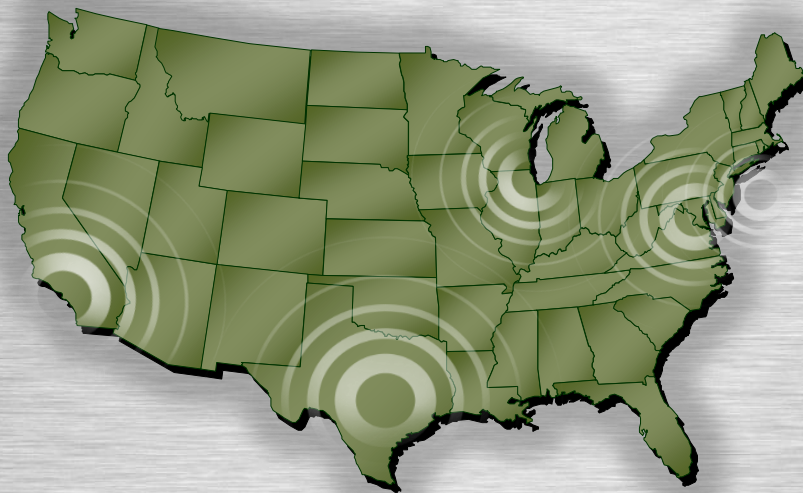




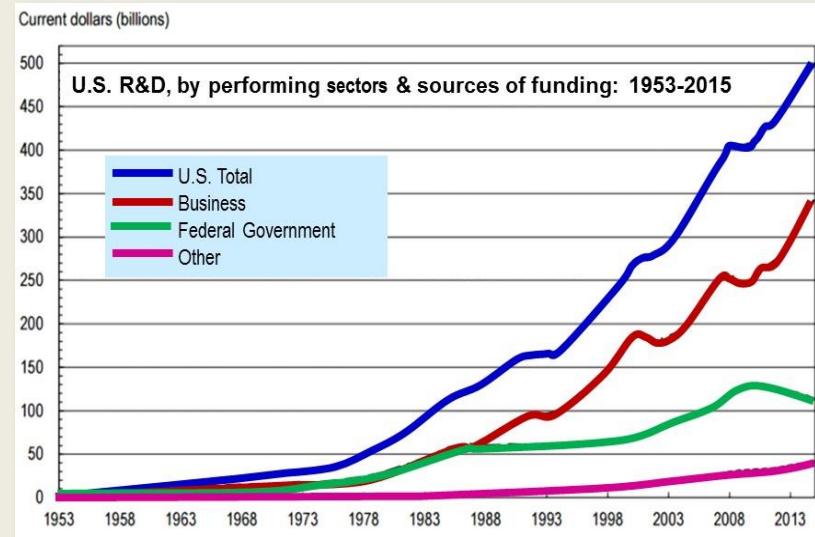
ARL Open Campus



A New Model for Army Science & Technology

Tien Pham, PhD
U.S. Army Research Laboratory

- Research is increasingly privately funded
 - Most private S&T not focused on DoD
- Changing workforce
 - Employees are more mobile
 - Workplace location strongly influences workforce demographics



Source - NSF, National Center for Science & Engineering Statistics, National Patterns of R&D Resources (annual series)

- ARL conclusion: closer collaborations with partners across the US is essential
 - Locate ARL people at key partner laboratories
 - Bring more partners into ARL laboratories

Open Campus will greatly increase the depth, breadth & diversity of research focused on Army problems



- Side-by-side collaborations at ARL & host labs
 - External researchers working in ARL labs
 - Vision: 10-15% of ARL researchers stationed at host labs
- A regional headquarters with connections to other regional partners
 - Distributed environment - “Hub & spokes” model in each region
- Mix of people recruited locally
 - ARL researchers + other Army & DoD collaborators
 - Students, professors, contractors
 - Current ARL staff will spend significant time at new sites

ARL will “have a face” in important technology areas around the country



- **Hosts:**
 - Willingness of partners to host ARL staff & truly collaborate
 - Critical mass of first class research talent & infrastructure
 - Proximity to innovation centers – transition to & from industry
 - Locations beyond ARL's current regions
 - Number of top institutions in the area
- **Attractiveness to ARL recruits**
- **Achieve regional critical mass in particular technology areas**



ARL & Top 50 Engineering Universities*



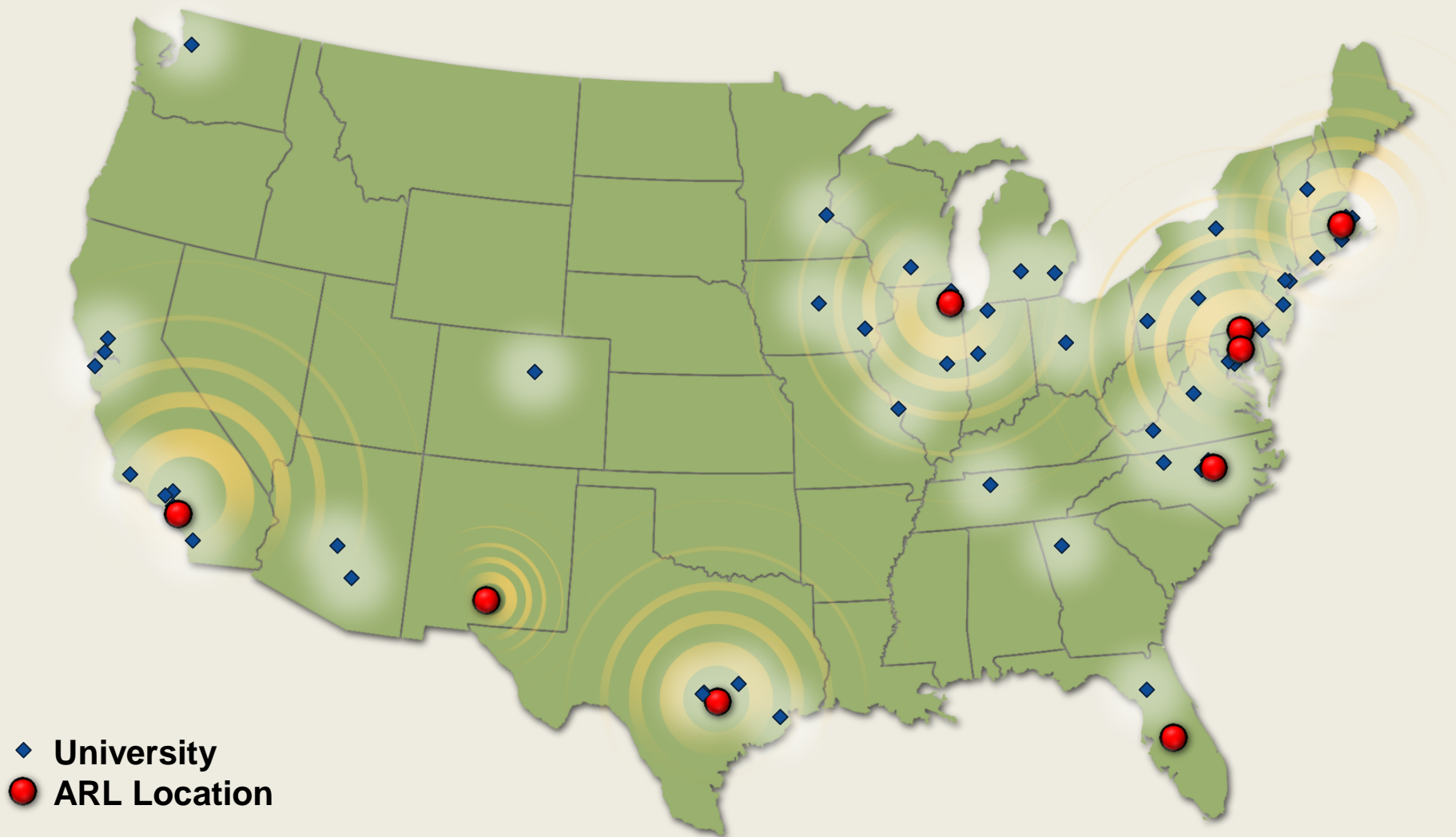
* Source: Wikipedia







ARL & Top 50 Engineering Universities*



* Source: Wikipedia



- **Faculty appointments**
 - Professors can be ARL employees up to 130 days per year
- **Direct Hire Authority**
 - Enables very rapid hiring of top talent
- **Robust CRADA portfolio**
 - Enables close research collaboration
- **ARL BAA**
 - Easy to engage with & fund external researchers in ARL domains

Army Benefits as of March 2017:

\$29.9M

in-kind research in FY16

105

Active CRADAs

45

CRADAs with Academia

60

CRADAs with Industry

234

CRADA projects

208

CRADA projects in Negotiation

775

visiting researchers

73

visiting foreign researchers from

23

different nations

ARL West

- 17 ARL employees & contract researchers
- 35 students
- 3 faculty

Exploring:

- Oregon State
- Washington State
- Arizona State

Stanford

UC Santa Barbara

Los Angeles

USC

UCLA

UC Irvine

UC Riverside

Established April 2016

ARL South

- 7 ARL employees
- 13 students
- 3 faculty

Texas Tech

U of North Texas

UT Arlington

New Mexico State

UT El Paso

UT Austin

Texas A&M

Rice Univ

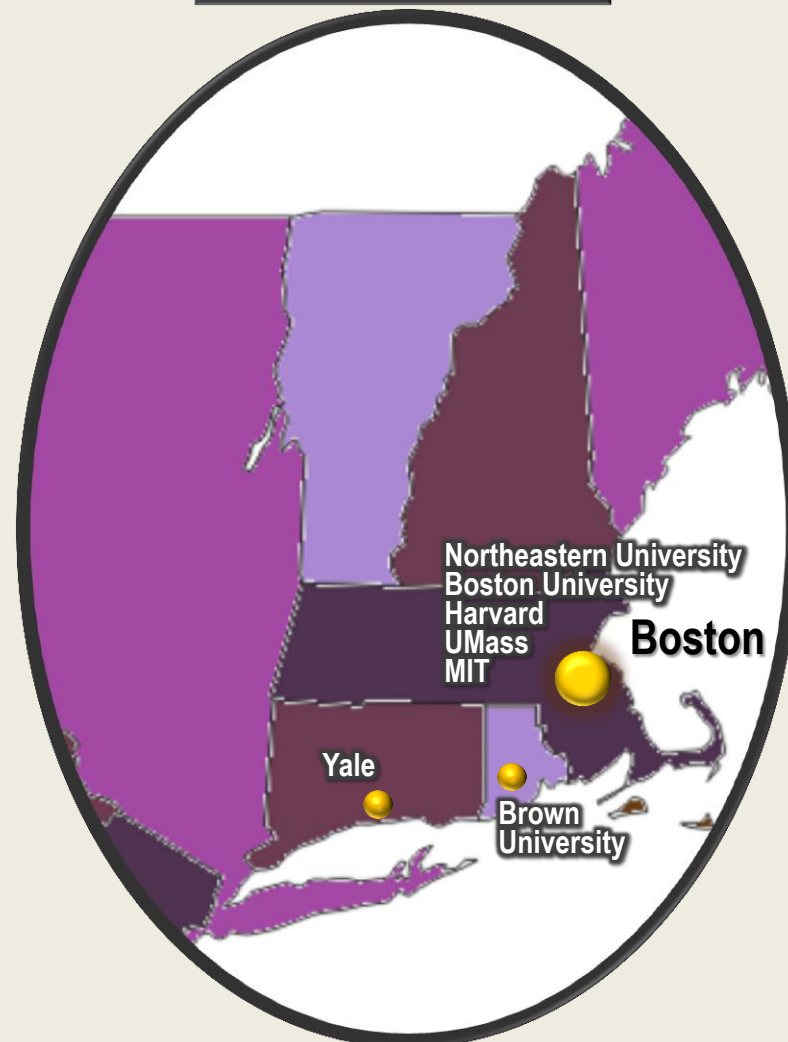
UT San Antonio
Ft. Sam Houston

Established April 2017

ARL Central



ARL Northeast



Target date to start operations: CY2017



- **Increase recruitment of highly talented undergrad & grad students**
- **Establish network of educational partnerships aligned to ARL's technical strategy**
- **Engage underrepresented minority students to pursue advanced degrees in STEM that support the future Army**
- **Increase presence of respected, informed, & talented researchers to provide role models for others who aspire to careers in STEM**
- **Increase number of faculty & students participating in ARL collaborations**
- **Promote sustainability of onsite collaborations & retention of talented researchers**

Program	Level	Time	Description
College Qualified Leaders (CQL)	Undergrad Recent grad	Year Round Summer	Work directly with mentor & receive first-hand research experience
University Career Experience Program (UCEP)	Undergrad Grad	Summer	Enrichment program for college students in STEM related disciplines
Thurgood Marshall College Fund (TMCf) Internship Program	Undergrad Recent grad Grad	Summer	Provide TMCf member-school students with developmental experience to broaden their perspectives & provide practical advanced education <i>(Housing & Travel Allowance available)</i>
ARL Fellowship Program	Undergrad Grad	Year Round	S&E students (BS through PhD) engage in research problems that contribute to ARL research efforts
Thurgood Marshall College Fund (TMCf) Fellowship Program	Faculty	Summer	TMCf member-school faculty work at ARL conducting joint research <i>(Housing & Travel Allowance available)</i>
HBCU/MI Faculty Fellow Research Team Program	Faculty Student Team	Summer	Faculty and student work as a team at ARL conducting joint research <i>(Housing & Travel Allowance available)</i>

New ARL campuses at partner sites will all be very active in recruiting & mentoring students

ARL 1 – Research Assistant, Individual Traits and Training Effectiveness: Predicting the Effectiveness of Gamified Training

Project Name: Individual Traits and Training Effectiveness: Predicting the Effectiveness of Gamified Training

ARL 2 – Research Assistant, Brain Computer Interface for Quality of Information

Project Name: Brain Computer Interface for Quality of Information

ARL 3 – Research Assistant, Real-Time Context-Aware State Estimation and Prediction for Multi-Aspect Analytics

Project Name: Real-Time Context-Aware State Estimation and Prediction for Multi-Aspect Analytics

ARL 4 – Research Assistant, 3D Visualization for Designing View-Dependent Materials & Patterns

Project Name: 3D Visualization for Designing View-Dependent Materials & Patterns

ARL 5 – Research Assistant, Gamification and Wearable Physiological Sensors

Project Name: Gamification and Wearable Physiological Sensors

ARL 6 – Research Assistant, Adaptive Automation Experimentation

Project Name: Adaptive Automation Experimentation

ARL 7 – Research Assistant, Machine Learning, State Estimation, Sensor Modeling

Project Name: Machine Learning with State estimation and Sensor Modeling

ARL 8 – Research Assistant, Geometry Limits in a Game Engine

Project Name: Geometry Limits in a Game Engine

ARL 9 – Research Assistant, Modeling & Simulation with VR

Project Name: Modeling & Simulation with Virtual Reality

ARL 10 – Programmer, Anonymized Human Injury Database

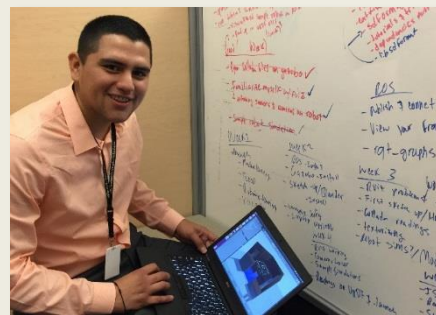
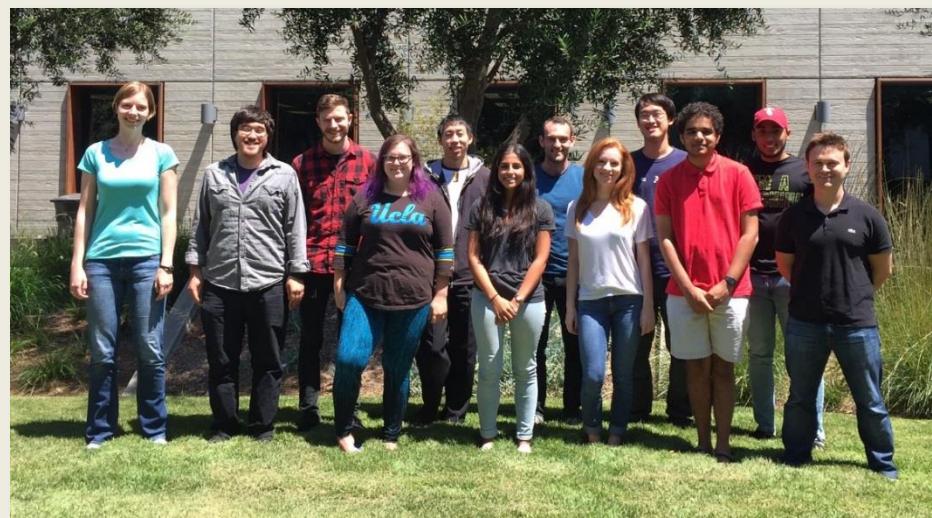
Project Name: Anonymized Human Injury Database

ARL 11 – Research Assistant, The Biomechanics of Ballistic-Blunt Impact Injuries

Project Name: The Biomechanics of Ballistic-Blunt Impact Injuries

ARL 12 – Research Assistant, Integrated Circuit Design

Project Name: Integrated Circuit Design for Army Research Applications





- Open Campus is an experiment that is now well underway
- ARL will improve external engagement with interesting Army problems
 - A far wider engagement with students & faculty across the country
- Extended locations give Army access to others' R&D investments
 - Early access to emerging ideas & concepts
 - Close (local) engagements enables Army to influence private R&D

Defense Science Board: “ARL Open Campus is “a role model to the broader defense research enterprise”

* Defense Science Board Task Force on Defense Research Enterprise Assessment, January 2017