Vision

A digital economy enabled by a knowledgeable and skilled cybersecurity workforce.
Mission of NICE

To energize and promote a robust network and an ecosystem of cybersecurity education, training, and workforce development.
Accelerate Learning and Skills Development

Inspire a sense of urgency in both the public and private sectors to address the shortage of skilled cybersecurity workers.
Nurture A Diverse Learning Community

Strengthen education and training across the ecosystem to emphasize learning, measure outcomes, and diversify the cybersecurity workforce
Objective to Diversify the Cybersecurity Workforce

• Grow creative and effective efforts to increase the number of women, minorities, veterans, persons with disabilities, and other underrepresented populations in the cybersecurity workforce
• Host or Fund a Series of Interactive Workshops:
  – Veterans in Cybersecurity (Spring 2017)
  – Women in Cybersecurity (Fall 2017)
  – Minorities in Cybersecurity (Spring 2018)
Guide Career Development & Workforce Planning

Support employers to address market demands and enhance recruitment, hiring, development, and retention of cybersecurity talent.
Executive Order on Cybersecurity

Cybersecurity for the Nation: Policy

To ensure that the internet remains valuable for future generations, it is the policy of the executive branch to promote an open, interoperable, reliable, and secure internet that fosters efficiency, innovation, communication, and economic prosperity, while respecting privacy and guarding against disruption, fraud, and theft. Further, the United States seeks to support the growth and sustainment of a workforce that is skilled in cybersecurity and related fields as the foundation for achieving our objectives in cyberspace.
Public and Private Sector Workforce

• Assess the scope and sufficiency of efforts to educate and train the American cybersecurity workforce of the future, including cybersecurity-related education curricula, training, and apprenticeship programs, from primary through higher education.

• Provide a report to the President within 120 days with findings and recommendations regarding how to support the growth and sustainment of the Nation's cybersecurity workforce in both the public and private sectors.
NICE Engagement

Inform

NICE Working Groups and Interagency Council
Quarterly e-Newsletter
Events:
- Monthly Webinars
- NICE Conference & Expo – Nov. 7-8 in Dayton, OH
- NICE K-12 Cybersecurity Education Conference – Dec. 4-5 in Nashville, TN

Influence

NICE Cybersecurity Workforce Framework
Cybersecurity Jobs Heat Map: CyberSeek.org
RAMPS Communities

Innovate

NICE Challenge Project
“STRATEGIES TO DEVELOP A DIVERSE AND INCLUSIVE CYBERSECURITY PIPELINE”

Ethan Givens
College of Cyber, NSA, ewgiven@nsa.gov
Programmatic Approaches to Developing Diverse and Inclusive Workforce

Victor Piotrowski
Division of Graduate Education, NSF
CyberCorps® SFS
Secure and Trustworthy Cyberspace (SaTC)
Degrees earned by underrepresented minorities: 1993–2012

NOTE: Data not available for 1999.
Scientists and engineers working in science and engineering occupations: 2013

NOTE: Hispanic may be any race. Other includes American Indian or Alaska Native, Native Hawaiian or Other Pacific Islander, and multiple race.
NSF Major Investments FY 2016-2017

- NSF Inclusion across the Nation of Communities of Learners that have been Underrepresented for Diversity in Engineering and Science (INCLUDES)
- Innovations at the Nexus of Food, Energy, and Water Systems (INFEWS)
- Understanding the Brain (UtB)
- Risk and Resilience
- CyberCorps® Scholarship for Service (SFS)
- Graduate Research Fellowship Program
- NSF Innovation Corps (I-Corps)
- NSF Research Traineeship (NRT)
Goals for NSF Investments in Graduate Education

• **Advance Science and Engineering (S&E) Research:** Support graduate students and graduate education to enable long-term contributions of new knowledge at the frontiers of science and engineering.

• **Broaden Participation to Promote Excellence in Research and Build the Next Generation STEM Workforce:** Recruit graduate students from a variety of geographic, demographic, social, and educational backgrounds to promote the advancement of science and a highly qualified professional workforce.

• **Build Effective Models of Graduate Education and Workforce Development:** Support the development and use of innovative models and evidence based approaches in graduate education, including education and research about promising practices and program effectiveness.
Division of Graduate Education Portfolio

- Graduate Research Fellowship Program (GRFP)
- NSF Research Traineeship Program (NRT)
- CyberCorps® Scholarship for Service (SFS)
- EHR Core Research: Workforce Development (ECR)
Active GRFP Fellows (2016-2017)

54% Women
21.5% URM

U.S. Doctoral Degrees

42% Women
14% URM

Division of Graduate Education
Directorate for Education and Human Resources
NSF
**NSF CyberCorps®: Scholarship for Service (SFS) Program**

**SUPPORT**

- Full tuition, stipend ($22.5K/$34K per year), and fees/insurance/allowance (up to $9K per year), up to 3 years
- Summer internship, Job Fair, post-graduation service requirement (work in government positions equal to scholarship length)

**IMPACT**

- 3,300 SFS scholarship recipients (since 2001)
- B.S. (22%), M.S. (75%), Ph.D. (2%), B.S./M.S. (1%)
- Female (25%)
- Overall placement rate ➔ 94%
NSF CyberCorps®: Scholarship for Service (SFS) Program

CyberCorps®: Scholarship for Service (SFS) Participating Institutions

69 Scholarship for Service Participating Institutions
in 31 states + District of Columbia and Commonwealth of Puerto Rico

For more information, visit: sfs.opm.gov or contact: sfs@opm.gov

Directorate for Education and Human Resources
Division of Graduate Education
The GenCyber program provides summer cybersecurity camp experiences for students and teachers at the K-12 level. The goals of the program are to help all students understand correct and safe on-line behavior, increase diversity and interest in cybersecurity and careers in the cybersecurity workforce of the Nation, and improve teaching methods for delivering cybersecurity content in K-12 computer science curricula.

Our vision is for the GenCyber program to be part of the solution to the Nation’s shortfall of skilled cybersecurity professionals. Ensuring that enough young people are inspired to direct their talents in this area is critical to the future of our country’s national and economic security as we become even more reliant on cyber-based technology in every aspect of our daily lives.

To ensure a level playing field, GenCyber camps are open to all student and teacher participants at no cost. Funding is provided jointly by the National Security Agency and the National Science Foundation.
GenCyber Students by Sex

Table 10: Attendance by Sex

<table>
<thead>
<tr>
<th></th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>4112</td>
</tr>
<tr>
<td>Female</td>
<td>1797</td>
</tr>
<tr>
<td>Male</td>
<td>2286</td>
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<tr>
<td>Prefer to Not Disclose</td>
<td>29</td>
</tr>
</tbody>
</table>

Figure 14

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th>Female</th>
<th>Prefer to Not Disclose</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>49.11%</td>
<td>50.73%</td>
<td>0.16%</td>
</tr>
<tr>
<td>2016</td>
<td>55.59%</td>
<td>43.70%</td>
<td>0.71%</td>
</tr>
</tbody>
</table>

2015 - 2016
# GenCyber Students by Race

## Table 11: Attendance by Race

<table>
<thead>
<tr>
<th>Race</th>
<th>N</th>
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</thead>
<tbody>
<tr>
<td>Total</td>
<td>4112</td>
</tr>
<tr>
<td>Caucasian</td>
<td>1805</td>
</tr>
<tr>
<td>Hispanic/Latino</td>
<td>728</td>
</tr>
<tr>
<td>African American</td>
<td>708</td>
</tr>
<tr>
<td>Asian</td>
<td>542</td>
</tr>
<tr>
<td>Native American/Pacific Islander</td>
<td>199</td>
</tr>
<tr>
<td>Other</td>
<td>44</td>
</tr>
<tr>
<td>Prefer to Not Disclose</td>
<td>86</td>
</tr>
</tbody>
</table>

## Figure 15

<table>
<thead>
<tr>
<th>Year</th>
<th>African American</th>
<th>Asian</th>
<th>Caucasian</th>
<th>Hispanic</th>
<th>Native American/Pacific Islander</th>
<th>Other</th>
<th>Prefer to Not Disclose</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>14.76%</td>
<td>11.61%</td>
<td>51.77%</td>
<td>12.18%</td>
<td>3.47%</td>
<td>0.89%</td>
<td>5.32%</td>
</tr>
<tr>
<td>2016</td>
<td>17.22%</td>
<td>13.18%</td>
<td>43.90%</td>
<td>17.70%</td>
<td>4.84%</td>
<td>1.07%</td>
<td>2.09%</td>
</tr>
</tbody>
</table>
Capacity Building - WiCyS

Women in CyberSecurity

DIRECTORATE FOR EDUCATION AND HUMAN RESOURCES
Dr. Victor Piotrowski
CyberCorps® SFS
Lead Program Director
National Science Foundation

VPIOTROW@NSF.GOV
Women in Cybersecurity Conference and Community

www.wicys.net
Why WiCyS?

Women in STEM Workforce

Women in IT Workforce

Women in Cybersecurity Workforce
Foundation of WiCyS

• WiCyS was established in 2013 by
  – NSF Award #1303441

• WiCyS has become a continuing effort to help with
  – recruitment, retention and advancement of women in cybersecurity
WiCyS Goal

- Bring together students/faculty/researchers/professionals from academia, research and industry for
  - sharing of knowledge/experience
  - networking and mentoring
  - building a community of peers/mentors.
WiCyS Features

- **Held in Spring annually**
- **Largest academia based cybersecurity conference**
  - Wide-ranging attendees (academia, industry, gov)
- **Registration is controlled**
  - 50% students, 25% educators, 25% professionals and others
- **Registration fee is heavily subsidized**
  - 100% students and 40% faculty are covered lodging
  - Some travel scholarships
WiCyS History

- April 2014
  - Nashville, TN (350+)

- April, 2015
  - Atlanta, GA (550+)

- April, 2016
  - Dallas, TX (800+)
  - University of Texas at Dallas
WiCyS 2017

• April, 2016
• Tucson, AZ (850+)
• Local Host: University of Arizona
WiCyS 2018 at Chicago

- **Local host**
  - Illinois Institute of Technology (IIT)

- **2018 Co-Chairs**
  - Dr. Ray Trygstad
    - Associate Chair, Department of Information Technology and Management, IIT
  - Dr. Janell Straach
    - Professor of Teaching, Computer Science, The University of Texas at Dallas
WiCyS Opportunities

• Speakers from Industry, Academia and Research
  – Technical presentations
  – Lightning talks
  – Panel sessions
  – Bird of feather sessions

• Workshops
• Poster competitions
• Resume clinic
• Speed mentoring and networking
• Career and graduate school fair
WiCyS Engagement

• **Attend**
  – Students, faculty
  – Scholarship applications open September 1

• **Participate/Encourage**
  – Poster competition
  – Program
  – Workshops
  – Planning committee
  – Graduate school fair
  – Call for Participation opens September 1

• **Become a partner**
  – Open now

• **Become a local host**
Feedback from Students

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learn Academic Programs</td>
<td>98</td>
</tr>
<tr>
<td>Learn Career Opportunities</td>
<td>98</td>
</tr>
<tr>
<td>Inspired Me</td>
<td>95</td>
</tr>
<tr>
<td>Increased Interest</td>
<td>96</td>
</tr>
<tr>
<td>Commitment Career</td>
<td>96</td>
</tr>
<tr>
<td>Confidence</td>
<td>95</td>
</tr>
<tr>
<td>Pursue Further Degree</td>
<td>92</td>
</tr>
<tr>
<td>Commitment Current Degree</td>
<td>96</td>
</tr>
</tbody>
</table>
Feedback from Non-Students

- Professional Development: 98%
- More Connected: 99%
- Renewed Enthusiasm: 98%
- Ideas to Share: 95%
- Ideas Improve Skill Set: 91%
Feedback from All

- Stay in Touch: 95
- Establish Contacts: 97
- Community: 97
- Less Isolated as a Woman: 96
WiCyS 2017
Sponsoring Partners
Contact Info:
ceroc@tntech.edu
“Strategies to Develop a Diverse and Inclusive Cybersecurity Pipeline”

ARLINGTON, VA

Dr. Aurelia T. Williams, CECOR PI
Chairman and Professor
Computer Science Department
Norfolk State University, Lead Institution

August 16, 2017
A collaborative effort funded by the Department of Energy to develop a K-20 pipeline for the workforce; the project will pilot a workforce development program to produce well-qualified cybersecurity professionals in significant numbers to address the pressing cybersecurity workforce shortage.

Partners include HBCUs and national laboratories.
- 13 HBCUs – 4 CAEs, 1 Two-year Technical College
- Lawrence Livermore National Laboratory, Sandia National Laboratory

Previous NNSA Consortia
- Addressing the Shortage and Quality of Cybersecurity Workers through Relevant and Dynamic Training, Norfolk State University (Lead), Bowie State University, North Carolina A & T State University, University of the Virgin Islands, Voorhees College, Sandia National Laboratory, 2012, 2013
- Malware Intelligence Harvesting for Greater Cyber Defense—Voorhees (Lead), Allen University, Clark Atlanta University, North Carolina A & T State University, Lawrence Livermore National Laboratory, 2012, 2013
Partners
Consortium Goal

✓ To establish a world-class workforce development, education and research program that combines the strengths of Historically Black Colleges and Universities (HBCUs) and national laboratories to create a K-20 pipeline of students to participate in cybersecurity and related fields.
Consortium Objectives

- Build consortium and institutional capacity in cybersecurity
- Develop and implement education and training programs for K-20
- Conduct cybersecurity related research
- Sponsor workforce development initiatives
- Establish government, corporate, and educational partnerships
## Consortium Activities

<table>
<thead>
<tr>
<th>Cybersecurity Capacity Building</th>
<th>Education and Training</th>
<th>Research</th>
<th>Workforce Development</th>
<th>Partnerships</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equipment acquisitions and upgrades</td>
<td>Middle and high school cybersecurity summer camps</td>
<td>Academic year research</td>
<td>Summer teacher training in cybersecurity for middle and high school teachers</td>
<td>DOE laboratories provide guidance in curriculum development</td>
</tr>
<tr>
<td>Software acquisitions and upgrades</td>
<td>MOU and articulation agreements between CAE institutions and consortium members</td>
<td>Student research experiences at CAE Institutions</td>
<td>Faculty development hosted by CAE universities</td>
<td>CAE universities provide guidance in curriculum development</td>
</tr>
<tr>
<td>Infrastructure enhancements to include the establishment of a teaching lab in SC</td>
<td>Tracer Fire cybersecurity Boot Camps for consortium students</td>
<td>Student internships with industry partners</td>
<td>Faculty research externships at DOE laboratories</td>
<td>Industry partners host students for summer experiences</td>
</tr>
<tr>
<td>Scholarship support for undergraduate students enrolled in cybersecurity concentrations</td>
<td>Pre-college Institute for incoming freshmen</td>
<td>Faculty research externships at DOE laboratories</td>
<td>Academic year training in computer science for middle and high school teachers</td>
<td>Development of federal and corporate K-20 partnerships</td>
</tr>
<tr>
<td>Scholarship support for graduate students enrolled in cybersecurity concentrations</td>
<td>Cybersecurity course and curriculum design, development, deployment and enhancement</td>
<td>Faculty research at local campuses and mentoring students in cybersecurity related areas</td>
<td>Student internships at DOE laboratories and SPAWAR</td>
<td></td>
</tr>
<tr>
<td>New faculty and staff hires</td>
<td>Boot Camp for LLNL bound students</td>
<td>Mobile applications development with high school students in CCSD</td>
<td>K-12 outreach and pipeline development</td>
<td></td>
</tr>
<tr>
<td>Resource and information sharing across the consortium</td>
<td>Boot Camp for SNL bound students</td>
<td></td>
<td>Development and implementation of training programs</td>
<td></td>
</tr>
<tr>
<td>Faculty lab start-up packages</td>
<td>STEM curriculum development at CCSD</td>
<td></td>
<td>Advice on K-12 STEM development and activities</td>
<td></td>
</tr>
<tr>
<td>DOE labs provide technical guidance to the consortium and its governing board</td>
<td>Implementation of 3D programming to CCSD students</td>
<td></td>
<td>Outreach and awareness to CCSD and 2-year colleges from consortium members</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Development of K-12 cybersecurity modules</td>
<td></td>
<td>Academic year internships</td>
<td></td>
</tr>
</tbody>
</table>
Dr. Gwen Lee-Thomas, Quality Metrics, LLC serves as our lead consortium evaluator

Short Term Metrics
- Percent or number of new incoming students
- Number of new courses created
- Number of students participating in DOE internship programs
- Retention Rate
- Graduation Rate
Evaluation Plan

✓ Long Term Metrics

✓ Number of Faculty who successfully complete cybersecurity workshop training
✓ Results of student performance at workshops and internships
✓ K-20 Cybersecurity Module development and implementation
✓ Number of students graduating with certificates/degrees in cybersecurity
✓ Number of graduates who are placed in a cybersecurity field (advanced degree/workforce)
✓ Number of graduates hired into cybersecurity-related employment within the DOE complex
THE ROLE OF THE COLLEGES AND UNIVERSITIES
Role of the Universities

- To Improve recruitment, retention, graduation, and matriculation into Cybersecurity graduate programs or careers
- Prepare matriculating students to succeed in college especially those from non-traditional backgrounds
- Provide social, financial, and academic assistance to students
- Enable students to become directly involved in ongoing research; offer student internships; establish liaisons with businesses and other universities to expand opportunities for research; and maintain a supportive environment in which a student can experiment (and possibly fail) without negative consequences.
Role of the Universities

- Support recruitment, retention, and professional development of faculty
- Align curricula with accepted content standards and develop courses that are relevant to the marketplace, the community, and student population
- Upgrade and maintain facilities and equipment
- Facilitate admission to and retention in Cybersecurity undergraduate and graduate programs and careers
THE ROLE OF THE
NATIONAL LABORATORIES
Labs

☑️ Provide guidance that assist in educational training in the areas of threat analysis, incident response, and cybersecurity forensics

☑️ Provide practical and research experience in understanding computer systems, network operations, computer security, information protection, and cyber policy

☑️ Provide assistance and advice on development and implementation of K-20 education programs related to math, computer science, and cybersecurity
Lab’s provide cybersecurity research and development capabilities include data analysis tools, cyber modeling and simulation tools.

SNL’s Cyber Engineering Research Institute (CERI) is a collaborative research office building to support partnerships between SNL, universities, and industry and includes a RECOIL training lab.

SNL and LLNL will host select students in its nationally recognized Cyber Defenders internship programs.
CONSORTIUM SUCCESS
K-12 Summer Camps
STEM Girls Rock! &
My Brother’s Keeper

In partnership with SPAWAR,
✓ 100 rising 8th and 9th grade female students and a parent were exposed to Science, Technology, Engineering and Math (STEM) related degrees and career opportunities in a fun and interactive way.

In partnership with LLNL,
✓ Bay Area students were exposed to the “My Brother’s Keeper” initiative launched by President Obama
High School Students learn the basics of computer forensics, cyber security and solve a case using forensics techniques learned during the camp.
K-12 Engagement

Awareness

Team Building

Importance

Impact
Continuing the Pipeline

The Berry Boys
✓ Participated in HS Programs
✓ Graduated from CECOR High School

✓ Continued Education at CECOR University
  ✓ Interned at LAB Partners
✓ Remain Engaged and Succeeding
Research Experiences for Undergraduates

K-12 Summer Camp at UVI
Camps, Competitions, Conferences

Python Bootcamp, NSU

Undergraduate Research Symposium, UVI

Presentations to Businesses, UVI

Debate legal, policy and technical topics

LEGO® Pi – build it and program it

Claflin Faculty, Deidra Morrison at LLNL for 12 weeks
CECOR Success

✓ Build consortium and institutional capacity in cybersecurity.
  ✓ 10 new labs @ 8 Schools; 52 faculty trained in Cybersecurity
✓ Develop and implement education and training programs for K13-20.
  ✓ 8 new programs @ 6 schools; 47 new/improved courses @ 11 schools
✓ Conduct cybersecurity related research.
  ✓ 28 documented research projects @ 7 partners
✓ Sponsor workforce development initiative.
  ✓ 29 camps @ 13 partners; 72 students hosted, 7 offers 3 hires with more pending @ 2 lab partners
✓ Establish government, corporate, and educational partnerships.
  ✓ Numerous partnerships have been established due to this important work

As of Year 2, 887 students have been affected by the CECOR program
Questions

Dr. Aurelia T. Williams, PI
Norfolk State University
cecor@nsu.edu
757-823-9454
http://cecork20.org/