



Centers of Academic Excellence in Cyber Security (CAE-C)

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National Centers of Academic Excellence in Cybersecurity (CAE-C)



- New paradigm for CAE in Cybersecurity (CAE-C)
 - NSA/DHS CAE in Cyber Defense (CAE-CD)
 - CAE in Cyber Defense Research (CAE-R)
 - CAE in Cyber Defense Education (CAE-CDE)
 - CAE in Cyber Defense 2Y Education (CAE-2Y)
 - NSA CAE in Cyber Operations (CAE-CO)

Centers of Academic Excellence (CAE) Purpose

CAE in Cyber Defense (CAE-CD)

- Creating the workforce
our Nation needs
- Reduce national infrastructure vulnerabilities
 - Promote CD higher education & research
 - Grow number of professionals with cybersecurity expertise



CAE in Cyber Operations (CAE-CO)

- Creating the workforce
DoD, IC & NSA need
- Complementary to the CAE-CD program
 - Deeply technical, BS/MS level programs
 - Offers a 12 week summer internship to gain knowledge of cyber operations topics & to work real world mission related challenge problems.



CAE: Creating Tomorrow's Workforce

CAE in Cyber Defense (CAE-CD)

Began in 1999 with seven Institutions designated

As of 2016, designations:

- CAE-R: 64
- CAE-2Y: 40
- CAE-CDE: 128

Target: Yearly 10% growth in each designation – continuous community input on standards

CAE in Cyber Operations (CAE-CO)

Began in 2012 with four Institutions designated

As of 2015:

- 14 Designated Institutions

Target: Around 25 institutions designated – standards continually elevated

Re-designation every 5 years

Increase Info sharing between CAEs

SEALs

Common Criteria for CAE-C Institutions

- Robust Program
- Physical or Virtual (hands on) Labs
- Active Faculty in Cyber Research
- Students in Cyber Research & Cyber Activities
- Student Recognition
- Multidisciplinary
- Outreach to Community
- Academic Requirements: Knowledge Units

Common Knowledge Unit Examples

- Mandatory (examples)
 - Networking Concepts
 - Cyber Defense
 - Security Fundamental Principles
 - Legal
 - Programming
- Optional (examples)
 - Secure Software Development
 - Risk Management
 - Forensics
 - SCADA Systems



CAE Cyber Defense Designation

- Promote Higher Education & Research in CD
 - Prepare growing number of CD professionals in various disciplines
 - Reduce vulnerabilities in Nation's networks & infrastructure
- Broader Technical Skill Set for the Defensive Cyber Space Mission across the Nation

CAE Cyber Defense Designation Requirements



- Academic Requirement – KU Mapping
 - CAE-2Y: 11 Core
 - CAE-CDE: 17 Core + 5 Optional
- Program Requirement
 - Program Outreach
 - CD Center Establishment & Maintenance
 - Student Curriculum Path & Recognition
 - CD Multidisciplinary Efforts
 - Practice of CD at Institution Level
 - CD Faculty

CAE Cyber Defense Program Outreach

- Shared curriculum or shared faculty
- Student access to CD practitioners
- Articulation/Transfer agreements with other Institutions & high schools
- Sponsorship/participation in Cybersecurity competitions
- Community Outreach

- **Cyber Center & Website**
 - Program guidance
 - General CD information
 - Cyber competitions, events, & news
 - Journals available to students & faculty
 - Labs & equipment; hands-on learning
- Promotes collaboration & interaction with other students, faculty, and programs

CAE Cyber Defense Student Development

- Cybersecurity degrees, areas of study, track or certificates
- Applied training for students
- CD student recognition

CAE Cyber Defense Multidisciplinary Science

- CD treated as a multidisciplinary science with elements of CD knowledge incorporated into various disciplines
 - CD taught in existing non-CD courses
 - Non-technical/non-CD students are introduced to CD
 - CD programs require non-technical courses of study
 - Non-credit/credit professional development courses in CD

CAE Cyber Defense Practice of Cybersecurity



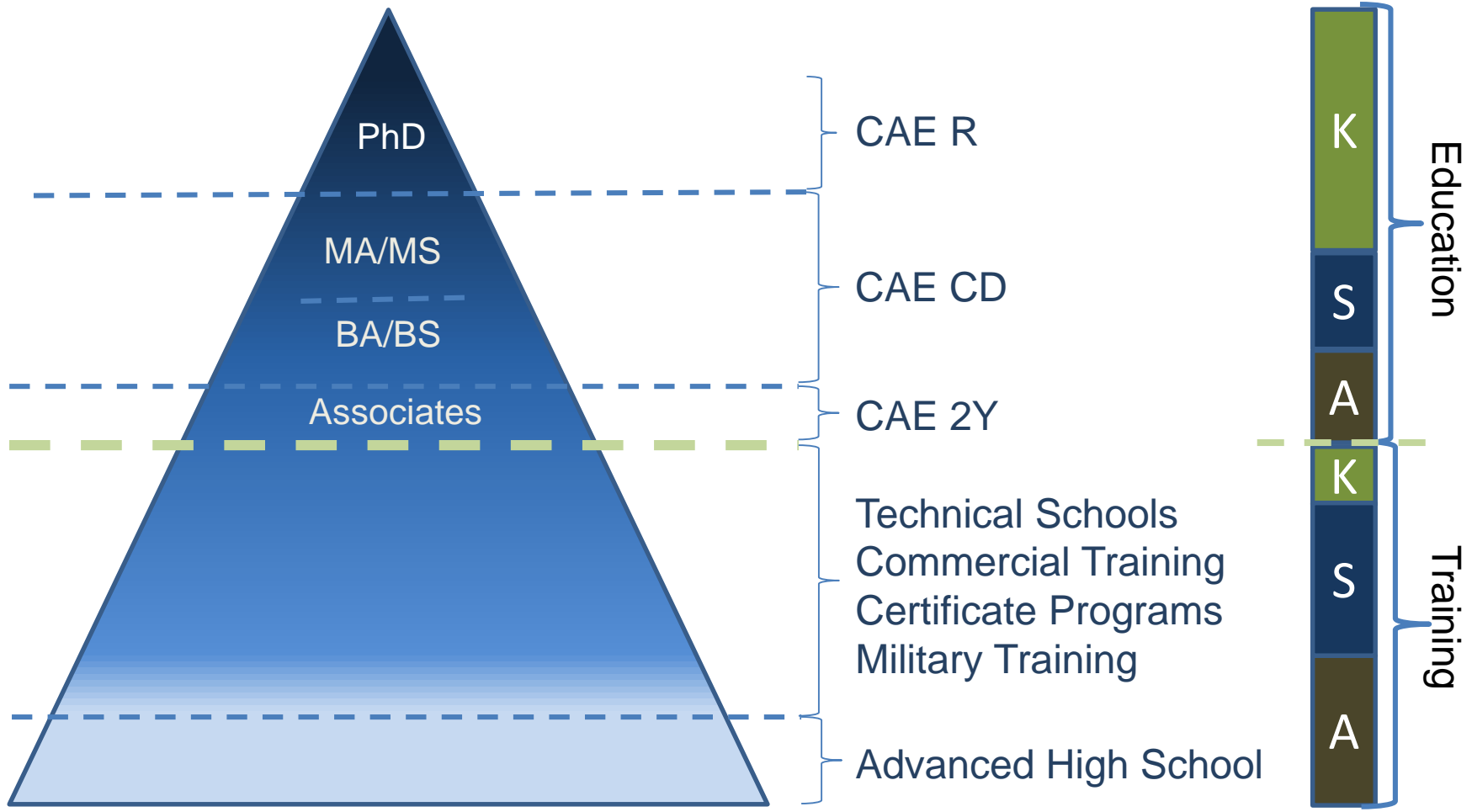
- Institution encourages practice of CD - not merely teaches CD
 - Institution Cybersecurity plan and/or policies
 - Institution designated Information System Security Officer or equivalent
 - Institution encourages CD awareness throughout the campus



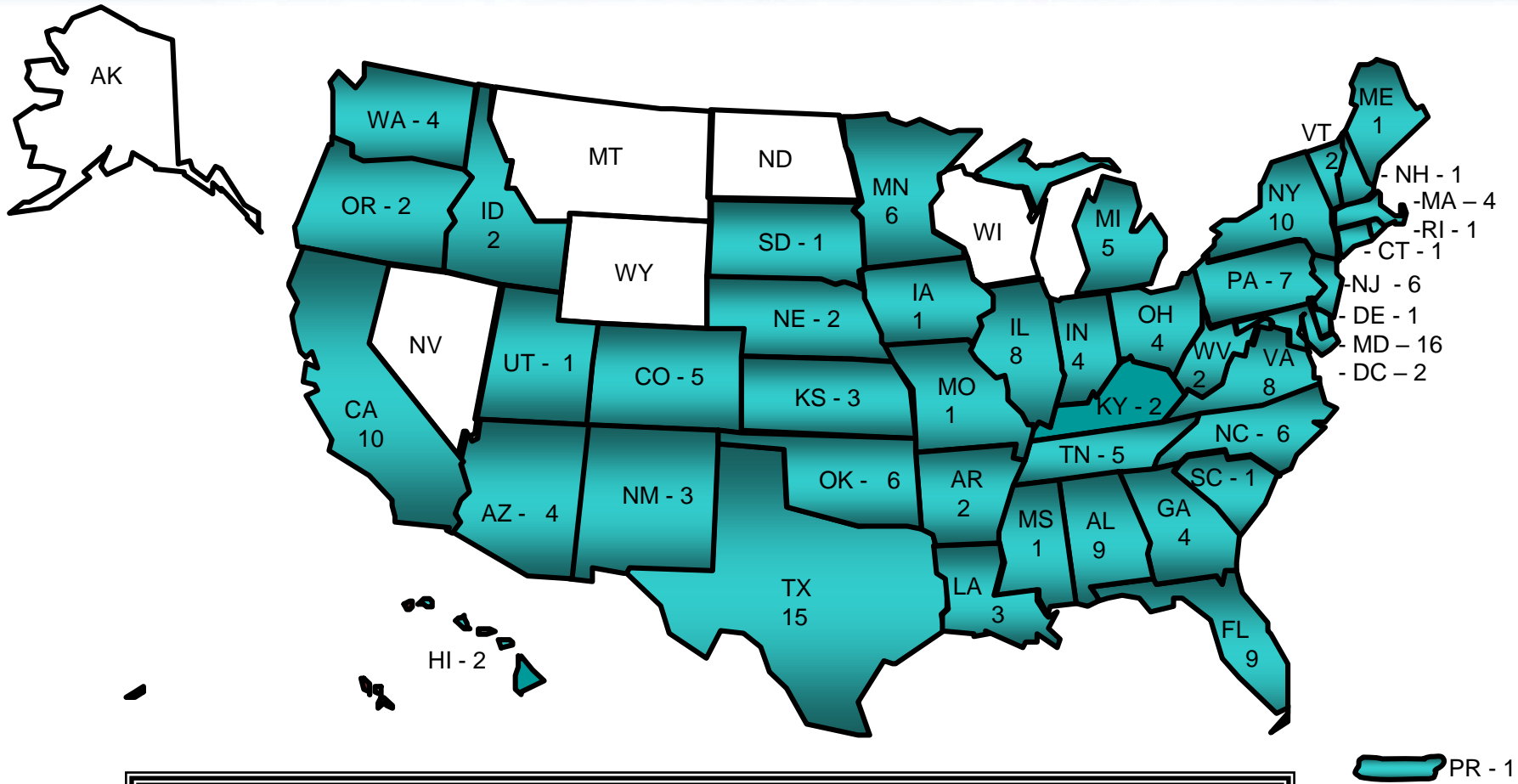
CAE Cyber Defense Faculty

- Faculty assigned specifically to teach and/or develop CD courses/curriculum/modules
 - Person with overall responsibility for CD program
 - Additional Cybersecurity faculty teaching CD courses
 - Evidence of faculty qualifications to teach Cybersecurity

CAE Cyber Defense & Cyber Workforce

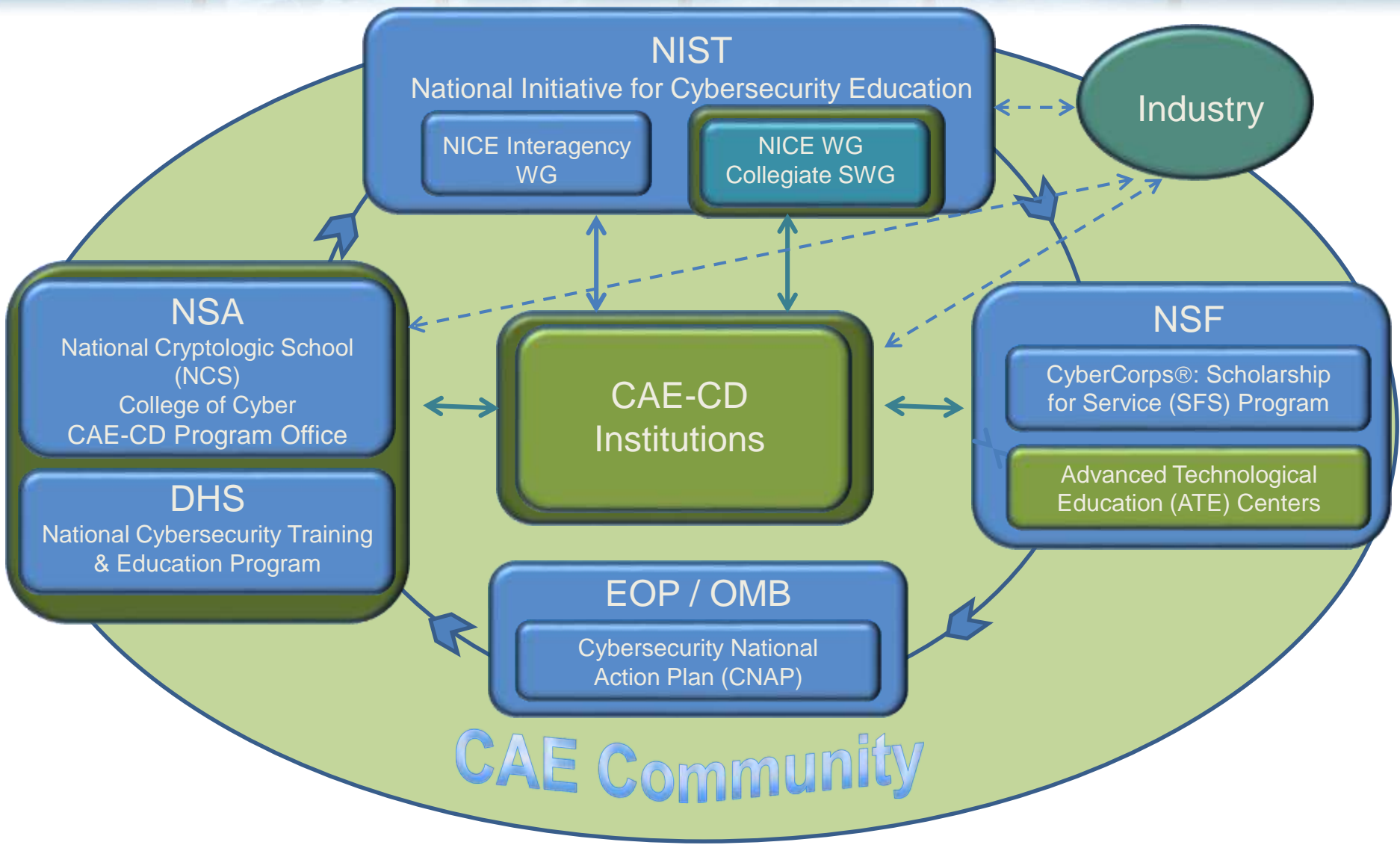


CAE Cyber Defense Designated Institutions



64 CAE-R, 128 CAE-CDE, and 40 CAE-2Y, totaling 194 CAEs (40 are both CDE and R) in 44 states + District of Columbia and Commonwealth of Puerto Rico
https://www.iad.gov/NIETP/reports/cae_designated_institutions.cfm

CAE Cyber Defense Program Partnerships



CAE Cyber Operations Program Details

- Supports the President's National Initiative for Cybersecurity Education (NICE): Building a Digital Nation
 - Furthers the goal to broaden the pool of skilled workers capable of supporting a cyber-secure nation
- Academic Requirement – KU Mapping
 - 10 Mandatory Requirements
 - 10 of 18 Optional Requirements
- Deeply technical skill set for the offensive cyber space mission including collection, exploitation, and response
- 2 Part Program
 - CAE-CO Designations and CAE-CO Summer Internship

CAE in Cyber Operations Designees



2012

Dakota State University
Naval Post Graduate School
Northeastern University
University of Tulsa

2013

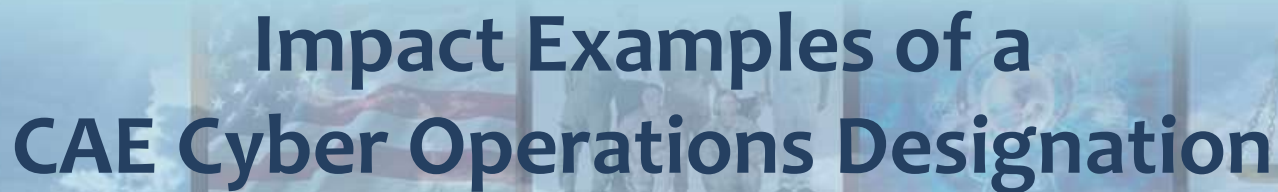
Air Force Institute of Technology
Auburn University
Carnegie Mellon University
Mississippi State University

2014

New York University
Towson University
United States Military Academy
University of Cincinnati
University of New Orleans

2015

University of Texas, Dallas



Impact Examples of a CAE Cyber Operations Designation

“300% enrollment increase”

“Stopped State Funding Cuts”

***“Increased opportunities for
NSF grants”***

***“Influencing regional collegiate programs
and outreach activities”***

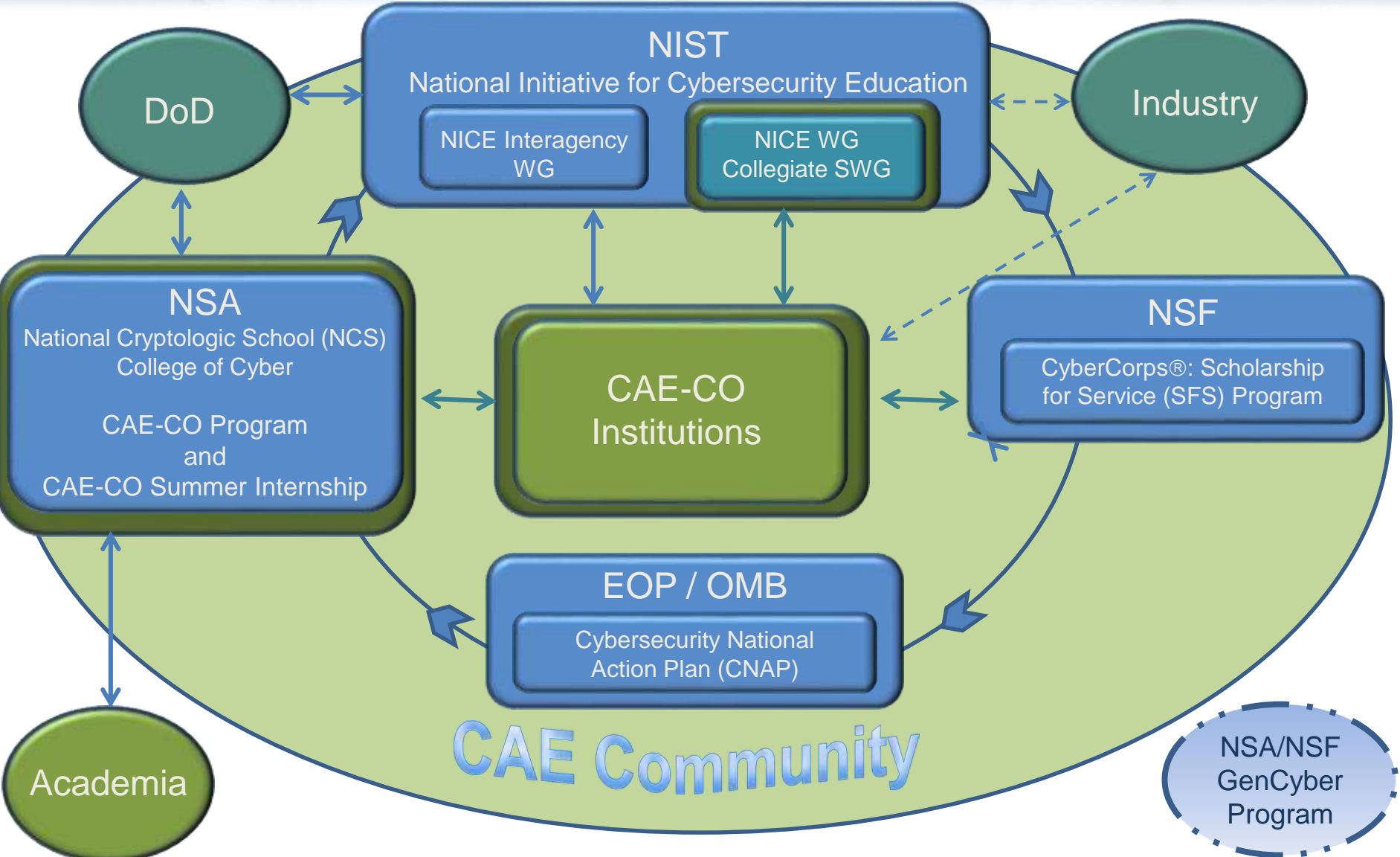
***“Increased contact from government
and industry seeking partnerships”***

***“Collegiate level Red Team vs. Blue
Team exercises between CAE-CO
schools”***

***“Administration support to increase faculty and
programs for Cyber Operations curriculum”***

***“Chosen by State government to consult
on Cyber Security Councils ”***

CAE Cyber Operations Program Partnerships



CAE Cyber Ops Summer Intern Program

Unique 12 week summer program

Mission Relevant CAPSTONE + Hands on Education

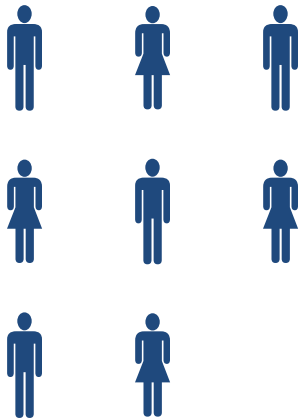
Topics include Security Fundamentals, Virtualization, Cyber Operations, Digital Forensics, Memory Analysis, Reverse Engineering, SCADA, Cellular/Mobile

Instructors are academic Subject Matter Experts from U.S. Schools

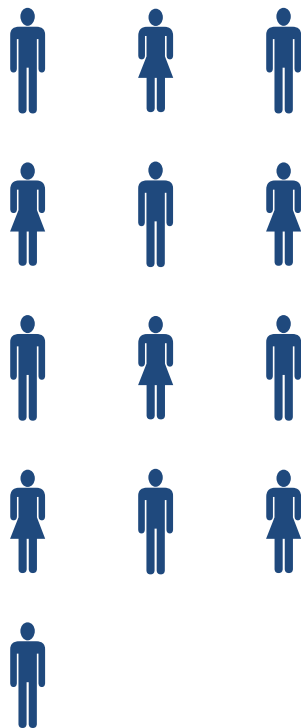
CAE Cyber Ops Summer Internship



2013: 8 Interns



2014: 13 Interns



2015 : 16 interns



Selection Priority is given to qualified applicants from CAE-CO school programs

80% of eligible Interns accepted NSA Job Offers!

CAE in Cyber Defense Program Office

- <https://www.iad.gov/NIETP/CAERequirements.cfm>
 - askCAEiae@NSA.gov 410-854-6206

CAE in Cyber Operations Program Office

- https://www.nsa.gov/academia/nat_cae_cyber_ops/index.shtml
 - askCAEcyberops@NSA.gov 410-854-6535