



# The U.S. Army Research Laboratory's Open Campus: Redefining Defense Research

# ARL

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# U.S. Army Research Laboratory



## Mission \_\_\_\_\_

**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**



*Making today's Army and the next Army obsolete*



# The Defense Laboratory

- Inspired by Thomas Edison's vision of "a great research laboratory" maintained by Government; NRL created in 1923
- In 1945, Bush's *Science-the Endless Frontier* became model for scientific pursuits

*"There are certain kinds of research - such as research on the improvement of existing weapons - which can best be done within the military establishment. However, the job of long-range research involving application of the newest scientific discoveries to military needs should be the responsibility of those civilian scientists in the universities and in industry who are best trained to discharge it thoroughly and successfully. It is essential that both kinds of research go forward and that there be the closest liaison between the two groups."*

## Current Defense Laboratory Model

*Gates & High Walls provide 20<sup>th</sup> century security, but are barriers to 21<sup>st</sup> century innovation*

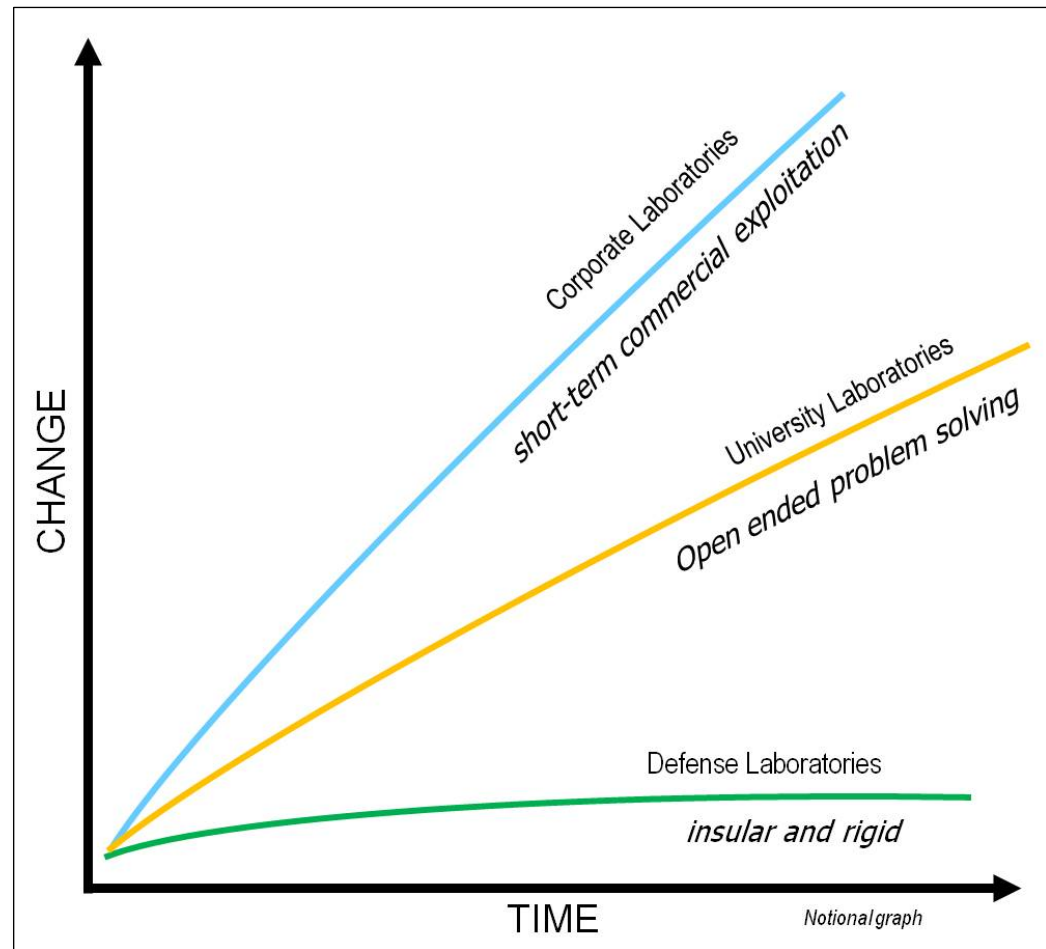
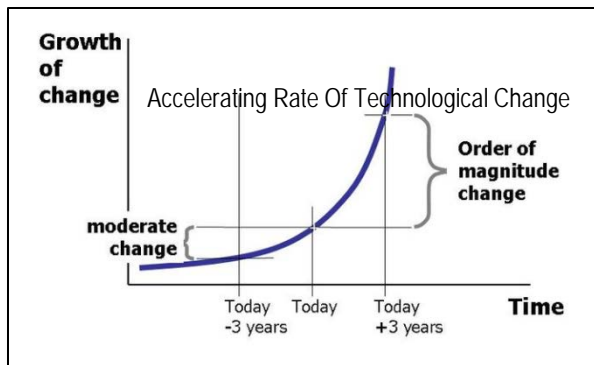


*Defense laboratories relatively unchanged since inception!*



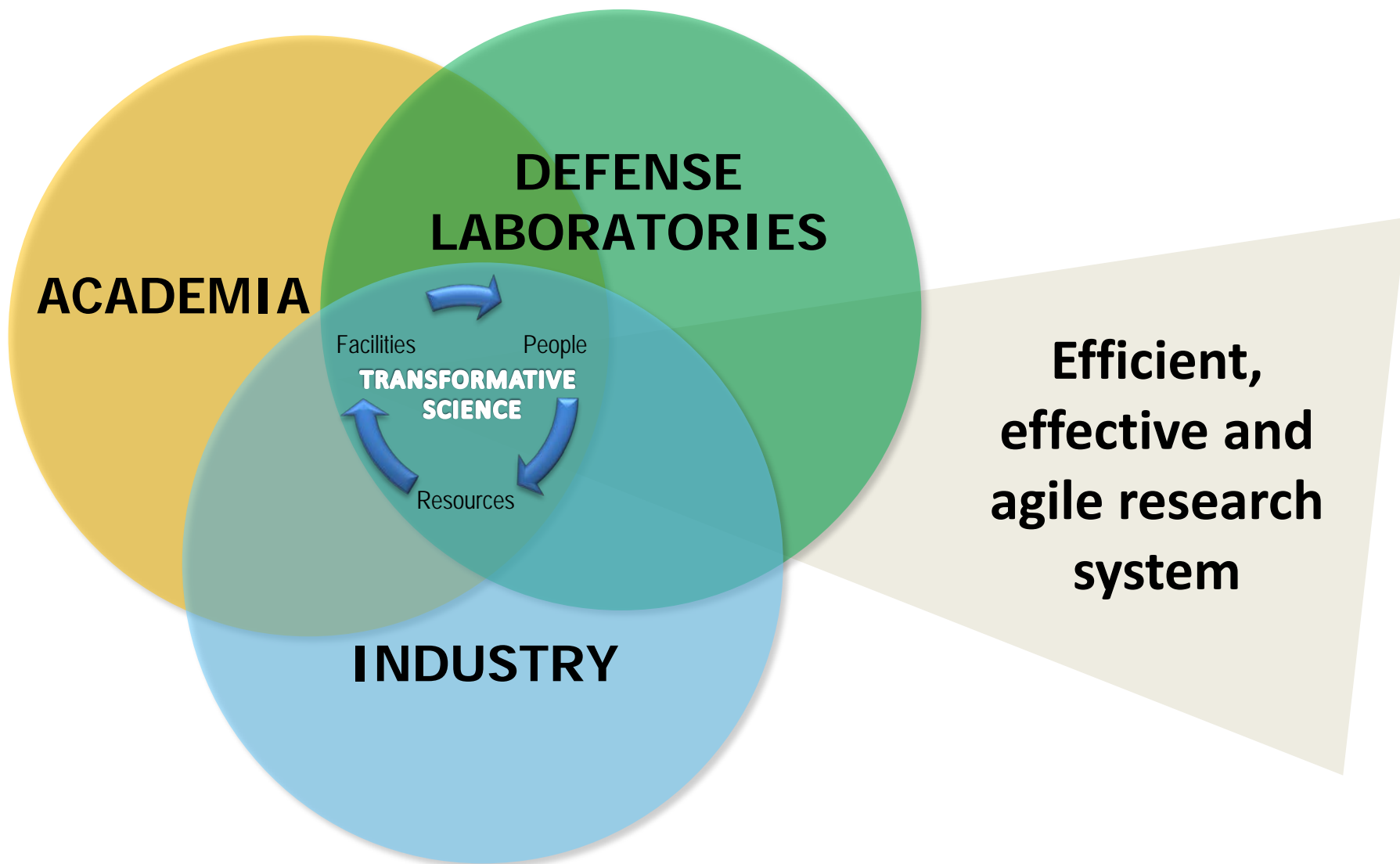
# Current Challenges with Defense Laboratory Model

- Increased number & frequency of threats
- Globalization of science and technology
- Mobility of workforce
- Funding constraints
- Growth in private sector research and innovation
- Requirement to be more efficient and resourceful





# Ideal State





# Addressing Current Challenges

## Piloting a New Laboratory Business Model



# ARL

### Transformation Principles

Flow, Agility, Quality, Efficiency & Effectiveness

Create flexibility and agility to make workforce changes to keep pace with rapidly evolving technologies & national security requirements

**ATTRACT BEST  
& BRIGHTEST**

Enhance partnering with academia, industry, federal labs, & entrepreneurs

**OPEN  
CAMPUSES**

Enable greater sharing of specialized facilities between agencies, private sector partners, and experiment with new models for modernizing labs

**SHARED MODERN  
FACILITIES**

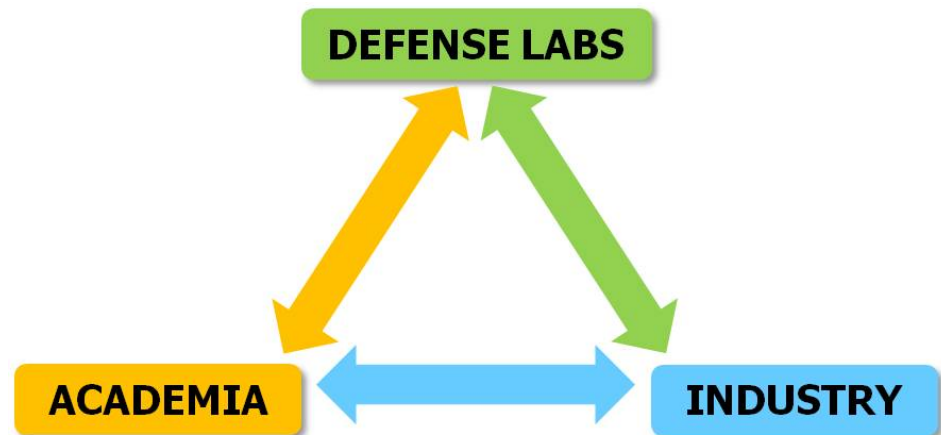
Implement strategies and policies that support exploitation of science and transition to small business and entrepreneurs

**INNOVATION  
PRACTICES**



# Attract Best and Brightest

- **Transforming Human Capital Management Strategy**
- Inject new, quality talent and begin personnel “flow” between government, academia, small-business & industry
  - Allow in-house staff opportunity to work in academic, industry and small business settings
  - Provide government employees opportunities to explore IP ventures
  - Create joint appointments between government, academia and industry
- Increase high-quality, high-impact jobs geared toward future technologies to attract future STEM workforce





# Open Campus

## Attributes

- Campus-like environment with collaborative space
- Ready access for all partners including foreign nationals
- Expansion of academic programs & collaboration
- Access to world-renown facilities and resources
- Synergistic with MD and DC metro area entrepreneur community
  - Better focus of small business innovative research (SBIR) investments



electronic access controls





# Why an Open Campus?

- Universities have built multi-discipline research facilities to encourage the formation of research communities that advance knowledge across traditional boundaries
  - Multi-disciplinary collaborative projects often yield unpredictable, innovative results
  - Multi-disciplinary collaborative projects are best accomplished with co-located teams
  - Physical design of buildings & campuses encourages physical interaction
  - Formal & informal interactions among scientists advance knowledge and promote research breakthroughs

**ARL OPEN CAMPUS IS ADOPTING THESE BEST PRACTICES TO STIMULATE RESEARCH, INNOVATION, AND TECHNOLOGY INFUSION**



# Shared Modern Research Facilities

## Specialty Electronic Materials & Sensors Cleanroom (SEMASC)

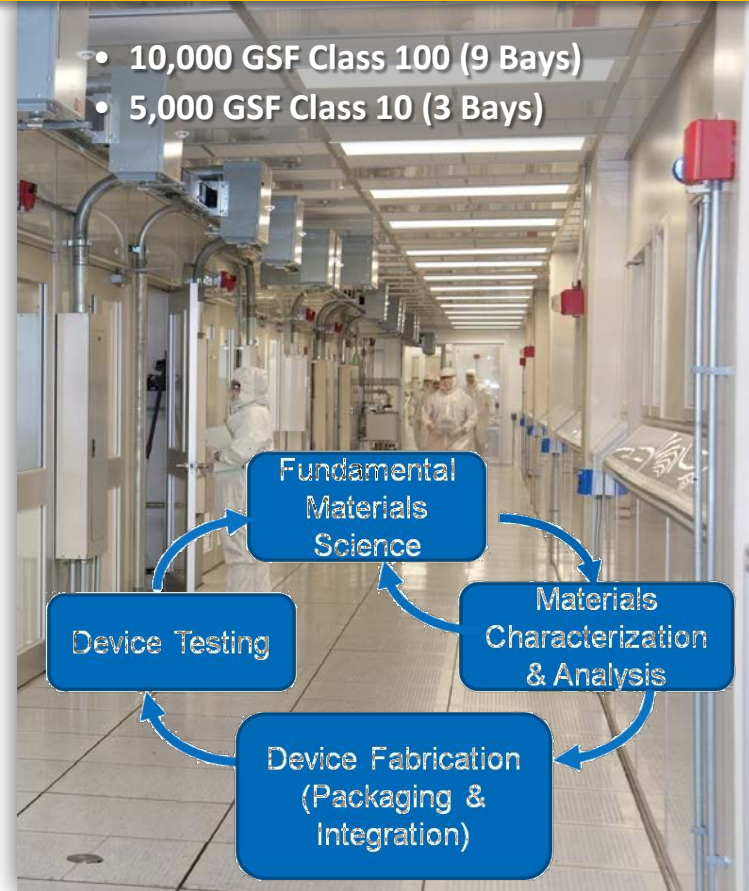
*State-of-the-art semiconductor processing laboratory in Adelphi, MD*

### Permits rapid study of interactions between device design, growth & processing

- Innovative materials, devices, & process technologies allow verification of new materials without impacting ongoing research
- Opto-electronics, nano-science, MEMS, electronics, microscale power conditioning & generation

### Collaborative research performed with domestic partners using *CRADAs, Interagency Agreements and Test Services Agreements*

- Highly collaborative (DoD, industry & academia)



**THE CURRENT DEFENSE LABORATORY MODEL LIMITS FULL PARTNERSHIP**



# Technical Infrastructure



DSRC & Scientific Visualization Facility



Electromagnetic Vulnerability Assessment Facility



B1171 Novel Energetics Research Facility



Microsystem Indoor Testing Grounds



Vertical Impulse Measurement Facility



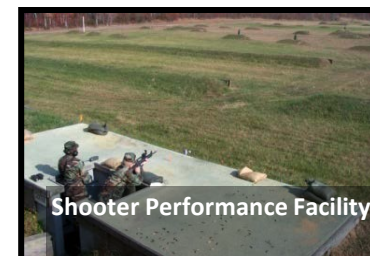
Rotorcraft Survivability Assessment Facility



Zahl Physical Sciences Laboratory



Specialty Electronic Materials and Sensors Cleanroom



Shooter Performance Facility



Robotics Research Facility



Rodman Materials Research Laboratory



Vehicle Research Laboratory



Environment for Auditory Research



Transonic Experimental Facility



Access to Partner Facilities



Pulse Power Facility



Fuel Reformation Laboratory



# Successful Innovation Example

## NASA Research Park (NRP) at NASA Ames Research Center

- World-class, shared-use R&D campus for government, academia, non-profits and industry working in a collaborative and profitable partnership to advance NASA mission
- 70 onsite partners (including 10 universities and over 45 companies)
- Developed culture of collaboration
- Proven business management and processes
- Large-scale leases
  - Google (42 acres 1.2M sf)
  - University Associates (72 acres 3M sf)



*NASA Research Park: 2020 Campus Plan*

- ❖ *2003 U.S. Government “Best Innovative Policy” national award*
- ❖ *National Research Council Review, “new model of industry-government partnerships.”*
- ❖ *National Academy of Sciences “NRP a NASA and National Asset” Paper Presentation 2008*

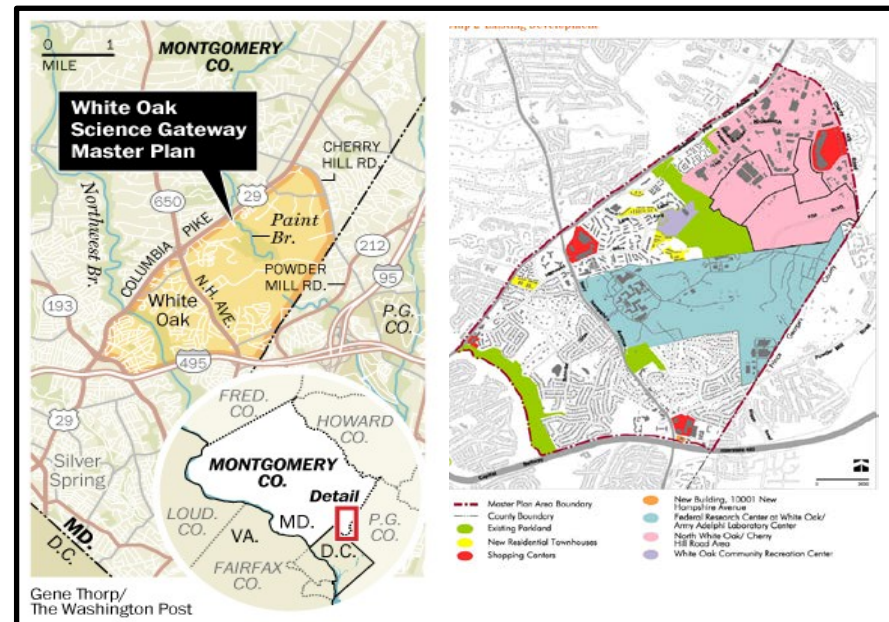


# Benefits to the Army

**ARL Open Campus will be uniquely positioned as a nourishing and dynamic environment for cutting-edge research and education**

**Through this initiative, ARL is creating:**

- A world-class shared-use R&D and education campus for industry, academia, non-profits, and government
- An environment that fosters both informal and formal interactions through careful selection of tenants
- A collaborative and profitable partnership to advance the defense mission
  - ✓ Ability to modernize facilities using leases with annual revenue that is re-invested in the Garrison
- A center that actively promotes innovation and entrepreneurship to develop revolutionary technology for the Soldier



*Montgomery Planning Board advances master plan for White Oak Science Gateway - 19 SEP 13*

- Create a mixed use center with reduced vehicular traffic by 25 % & connection to “purple line” METRO



# Action Plan

- Physically open designated portions of ARL/Adelphi campus to local academic and industry partners
  - Dedicate space for unclassified fundamental research in electronics and intelligent systems
    - State of the art clean room
    - Urban Experimental Facility for autonomous systems & sensing (9,800 ft<sup>2</sup>)
- Build partnerships
  - Conduct recruitment campaign seeking 50-100 visiting researchers by summer of 2014
- Pursue an enhanced use lease agreement to construct modern office spaces while renovating previous office space into lab facilities
  - Establish a Partnership Intermediary Agreement with the state of Maryland and a non-profit R&D organization to facilitate educational partnerships and accelerate technology transfer



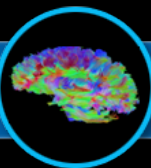
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# ARL S&T Campaigns

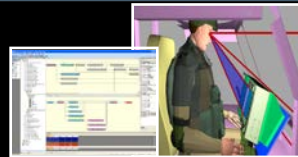
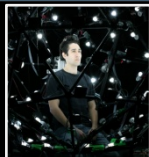
**Extramural Basic Research**

Steering and oversight of the systematic study to increase fundamental knowledge and understanding in physical, engineering, environmental, and life sciences related to long-term national security needs.



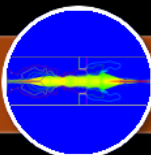
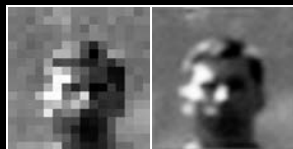
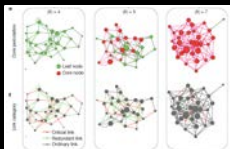
## Human Sciences

Fundamental understanding of Warfighter performance enhancement, training aids, and man-machine integration..



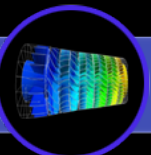
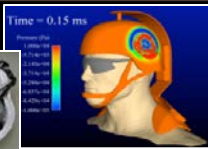
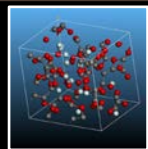
## Information Sciences

Fundamental understanding of information generation, collection, assurance, distribution, and exploitation.



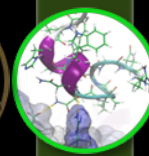
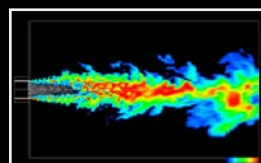
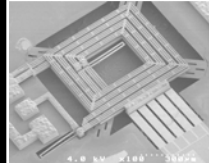
## Sciences for Lethality & Protection

Fundamental understanding of emerging technologies that support weapon systems, protection systems, and injury mechanisms affecting the Warfighter



## Sciences for Maneuver

Fundamental understanding of the design, integration, control, and exploitation of highly adaptive platforms in complex environments



**Computational Sciences**  
Fundamental understanding of computer hardware, high efficiency algorithms, and novel mathematical methods.

**Materials Research**  
Fundamental understanding of structural, electronic, photonic, and energy materials & devices.

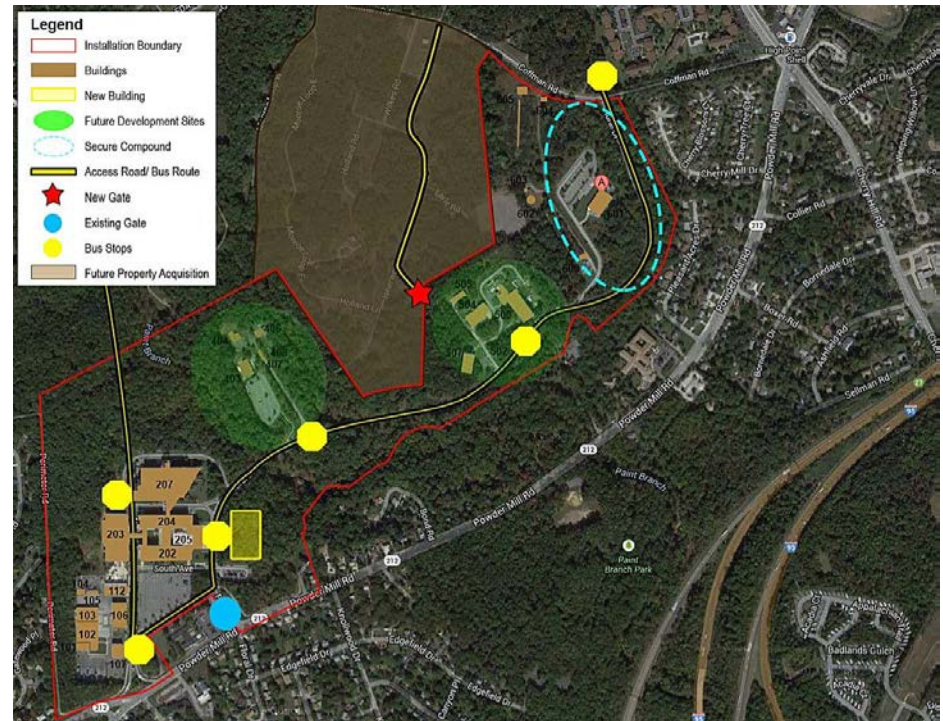
**Assessment and Analysis**  
Quantitatively Assess the development and application of analytical tools and methodologies to quantitatively assess the military utility of Army, DoD, and select foreign combat systems.



# Summary

## ARL Open Campus

- Establishes a new world-class R&D and education campus for the Army
- Leverages Army resources for greater mission benefit
- Improves ARL performance by onsite R&D collaborations with
  - More opportunity for technology advancement and transfer of research knowledge
  - Pursues Army education and outreach goals
  - Provides workforce development opportunities for high-tech careers
- Increases public involvement and understanding of defense science technology and exploration



ARL ALC Future Development





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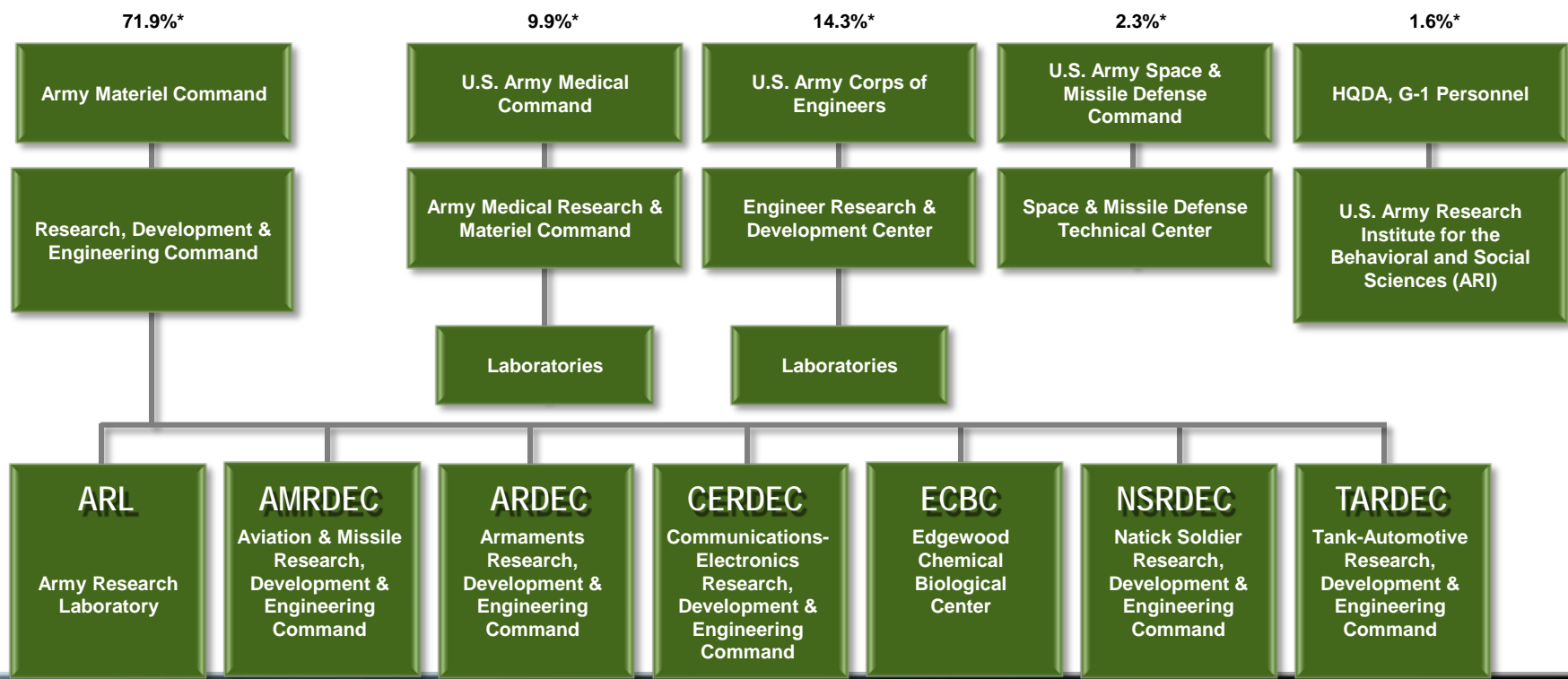
# Backup



# Army S&T Enterprise

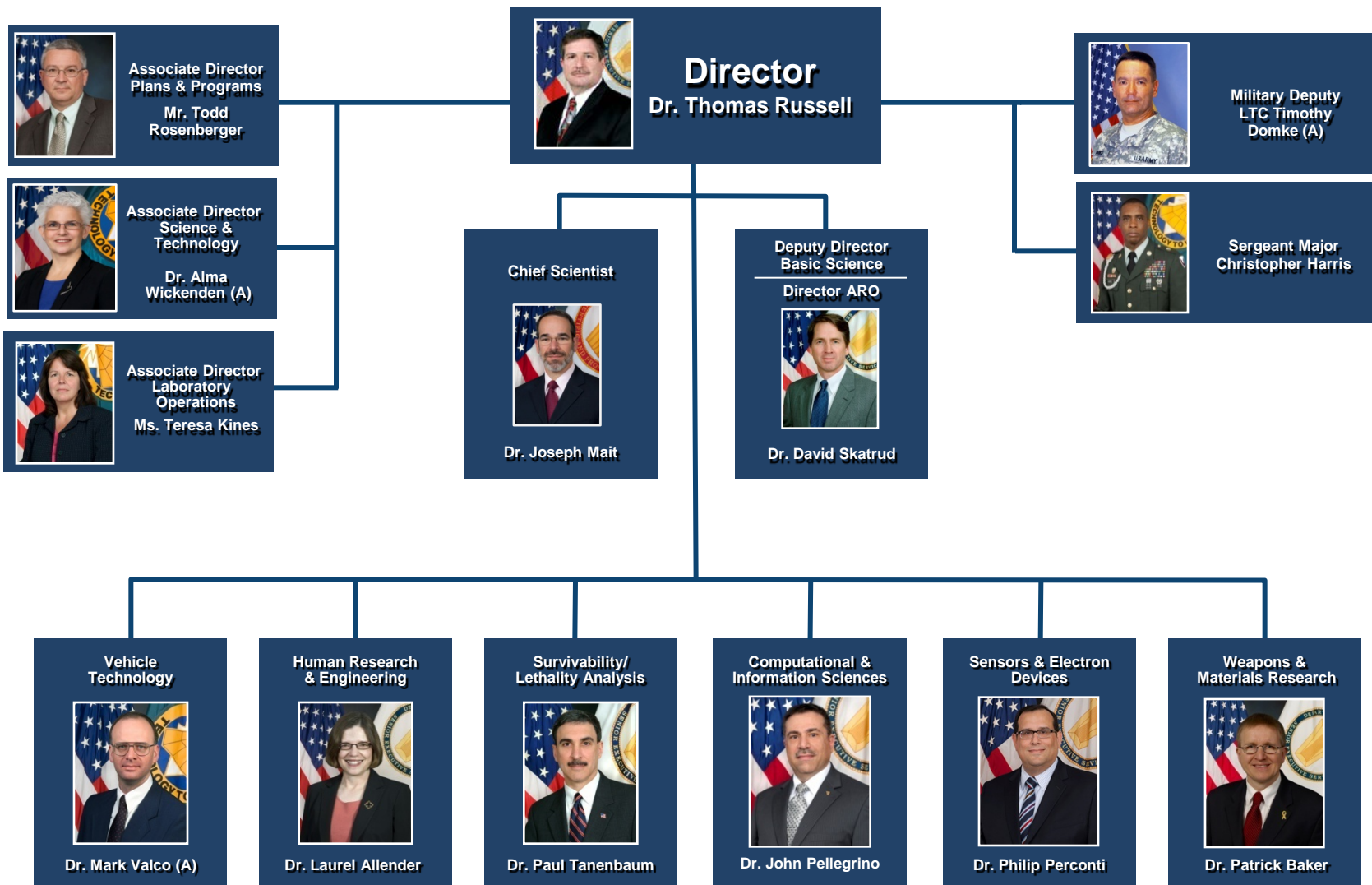


\* Percent of S&T core program executed





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# S&T in RDECOM

