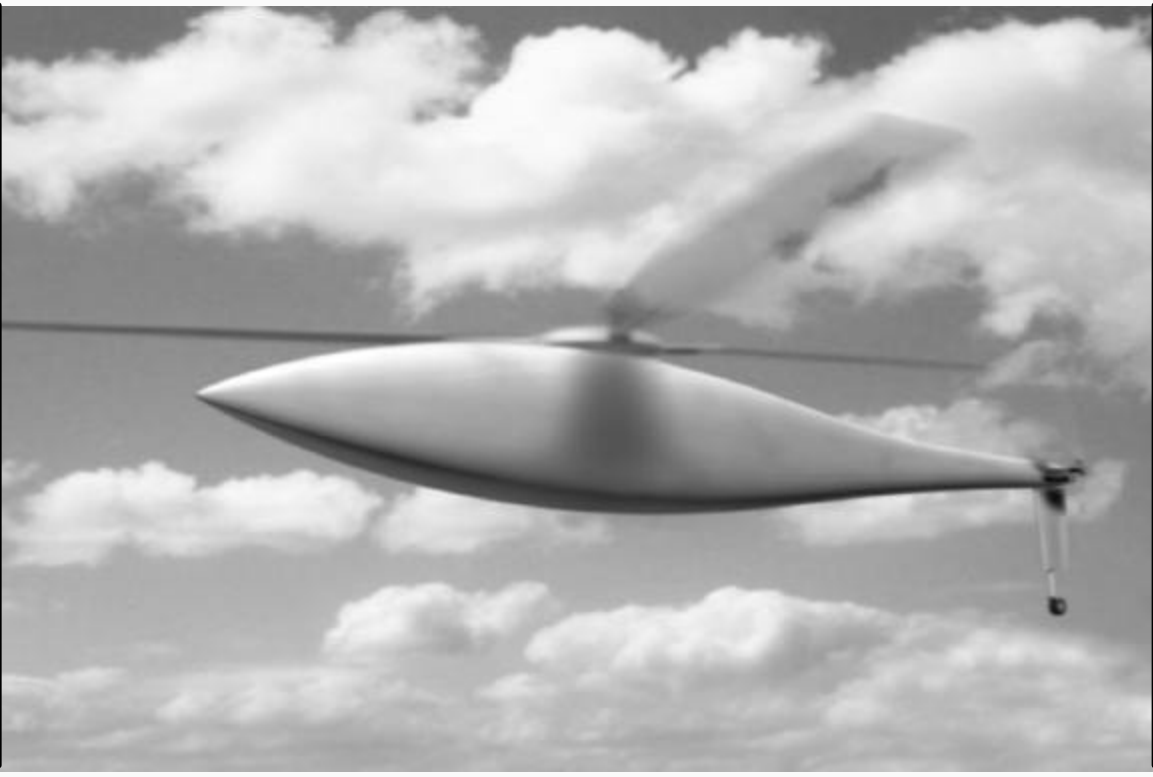


A160 Hummingbird



Rotor Diameter
36 ft

Fuselage Length
35 ft



Gross Weight
4000 to 5000 lb

Internal Payload
300 to 500 lb

<u>Performance Goals</u>				
Range Ceiling	Endurance	Speed	Hover Ceiling	Operating
2500+ nm	40+ hr	140 kt	15,000 ft	30,000+ ft

A160 Hummingbird



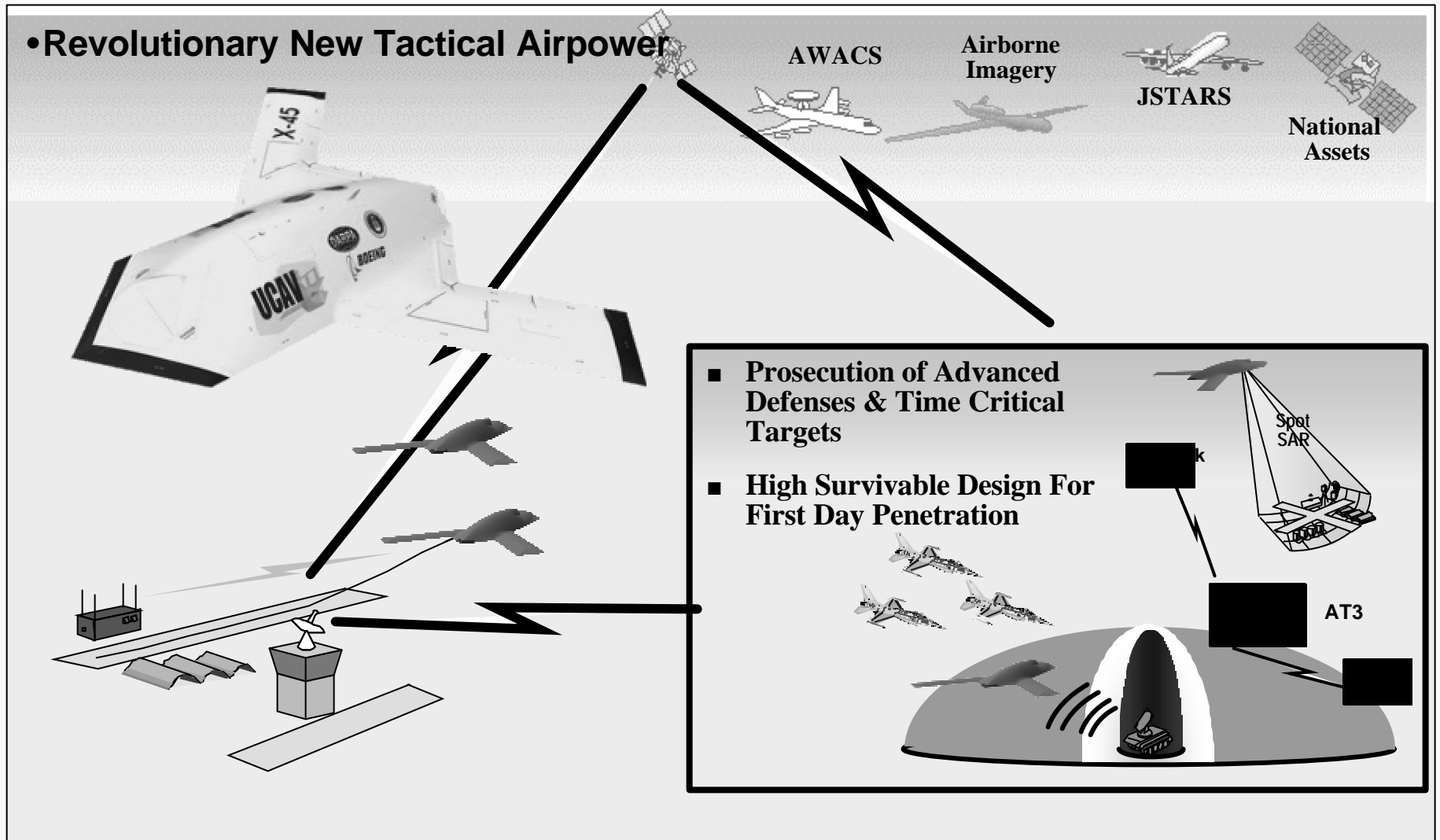
**Frontier Systems Inc.
A160 4-Blade 4th flight - Dec 6, 2002**



Unmanned Combat Air Vehicle



• Revolutionary New Tactical Airpower



Unmanned Combat Air Vehicle

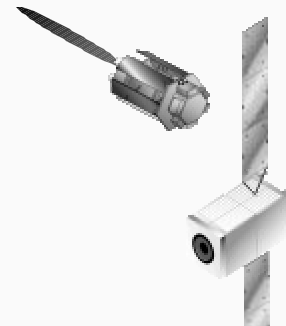


Opportunity



- DoD Science & Technology Funds Increasing
 - Goal: 3% Reinvestment of DoD Top Line(\cong \$11B)
- DARPA Always Interested in Good Ideas
 - Talk to DARPA Program Managers
 - Join DARPA as a Program Manager

DARPA Tech - March 8-12, 2004
Anaheim, California



The DARPA Grand Challenge



**300 miles of
some of the
toughest terrain
in the world**

**The best
autonomous
robotic vehicles
America can
build**

**\$1 million cash
prize**

13 March 2004

Winner takes all



Un-Surfaced Roads (40-60%)

Winding



Water



Underpass

10' wide x 9' high

