Mission

Provide innovative science, technology, and analyses to enable full spectrum operations.

Vision

America’s Laboratory for the Army: Many Minds, Many Capabilities, Single Focus on the Soldier

Acknowledged Scientific, Technical and Analytical Excellence

Recognized bridge between the Nation’s Scientific and Technical Communities and the Army

Leader in providing innovative solutions for the current and future Army
ARL Partnerships
Co-op Agreements, OTAs, Contracts, Grants, CRADAs

Centers Of Excellence

- High Performance Computing
  - Stanford University
  - New Mexico State University
  - Morgan State University
  - University of Texas, El Paso
  - High Performance Tech, Inc
  - NASA - Ames

- Flexible Displays
  - Arizona State University

- Materials
  - University of Delaware
  - Johns Hopkins University
  - Rutgers University
  - Drexel University
  - Virginia Tech

Collaborative Technology Alliances

- Micro Autonomous Systems & Technology
- Robotics
- Network Science
- Neuroergonomics

University Affiliated Research Centers

- Biotechnology
  - Biologically-derived:
    - Sensors
    - Electronics
    - Information Processing

- Soldier Survivability
  - Protection
  - Performance Enhancement
  - Injury Intervention and Cure

- Electromechanics & Hypervelocity Physics
  - EM Launch
  - Pulsed-power
  - Electric Armaments

- Immersive Environments
  - Full Sensory Immersion
  - 3-D Mobility
  - Compelling Interactive Stories

Transition to Applied Research

- Far
  - High Scientific Maturity
    - University Research Initiatives
    - Single Investigator Program
    - Paradigm Shifting Capabilities Centers/UARCS

- Mid
  - In-House Laboratory Research
  - Centers for Enduring Needs/COEs
  - Collaborative Technology Alliances/CTAs

- Near
  - Paradigm Shifting Capabilities Centers/UARCS

International Technology Alliance

- Academia
- U.S. Gov
- Industry
- U.K. Gov.
- Immersive Environments
The 1990s Army Faced Some Daunting Challenges ...

- The Army was embarking on a modernization effort that sought to transform to a more mobile and agile force

- And it was becoming increasingly dependent on commercial information technologies
  - Communications
  - Networks
  - Microelectronics
  - Software

- But, the Army had unique requirements that were not met by merely adopting commercial technologies

- And the pace of technological change was accelerating and the information age/internet era was exploding → difficult to keep up
**Army Strategy**

- Focus in-house laboratory research on Army-unique areas (e.g. armor)
- Partner with the private sector where the center of gravity is in the commercial sector (e.g. telecoms)
- Consolidate basic research funding to establish extramural research centers (FedLabs)

**The Federated Laboratory Concept Goals**

- Go where the expertise is ... draw upon the best of the public and private sectors
- Get the best commercial technology
- Quickly adapt state-of-the-art technologies to solve Army problems
- Expand ARL’s knowledge base while exposing partners to the unique expertise that resides at ARL
- Transition research products to future systems
The Federated Laboratory Concept

Drawing upon the best of the public and private sectors to produce research and technology for future land warfare supremacy

- Cooperative agreement
- Intense collaboration between industry, academia, and government
- Integrated management
- Significant staff rotation and education

Combine Best of Government & Private Sector

Private Sector Lead and Commitment

Unique Army Requirements and Expertise

External Partners
The Federated Laboratory Program
1996 - 2001

Advanced Sensors
- Multidomain Smart Sensors
- Multisensor Fusion
  Automated Target Recognition
- Microsensors
- Signal Processing
- Radar

Telecommunications & Information Distribution
- Wireless Communication
- Tactical/Strategic Interoperability
- Information Distribution
- Multimedia Concept
- Defensive Information Warfare

Advanced Displays
- Soldier Centered Computer Interface
- Perception (Sensory) Based Display Formats
- Cognitive Engineering
Evolution of Collaborative Alliances at ARL

FEDERATED LABS
- Advanced Sensors
- Telecommunications
- Advanced Displays

COLLABORATIVE TECHNOLOGY ALLIANCES (CTAs)
- Communications and Networks
- Advanced Decision Architectures
- Robotics
- Advanced Sensors
- Power and Energy

INTERNATIONAL TECHNOLOGY ALLIANCE (ITA)
- Network and Information Sciences

CTAs
- Neuroergonomics
- Robotics

Network Science CTA
- Interdisciplinary Research
- Communications Networks
- Information Networks
- Social-Cognitive Networks

Micro Autonomous Systems and Technology CTA
Evolution of Collaborative Alliances at ARL

- **Cooperative Agreement**
- **Collaboration Triad: Industry, Academia, Govt**
- **Integrated Management**
- **Significant Staff Rotation**

**FEDERATED LABS**
- Advanced Sensors
- Telecommunications
- Advanced Displays

**COLLABORATIVE TECHNOLOGY ALLIANCES (CTAs)**
- Communications and Networks
- Advanced Decision Architectures
- Robotics
- Advanced Sensors
- Power and Energy

**INTERNATIONAL TECHNOLOGY ALLIANCE (ITA)**
- Network and Information Sciences

**CTAs**
- Neuroergonomics
- Robotics

**Network Science CTA**
- Interdisciplinary Research
- Communications Networks
- Information Networks
- Social-Cognitive Networks

**Micro Autonomous Systems and Technology CTA**
Evolution of Collaborative Alliances at ARL

**FEDERATED LABS**
- Advanced Sensors
- Telecommunications
- Advanced Displays

**COLLABORATIVE TECHNOLOGY ALLIANCES (CTAs)**
- Communications and Networks
- Advanced Decision Architectures
- Robotics
- Advanced Sensors
- Power and Energy

**INTERNATIONAL TECHNOLOGY ALLIANCE (ITA)**
- Network and Information Sciences

**CTAs**
- Neuroergonomics
- Robotics

**Network Science CTA**
- Interdisciplinary Research
- Communications Networks
- Information Networks
- Social-Cognitive Networks

**Micro Autonomous Systems and Technology CTA**

**Pre-negotiated Transition Contract**
- Possibility to Extend to 8 Years
- Targeted Staff Rotation
- Flexibility to Add New Research
Evolution of Collaborative Alliances at ARL

FEDERATED LABS
- Advanced Sensors
- Telecommunications
- Advanced Displays

COLLABORATIVE TECHNOLOGY ALLIANCES (CTAs)
- Communications and Networks
- Advanced Decision Architectures
- Robotics
- Advanced Sensors
- Power and Energy

INTERNATIONAL TECHNOLOGY ALLIANCE (ITA)
- Extended to US-UK Triads
- Highly Multi-disciplinary
- Network and Information Sciences

CTAs
- Neuroergonomics
- Robotics

Network Science CTA
- Interdisciplinary Research
- Communications Networks
- Information Networks
- Social-Cognitive Networks

Micro Autonomous Systems and Technology CTA
Evolution of Collaborative Alliances at ARL

FEDERATED LABS
- Advanced Sensors
- Telecommunications
- Advanced Displays

COLLABORATIVE TECHNOLOGY ALLIANCES (CTAs)
- Communications and Networks
- Advanced Decision Architectures
- Robotics
- Advanced Sensors
- Power and Energy
  - Centers Individually Selected, Consortium Formed at Award
  - Highly Multi-disciplinary

INTERNATIONAL TECHNOLOGY ALLIANCE (ITA)
- Network and Information Sciences

CTAs
- Neuroergonomics
- Robotics

Network Science CTA
- Interdisciplinary Research
- Communications Networks
- Information Networks
- Social-Cognitive Networks

Micro Autonomous Systems and Technology CTA
Evolution of Collaborative Alliances at ARL

FEDERATED LABS
- Advanced Sensors
- Telecommunications
- Advanced Displays

COLLABORATIVE TECHNOLOGY ALLIANCES (CTAs)
- Communications and Networks
- Advanced Decision Architectures
- Robotics
- Advanced Sensors
- Power and Energy

INTERNATIONAL TECHNOLOGY ALLIANCE (ITA)
- Network and Information Sciences

CTAs
- Neuroergonomics
- Robotics

Network Science CTA
- Interdisciplinary Research
- Communications Networks
- Information Networks
- Social-Cognitive Networks

Micro Autonomous Systems and Technology CTA
- Centers Individually Selected, Consortium Formed at Award
- Highly Multi-disciplinary

Facility as Nexus for CTA
- Experimentation Component
Collaborative Technology Alliances
2001 - 2009

Communications & Networks

Power & Energy

Advanced Decision Architectures

Advanced Sensors

Robotics

CTA Key Attributes

- Leverage fast-moving commercial sector
- Identifies unique military problems commercial sector would not solve
- Fully collaborative Alliance of academia, industry, govt
- Deep collaboration enabled by staff rotations
- New collaborations --- peer-to-peer, mentorships
- Flexibility to adapt to emerging research trends
- Emphasis on rapid transition through task-order contract
ITA Strategic Goals

- To enhance distributed, secure, and flexible decision-making for coalition operations
- Enable the rapid and secure formation of *ad hoc* teams to support multiple dynamic collaborative missions

Key Attributes

- Initiated in May 2006
- The Consortium and the US/UK Governments establish Alliance
- Involves US/UK industry, academia, and government
- Consortium led by IBM US and IBM UK
- Equal funding and co-leadership by US ARL and UK MOD
**MAST CTA Strategic Goals**

- To enhance tactical situational awareness in urban and complex terrain
- Enable the autonomous operation of a collaborative ensemble of multifunctional, mobile microsystems
- Emphasis on small scale systems that can maneuver in confined spaces and remain stealthy

**Key Attributes**

- Initiated in 2008, led by BAE Systems
- Four Centers selected independently, formed Consortium at award
  - Integration
  - Microsystem Mechanics
  - Microelectronics
  - Processing for Autonomous Operation
- Emphasis on integration: understand relationships between goals, system characteristics, and physical structure
Network Science CTA Strategic Goals

- A fundamental understanding of:
  - Interplay and common underlying science among social/cognitive, information, and communications networks
  - How processes and parameters in one network affect and are affected by those in other networks
  - Prediction, design, and control of the individual and composite behavior of these complex interacting networks
- Enable humans to effectively exploit information for timely decision-making

Key Attributes

- Initiated in 2009, led by BBN
- Four Centers selected independently, formed Consortium at award
- Interdisciplinary Research
- Communication Networks
- Information Networks
- Social-Cognitive Networks
- Major emphasis on cross cutting research issues
- NS CTA Facility in Cambridge MA with significant researcher presence
- Consists of basic **and** applied research
- Distributed multi-user experimentation
The Key Components of CTA Concept

A new way of conducting collaborative research

- Breaks down research barriers
- Builds new collaborative relationships
- Develops mutual understanding across organizations, technical disciplines, and research areas

Is built upon deep, persistent, meaningful collaboration

- Fully collaborative Alliance of academia, industry, government
- Shared understanding enabled by interchanges and staff rotations
- New collaborations --- peer-to-peer, mentorships, partnerships

Emphasize multi-disciplinary aspect and cross cutting research issues

Acceleration of transition of research results
Key Success Factors and Lessons Learned

- Collaboration is hard but the results are worth the effort and energy

- Strive to work as an Alliance NOT as a Consortium + Government and NOT as loosely coupled Centers

- Success relies upon the combined efforts of researchers in the Army, academia, and industry

- It is about motivating and inspiring people to expand their research focus and to break down research barriers
Ultimate Measure of Success

- Show evidence that the Alliance achieves results that were enabled by its unique features
  - Synergies from robust academia, industry, government collaborations
  - Insights and fundamental understanding arising from jointly addressing multi-disciplinary aspects of broad research agenda
  - Rapid transition of research results through stakeholder involvement

- Ultimate measure of success is to make a significant impact on the effectiveness and survivability of our military forces
Thank You