

*"If a genie granted me a wish to spend the summer any way I like, I would use that wish to participate in the **REAP program** again. I learned things from data software to fundamentals of research. It has given me a leg up on college and has inspired me to pursue my interest in independent experimentation and research. This has been one of the most valuable summer of my high school years. I am grateful for the opportunity and knowledge **REAP has given me. Thank you.**" -REAP APPRENTICE*

IT STARTS
HERE.



Army Educational Outreach Program

26 February 2015

Andrea E. Simmons-Worthen

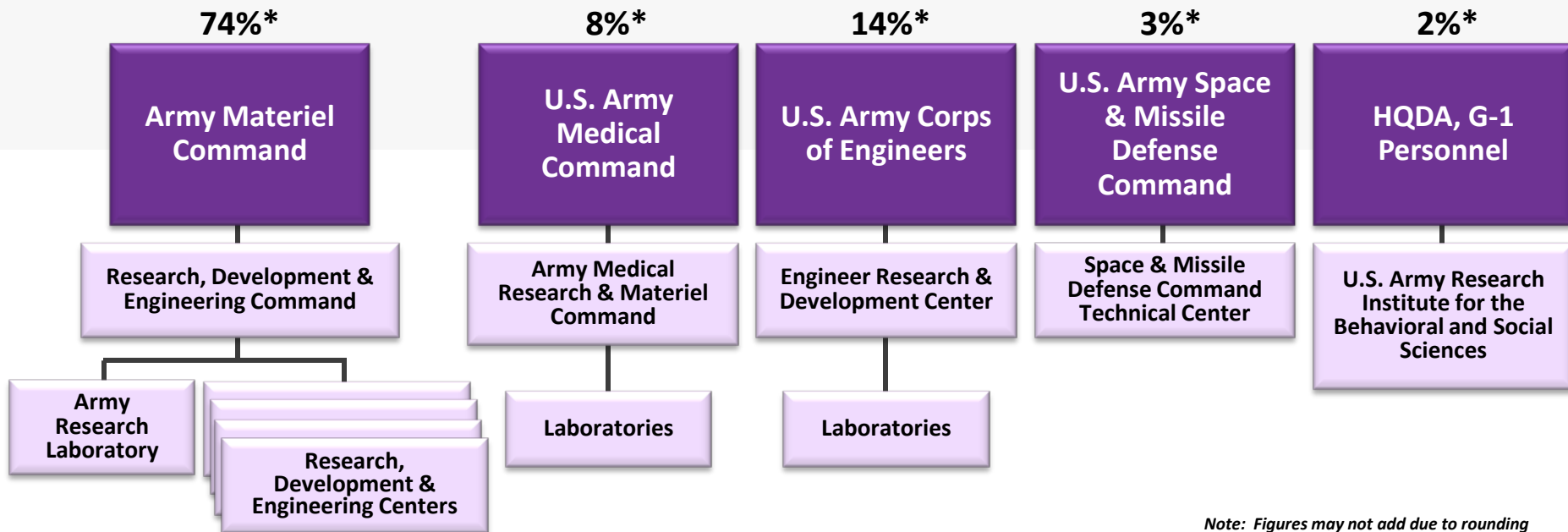
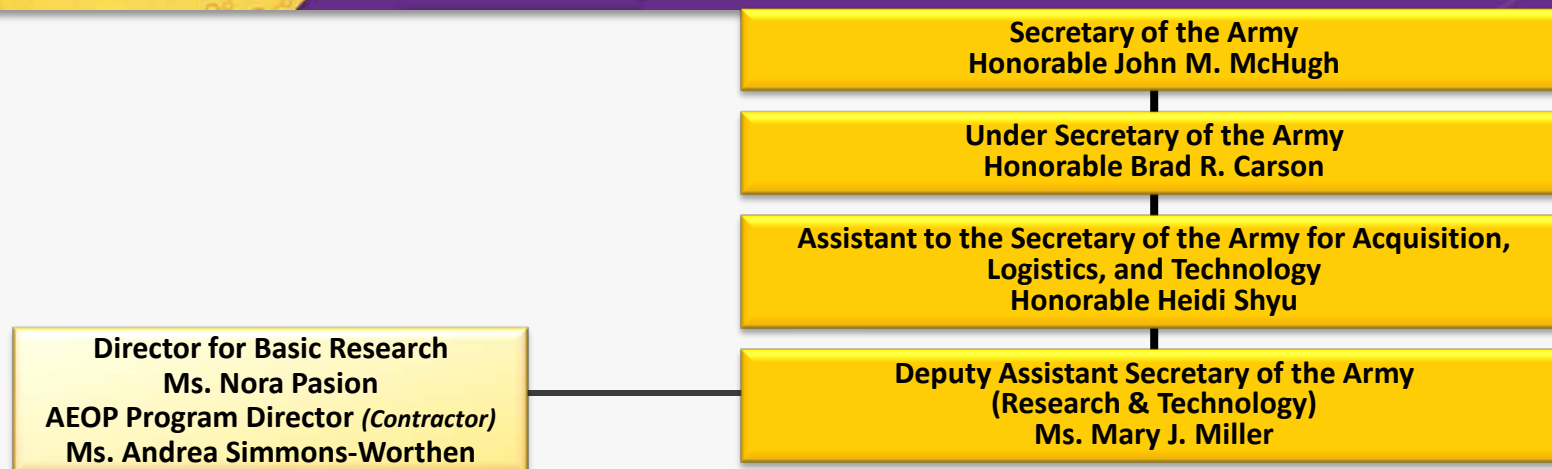
Army Educational Outreach Program Director

Camber Corporation

Support Contractor to the Deputy Assistant Secretary of the
Army for Research & Technology (DASA R&T)



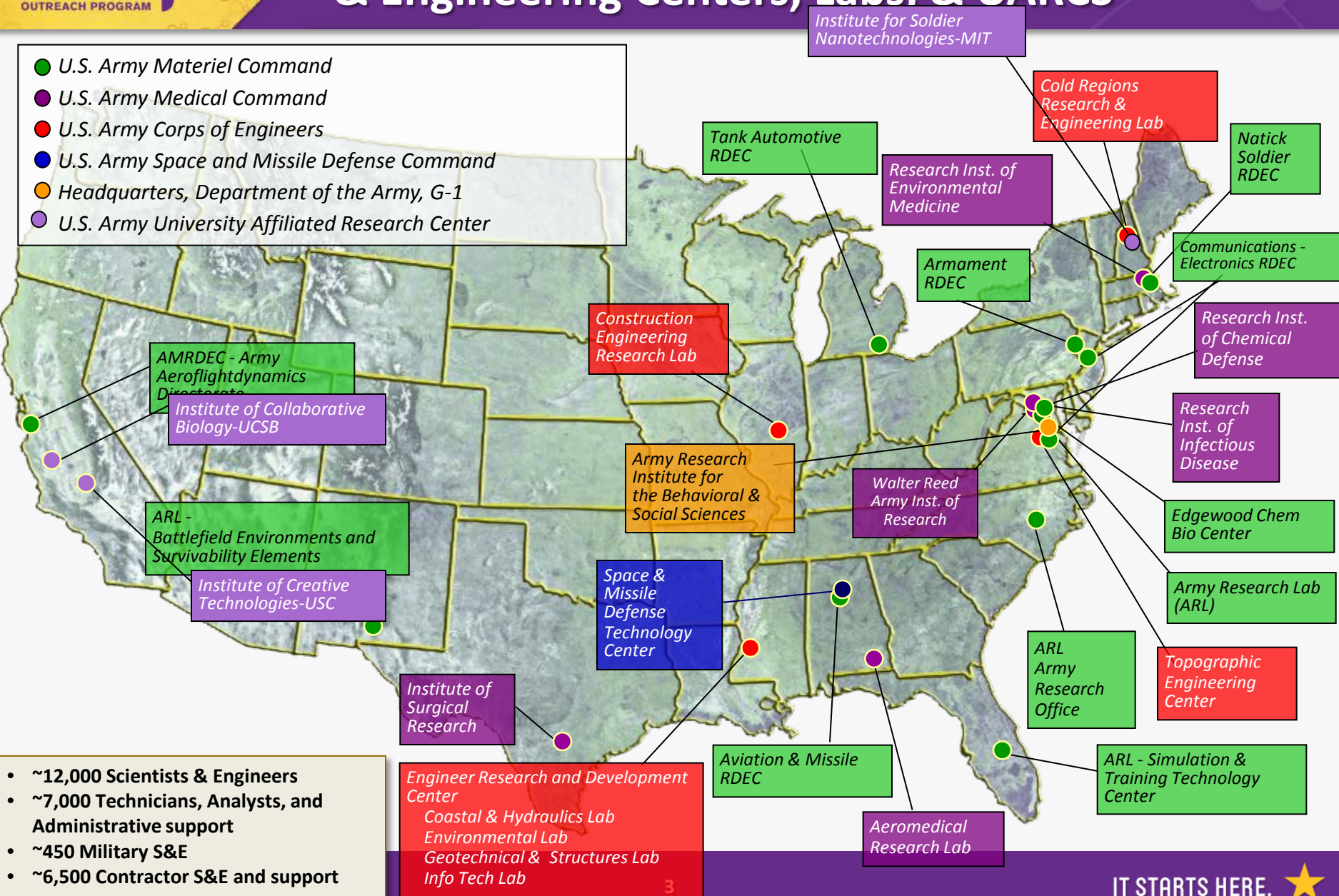
Army Science & Technology (S&T) Enterprise



Note: Figures may not add due to rounding

Army S&T Enterprise—Research, Development & Engineering Centers, Labs. & UARCS

- U.S. Army Materiel Command
- U.S. Army Medical Command
- U.S. Army Corps of Engineers
- U.S. Army Space and Missile Defense Command
- Headquarters, Department of the Army, G-1
- U.S. Army University Affiliated Research Center



- ~12,000 Scientists & Engineers
- ~7,000 Technicians, Analysts, and Administrative support
- ~450 Military S&E
- ~6,500 Contractor S&E and support

“ We don't even know what skills may be needed in the years ahead. That is why we must train our young people in the fundamental fields of knowledge, and equip them to understand and cope with change. That is why we must give them the critical qualities of mind and durable qualities of character that will serve them in circumstances we cannot now even predict.”

-- John Gardner, former Secretary of Health, Education and Welfare under President Lyndon Johnson, "Excellence: Can We Be Equal and Excellent Too?" (1961)

We need to prepare students for jobs that don't yet exist, using technologies that haven't yet been invented



The National STEM Challenge

- There is an emerging demand on STEM competencies both within and beyond traditional STEM occupations
- The global competitiveness for STEM talent is strengthening
- The STEM prepared talent emerging from traditional U.S. education experiences is not adequately supplying the demand
- There is an unbalanced representation of our nation's demographics in STEM fields
- There is a critical need for an agile and resilient STEM workforce to prepare for both current and emerging STEM fields

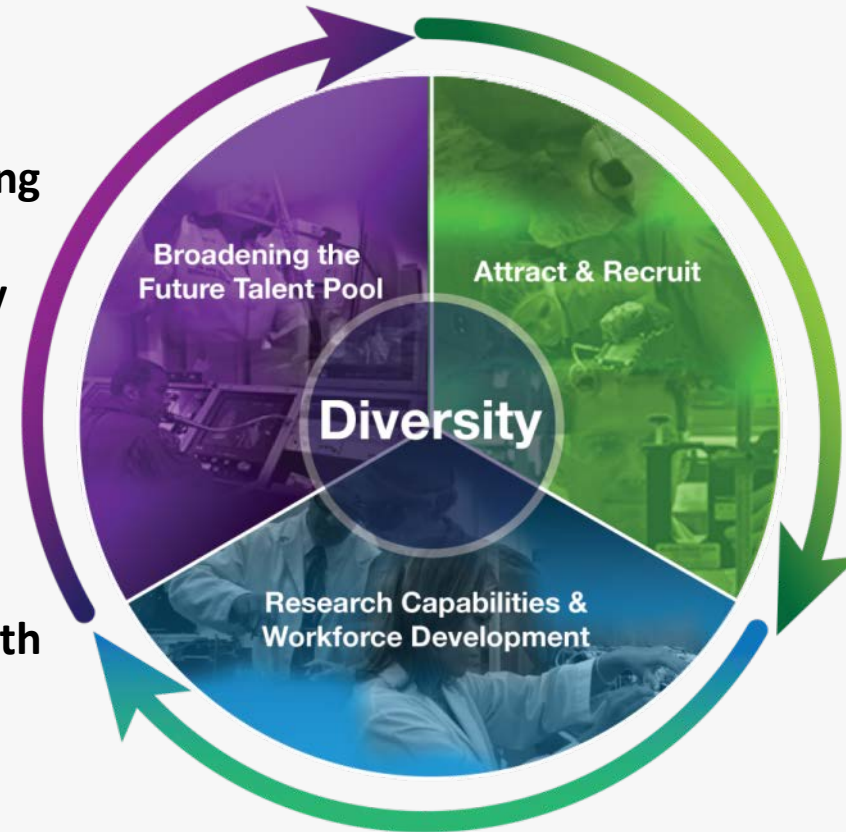
*References: 2011 STEM Report, Georgetown University Center on Education and the Workforce.
2010 Report to the President, Prepare and Inspire: K-12 Education in STEM for America's Future.
2013 Federal Science, Technology, Engineering, and Mathematics (STEM) Education 5 year Strategic Plan.
2013 National Academies Report, Assuring the U.S. DoD of a Strong STEM Workforce*

Army Implications

- The Army is critically dependent on a pool of home-grown, STEM literate talent to enter higher education or the workforce which in turn directly support the defense industry and the Army S&T needs
- The Army is concerned not only with the 21% of S&T occupations but with the workforce as a whole, dependent on STEM competencies that are in demand both within and outside traditional STEM occupancies
- The Army is concerned with the unbalanced representation of our Nation's demographics in STEM fields
- The Army offers a unique and valuable asset to the President's "all-hands on deck" approach to STEM education
 - Scientists & engineers to serve as mentors
 - Highly equipped laboratories and research centers

The Army STEM Requirements

- The Army Employs over 23,000 world-class scientist and engineers as direct military, civilian, or contracted human capital
- STEM fields are critical to generating and supporting the new ideas that the government, industry and academia depend on to ensure our Nation not only remains globally competitive but also remain the world's lead in cutting-edge technology
- Multidimensional and cross-disciplinary STEM competencies are not only essential to supply specific technical talent for our research centers with experts in immersing new fields but also critical to fill our workforce with STEM-literate talent for the research and analysis work that the Army does across every field



The health of the Army, and our Nation, is dependent on our continuing and readily available supply of US STEM capabilities

History of AEOP

Army STEM (1950)

The Army has a long history of program support investing in our future STEM capacity...even before the term STEM was vogue. The Army S&T capabilities are directly correlated with the availability of STEM talent as well as its ability to meet not just current STEM needs, but be able to have the STEM workforce agility to meet emerging STEM demands that can not be foreseen. Research shows that the government has been not just bad, but “abysmal”*, at forecasting our S&T workforce demands due to the nature of innovation.

* NRC Study “Assuring DoD a Strong STEM Workforce” (2013)

Army STEM Coordination – AEOP (2004-2006)

Research starts to highlight US interest and national security is at risk due to a rising trend among the global economy to invest in STEM capacity and the US clearly falling behind. Congress commissioned a study highlighting the STEM challenge. The Army “gathers its troops” to examine how to collectively addressing the rising challenge and established the Army STEM Executive Board among our S&T Directors to provide leadership and direction to STEM investments. Out of this Army collaboration effort, the AEOP was born...

* National Academies “Rising Above the Gathering Storm Energizing And Employing America for a Brighter Economic Future” (2007)

Army STEM Consolidation and Strategy (2008-2010)

STEM goes vogue...and in a resource restricted environment, everyone became STEM experts. The Army started to reign in a common message among its stakeholders and partners while finding SME in STEM Programs and Evaluations. The result was there were a lot of strongly established opinions and theories but no common practice that could provide proven or excepted method of evaluation for informal STEM experiences or competitions. With research emphasizing the demand for mentors, STEM career awareness, and exposure to research and technology being major indicators in STEM interest and retainment, the Army examined its approach. Recognizing the limited funding capacity to meaningfully engage in STEM for the national interest, the Army got creative and the AEOPCOA was born...

History of AEOP (cont'd)

Army STEM Management – AEOPCOA (Sep. 2010)

VT, along with a consortium of well established STEM partners, joined team AEOP! The Army, and it's partners, had to relearn everything. In 2013 we started to align to evidence based approaches and provide program documentation that truly captures the work that we do together.

Federal STEM Consolidation (2013 -)

After several unsatisfying attempts to answer congressional demands for a “cohesive and coordinated” STEM strategy among Federal agencies, OSTP lead a group to examine efficiencies, best practices, and strategy for Federal investments. The result is a published 5-Year Federal STEM Strategy that “terminated” STEM efforts for a more focused, teacher driven approach to STEM education lead by ED. Informal education initiatives were to be lead by the Smithsonian, and undergrad/graduate investments NSF.



FEDERAL SCIENCE, TECHNOLOGY,
ENGINEERING, AND MATHEMATICS
(STEM) EDUCATION

5-YEAR STRATEGIC PLAN

A Report from the
Committee on STEM Education
National Science and Technology Council

MAY 2013



Five priority areas –

- Improve P-12 STEM instruction
- Improve undergraduate STEM education
- Increase and sustain youth and public engagement in STEM
- Better serve groups historically underrepresented in STEM fields
- Design graduate education for today's STEM workforce

The Department has unique assets that play an important role in STEM education – our STEM professional workforce and our highly equipped research laboratories.

Evidence-based Approaches to STEM Education

- “Conduct STEM education research and evaluation to build evidence about promising practices and program effectiveness, use across agencies, and share with the public to improve the impact of the Federal STEM education investment.”
- “...increase use of research studies and program evaluation to identify and test practices and approaches for their effectiveness...findings about effectiveness will be shared.”
- “...where evidence is only suggestive of promise...evidence base is built as the program is implemented.”
- “...programs will rest on or scale-up evidence-based practices.”

AEOP Centralized Budget

- **Centralized core funding**
 - 0601104A: University and Industry Research Centers
 - J14: Army Educational Outreach Program
 - Consolidated funding 2013
- **Additional funds**
 - Navy & Air Force funds supporting JSHS
 - Student stipends are supported by participating laboratories

	2011	2012	2013	2014	2015	2016
0601104	3.628	5.417	9.593	9.733	9.550	9.466

Information is publically available at

http://www.dtic.mil/descriptivesum/Y2013_Army.html

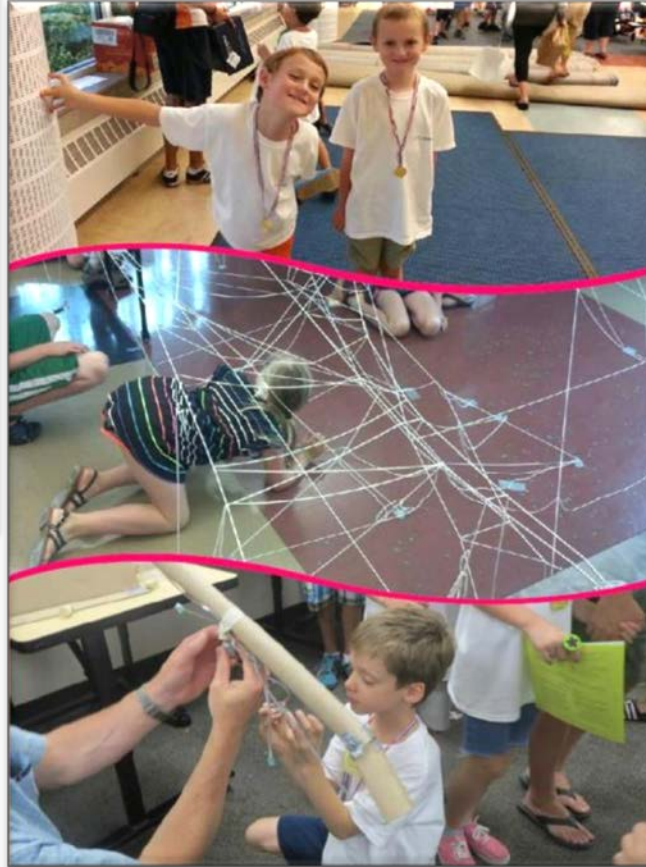
**FY16 is planned but not approved funding*

Ability to operate in an austere budget environment

Student Stories: Camp Invention



"My kids are in three different groups due to their ages and they loved sharing at the dinner table who got the least number of degrees on the insulation experiment. All three said they would like to go back next year!!! Thank you"



"My son loved Planet ZAK and proud to have built the best shelter in the Orange group."



THEY WILL DISCOVER WHAT THEY DIDN'T KNOW THEY WERE CAPABLE OF.

Student Story: Broadening the STEM Talent Pool



Immerging innovators with their Near-Peer mentors at the WRAIR. From left to right: Morganne Kelliebrew, Malik Kbrue, Michael Melton, Myles Thomas-Bangor, Dr. Debra Yourick, Director Science Education; Patricia Story, Medical Illustrator; and Jason Carey.

“If you think about the world by jumping to conclusions, you’re going to be left behind, but if you think about the world by making observations, and then trying to figure out what that means, then you are going to be ahead of the game; you’re going to be successful because you are always going to be thinking about what something means and not listening to what other people tell you it means. That’s what science is about, that’s where discoveries come from”.

-COL Steven Edward Braverman, M.D., Commander for the Walter Reed Army Institute of Research, Silver Spring, MD, speaks to GEMS students in a week long STEM experience at WRAIR

Student Story: Saumil Bandyopadhyay

Maximizing Capabilities



Saumil Bandyopadhyay, a high-school senior at Maggie L. Walker Governor's School in Richmond, Virginia, didn't wait until graduation to begin growing novel technologies for use by cutting edge organizations.

Mentor: Dr. Gary C. Tepper, Virginia Commonwealth University

"I believe that although it is nice to understand something theoretically for knowledge's sake, it is more important to apply it."

– Saumil Bandyopadhyay, Glen Allen, Virginia



Student Story: Nicole Racine

Nurturing STEM Interests



Nicole Racine, representing AEOP at the opening of the STEM Education Outreach Center in APG, MD

"I love working in this [Army Research Laboratory] lab because I know the research is directly applicable to real-life situations. I know that I have a role in ensuring the safety of our Soldiers. The Army Educational Outreach Programs that I participated in, from GEMS to SEAP to CQL, have given me valuable, hands-on lab experience that I would not have attained otherwise."

"GEMS helped me realize what I can do with science and engineering," Racine said. "I officially developed a passion that will last me for the rest of my education."

Future Innovation Depends on the Future of our Youth



“In a global economy where the most valuable skill you can sell is your knowledge, a good education is no longer just a pathway to opportunity – it is a prerequisite.”

-- President Barack Obama, State of the Union Address, February 24, 2009

“Be the change you want to see in the world.”

– Mahatma Gandhi

“We don’t want our kids just to be consumers of the amazing things that science generates; we want them to be producers as well.”

– President Obama, April 2013, National Academies of Science

Questions?



BACK UP SLIDES

- **ASA(ALT) is the delegated STEM Educational Outreach Authority for the Army, further re-delegated to DASA(RT)**
- **Programmatic oversight by Director for Basic Research under advisement of an Integrated Process Team with representation from the Major Commands – AMC/RDECOM, MEDCOM, USACE, G-1/ARI, SMDC and the USMA**
- **Programs reviewed annually**
- **Executed through the Commands**
- **Major initiatives include:**
 - **a holistic marketing strategy to engage students in the pipeline of programs available across commands**
 - **a comprehensive program review and assessment against program goals**
 - **identification of gaps**
 - **planning to mitigate challenges and close strategic gaps**
 - **strategic program decisions based on meaningful metrics**

Title 10 – §2192.

Improvement of Education in Technical Fields: General Authority Regarding Education in Science, Mathematics, and Engineering

a) The Secretary of Defense, in consultation with the Secretary of Education, shall, on a continuing basis—

(2) establish and conduct programs to carry out such actions.

b)

(1) In furtherance of the authority of the Secretary of Defense under any provision of this chapter or any other provision of law to support educational programs in science, mathematics, engineering, and technology, the Secretary of Defense may, unless otherwise specified in such provision—

(A) enter into contracts and cooperative agreements with eligible entities;

(B) make grants of financial assistance to eligible entities;

(C) provide cash awards and other items to eligible entities;

(D) accept voluntary services from eligible entities; and

(E) support national competition judging, other educational event activities, and associated award ceremonies in connection with these educational programs.