SCCYBER

Cyber Education Symposium

Defining the "Next Steps"

Claflin University

February 2017

Thomas Scott

Cyber Resilience Professional

- CISSP, CISA, PMP
- Critical Infrastructure, FEMA COOP Level 1

STATE EMERGENCY FLORIDA SERT RESPONSE TEAM

C-SAFE Cyber-Security Awareness For Everyone

EMERGENCY MANAGEMENT DIVISION S. C. SOUTH CAROLINA

INFRAGARD PARTNERSHIP FOR PROTECTION

SECURE FLORIDA .org

ISACA Trust in, and value from, information systems

SC INFORMATION SHARING & ANALYSIS CENTER SC-ISAC

acp

CPAC CONTINGENCY PLANNING ASSOCIATION OF THE CAROLINAS

MS-ISAC

The reality is….

South Carolina
Cyber Workforce Presentation

WELCOME TO CYBERSTATES™

THE DIGITAL ECONOMY AT YOUR FINGERTIPS

CompTIA presents Cyberstates™, the definitive guide to national, state, and metropolitan area tech sector and tech workforce analytics. Cyberstates aggregates mountains of data and transforms it into easy to understand visuals and actionable insights.

CompTIA

KEY FINDINGS

6.9 million
number of workers employed in the U.S. tech industry

492,550
number of tech business establishments

626,560
number of postings for tech occupation job openings during Q4 2016

7.3 million
number of tech occupation workers employed across industries in the U.S. economy

$108,900
average annual wages of U.S. tech industry workers, more than double the average national wage

$1.3 trillion, or 7.5 percent
the estimated direct contribution of the tech industry to the U.S. economy

182,220
the number of net new jobs added by the tech industry, driven largely by gains in the IT services and custom software services category (+108,930 jobs)

52,434
the number of tech patents granted during the most recently available year for patent data

South Carolina

STATE OF TECHNOLOGY SUMMARY

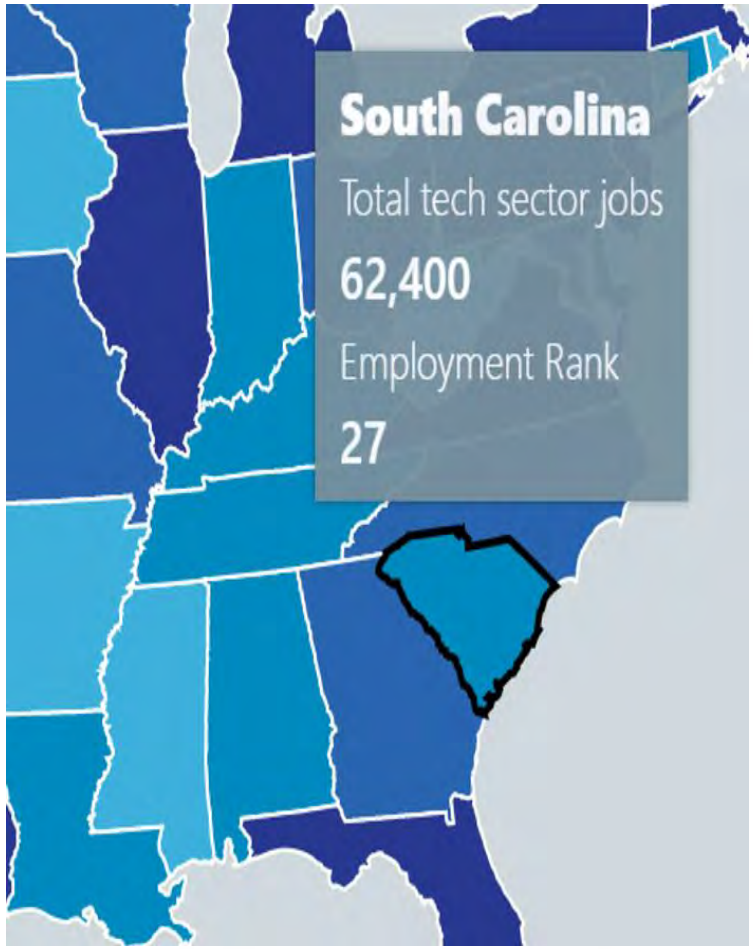
62,360 TECH INDUSTRY EMPLOYMENT

6,391 TECH BUSINESS ESTABLISHMENTS

$76,589 AVERAGE WAGE IN TECH INDUSTRY

3.2% TECH INDUSTRY AS A % OF OVERALL WORKFORCE

6,424 Q4 2016 POSTINGS FOR TECH OCC. JOB OPENINGS

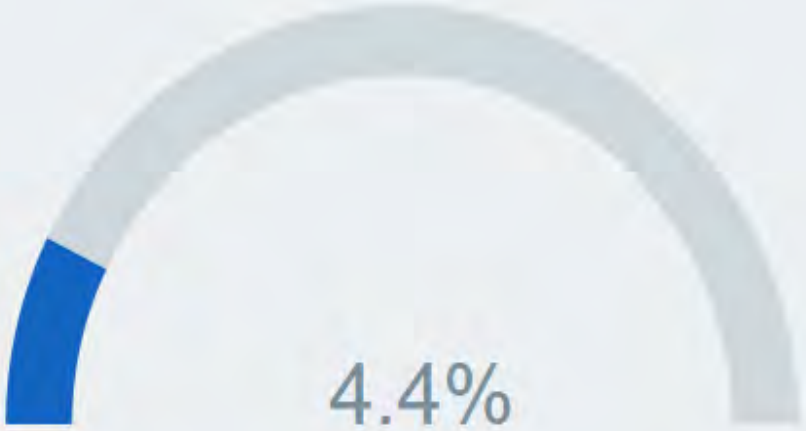


27th TECH EMPLOYMENT RANK

40th AVERAGE TECH WAGE RANK

38th INNOVATION RANK [per capita]

% OF WORKFORCE IN TECH INDUSTRY



STATE RANKING

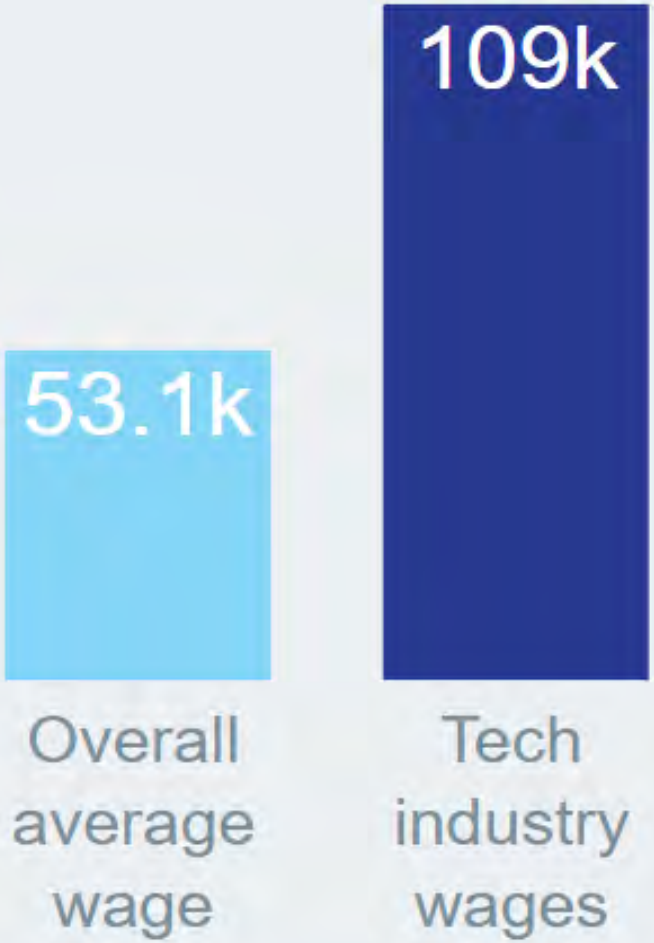
N/A

% OF WORKFORCE IN TECH INDUSTRY

STATE RANKING

35th

TECH INDUSTRY AVERAGE WAGES



TECH INDUSTRY AVERAGE WAGES

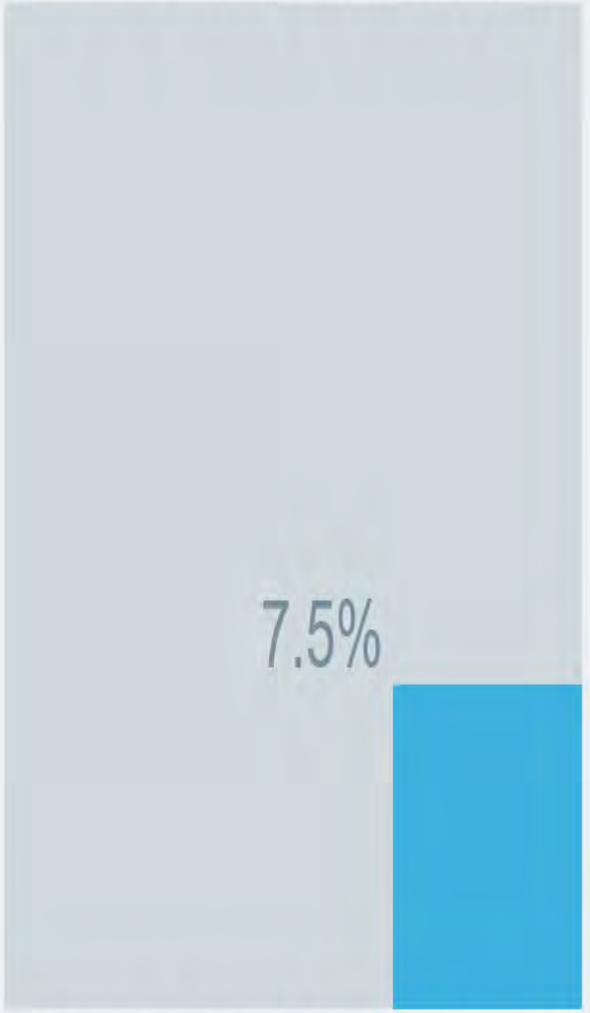
LEADING TECH OCCUPATION JOBS

Software and Web Developers	1,328,415
Network Architects, Admins, & Support	726,592
Systems & Cybersecurity Analysts	673,953
Computer Support Specialists	603,391
Database Administrators	117,638

LEADING TECH OCCUPATION JOBS

Network Architects, Admins, & Support	8,328
Systems & Cybersecurity Analysts	7,329
Computer Support Specialists	7,008
Software and Web Developers	6,877
Database Administrators	1,169

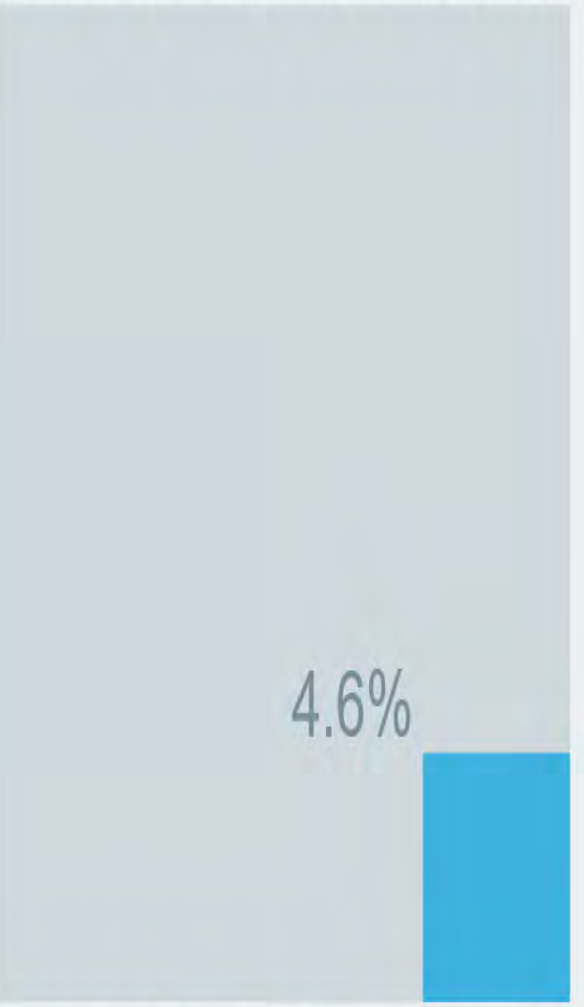
ECONOMIC IMPACT OF TECH INDUSTRY (% of overall)



ECONOMIC IMPACT OF TECH INDUSTRY (in billions $)

$1,342b

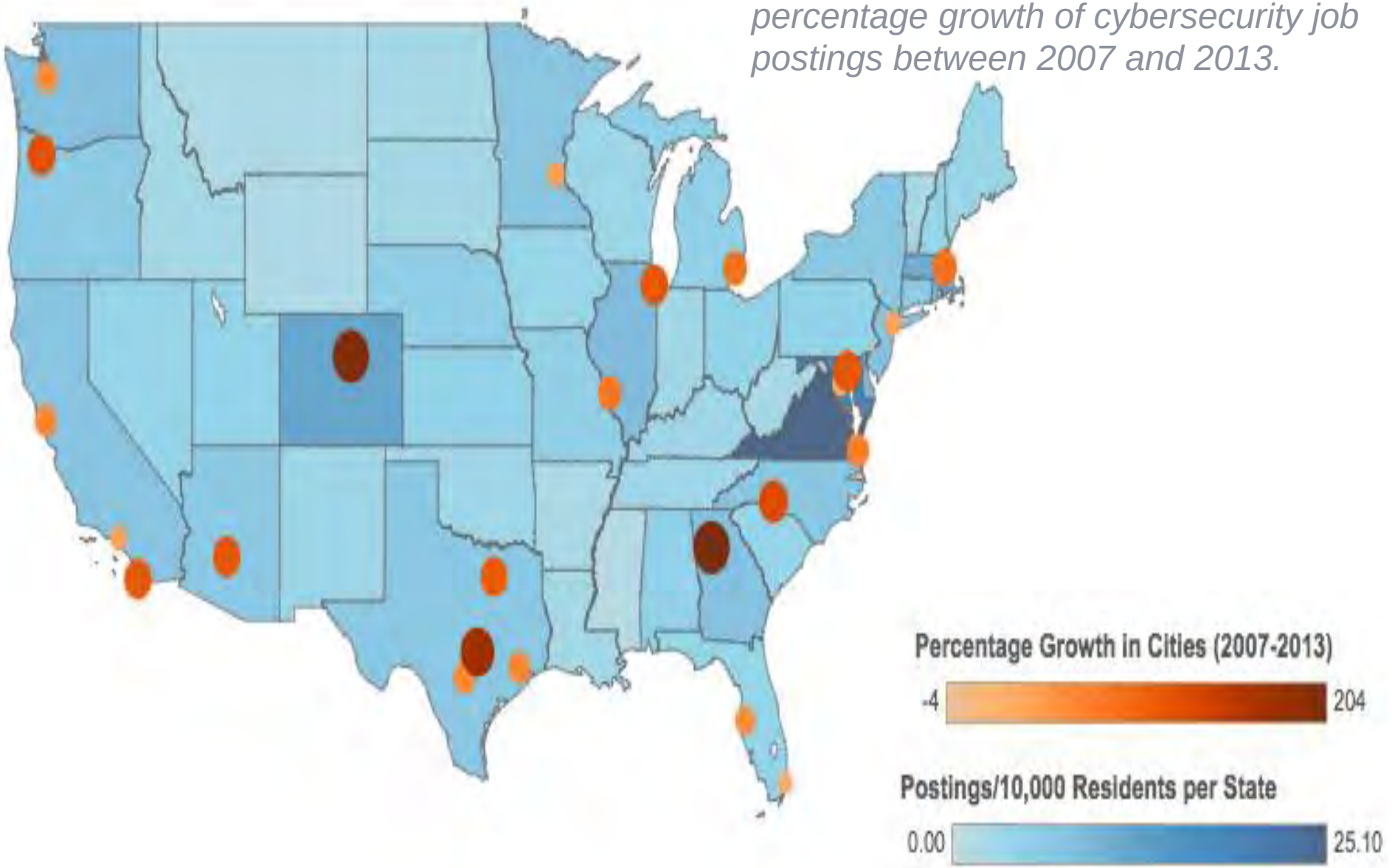
ECONOMIC IMPACT OF TECH INDUSTRY (% of overall)



ECONOMIC IMPACT OF TECH INDUSTRY (in billions $)

$9b

This map shows the top 25 cities by percentage growth of cybersecurity job postings between 2007 and 2013.



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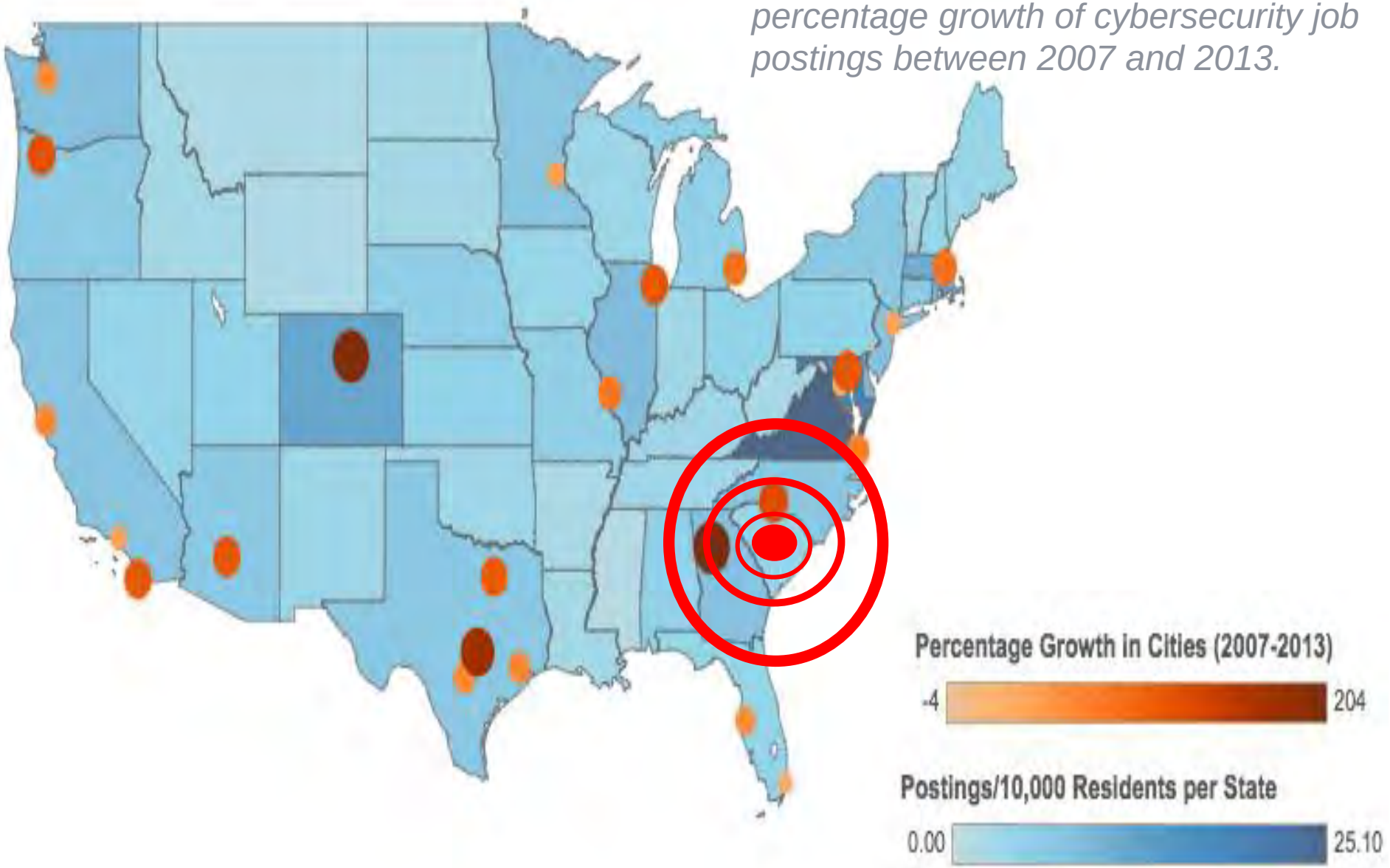
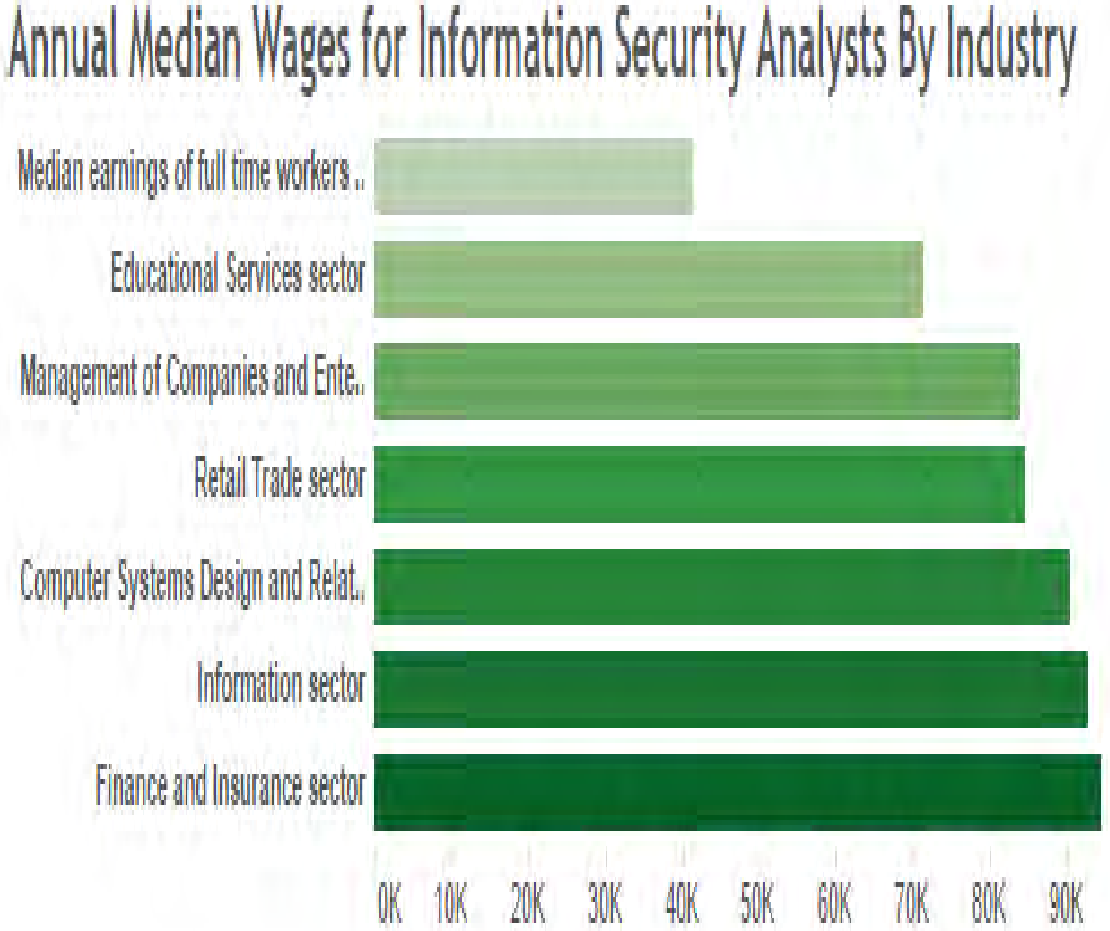
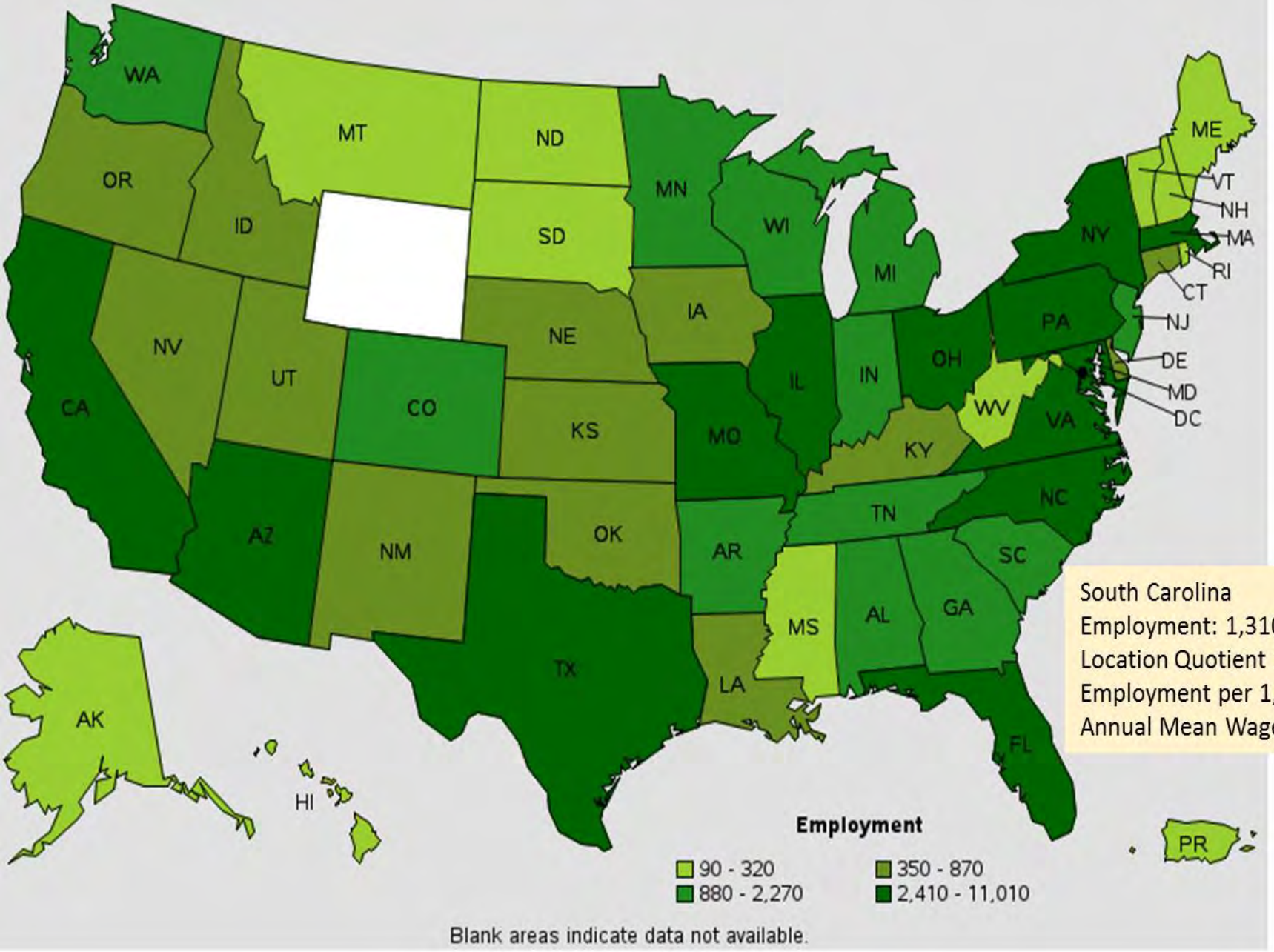




Sources: Burning Glass Cybersecurity Job Market report and Bureau of Labor Statistics website

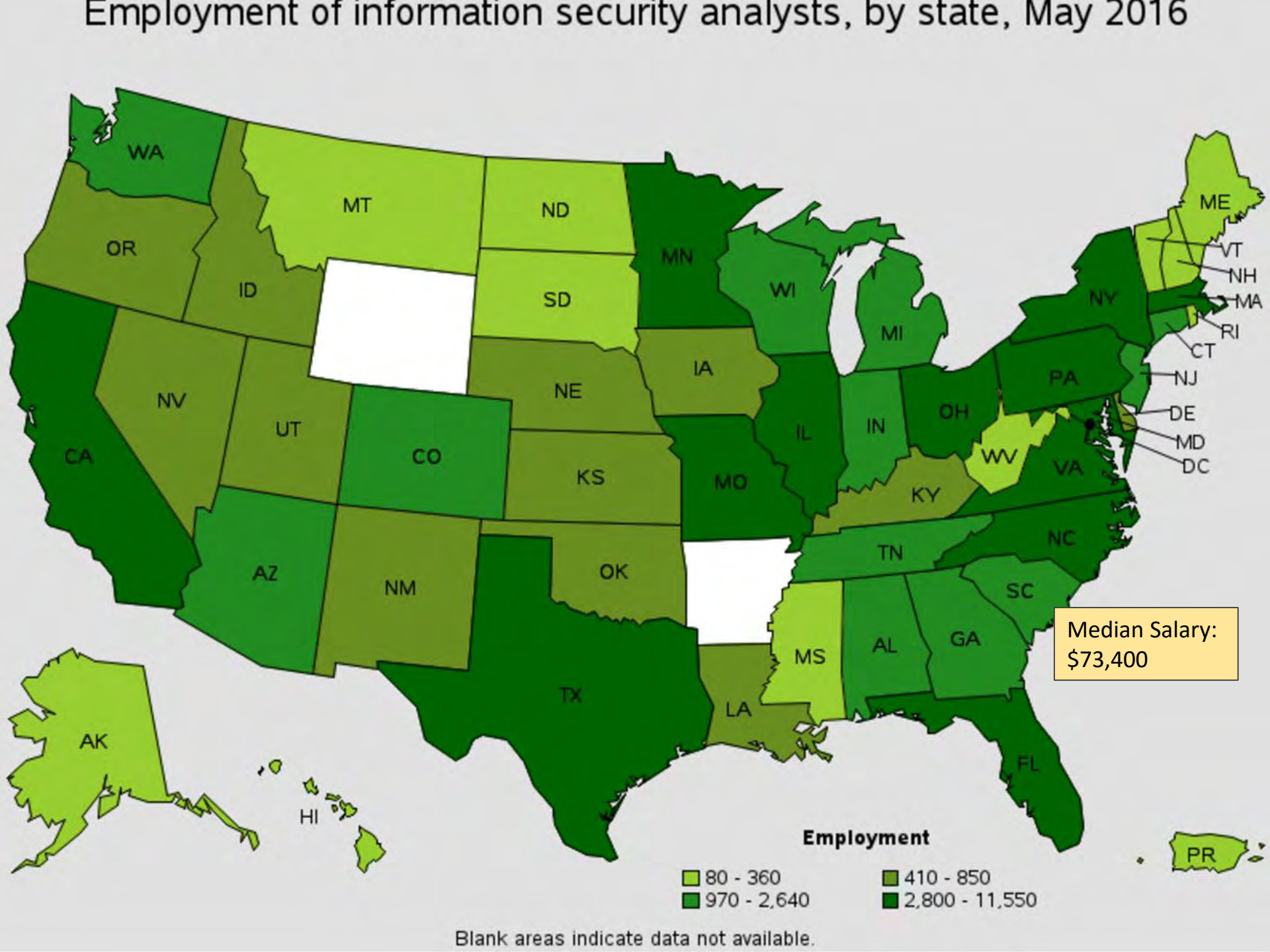
Arina Setalvad/Peninsula Press

Employment of information security analysts, by state, May 2015



South Carolina
Employment: 1,310
Location Quotient 1.05
Employment per 1,000: 0.68
Annual Mean Wage: $71,600

Blank areas indicate data not available.


Employment of information security analysts, by state, May 2016
WA
OR
CA
ID
NV
MT
WY
UT
AZ
CO
NM
ND
SD
NE
KS
OK
TX
MN
IA
MO
AR
LA
WI
IL
MS
MI
IN
KY
TN
AL
OH
WV
GA
FL
SC
NC
VA
PA
NY
ME
VT
NH
MA
RI
CT
NJ
DE
MD
DC
AK
HI
PR
Median Salary: $73,400
Employment
80 - 360
410 - 850
970 - 2,640
2,800 - 11,550
Blank areas indicate data not available.

Information Security Analysts

Median annual wages, May 2016

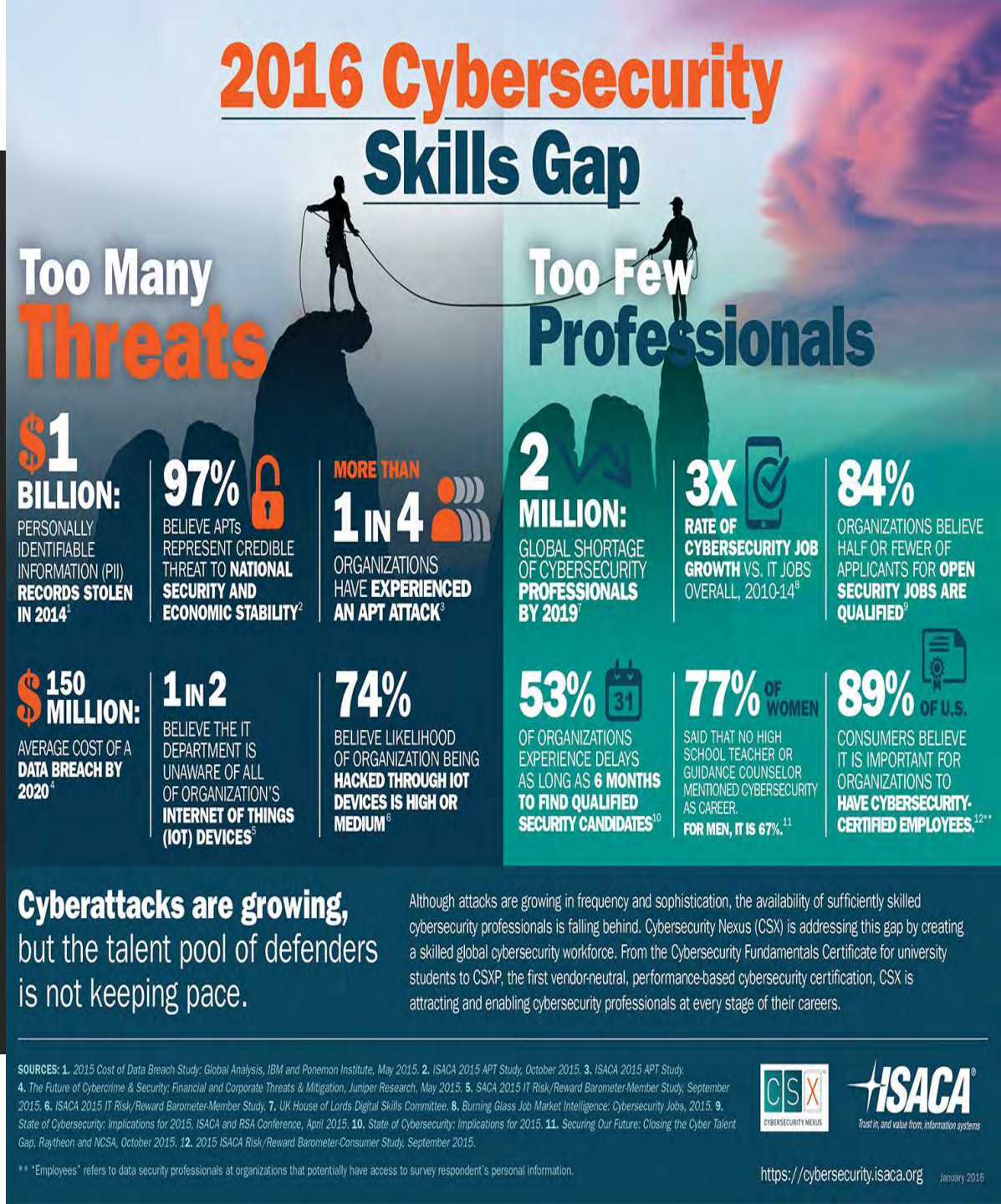
Note: All Occupations includes all occupations in the U.S. Economy.

Source: U.S. Bureau of Labor Statistics, Occupational Employment Statistics

1.5 Million

More cybersecurity professionals will be needed to accommodate the predicted global shortfall by 2020

More than half of IT professionals surveyed stated fewer than 1/4 of all applicants were qualified

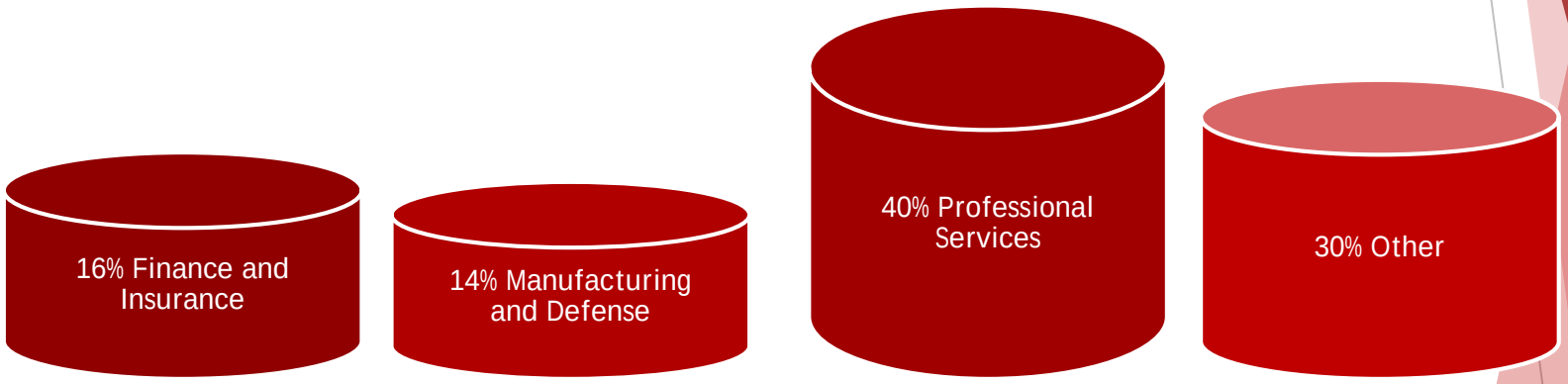


The biggest skill gaps of **today's cybersecurity** professionals

- 72% Ability to Understand the Business
- 46% Technical Skills
- 42% Communication Skills

Source: State of Cybersecurity: Implications for 2015 An ISACA and RSA Conference Survey

Fastest cybersecurity demand sectors are in industries managing consumer data



Source: Job Market Intelligence: Cybersecurity Jobs, 2015-2016 Burning Glass Technologies

Source: (ISC) 2016 Global Information Security Workforce Study

- Cybersecurity job postings took *8% longer to fill* than IT job postings overall

Expertise required for high demand cybersecurity roles

- Information Security
- Network Setup
- Auditing
- Network Protocols
- Core Database, Coding and Scripting
- Systems Administration

Approximately 10%

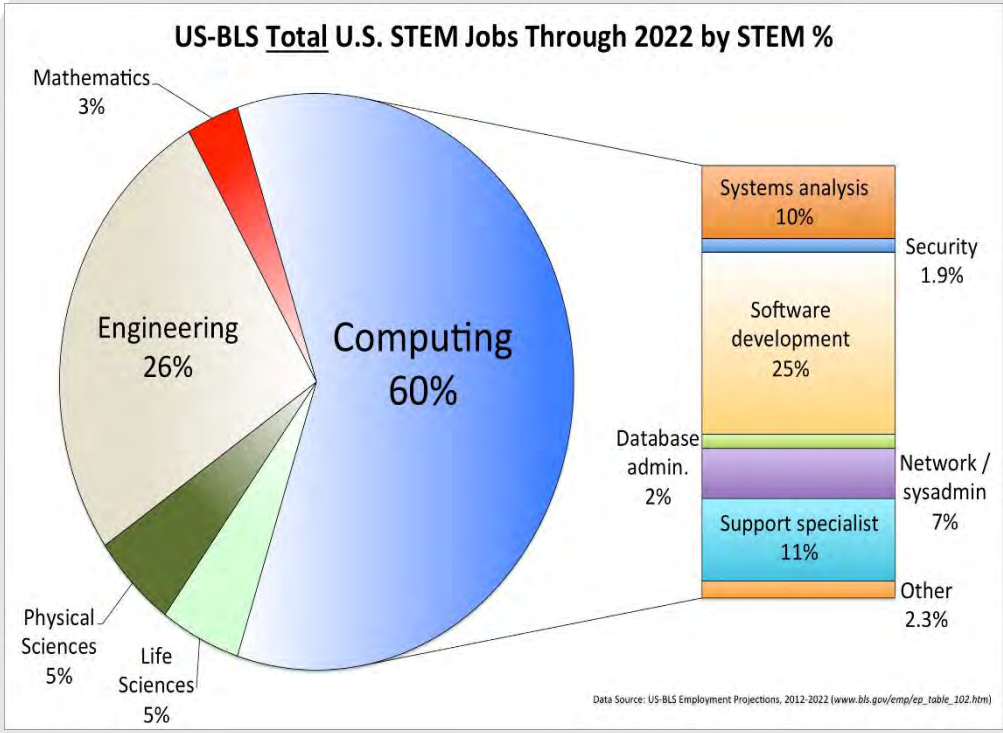
- Of the current cybersecurity workforce are comprised of women

Source: (ISC) 2015 Women in Security: Wisely Positioned for the Future of InfoSec

18% growth

Source: Bureau of Labor Statistics, U.S. Department of Labor

- Computer occupations will grow much faster than the average job during 2012-2024



- **Python**
- **HIPAA**
- **Risk Management**
- **Internal Auditing**
- **Audit Planning**

Source: Partnership for Public Service

Fastest growing skills in cybersecurity job postings

SCCYBER

Cyber Education Symposium

Claflin University

February 2017

SC CYBER

Symposium

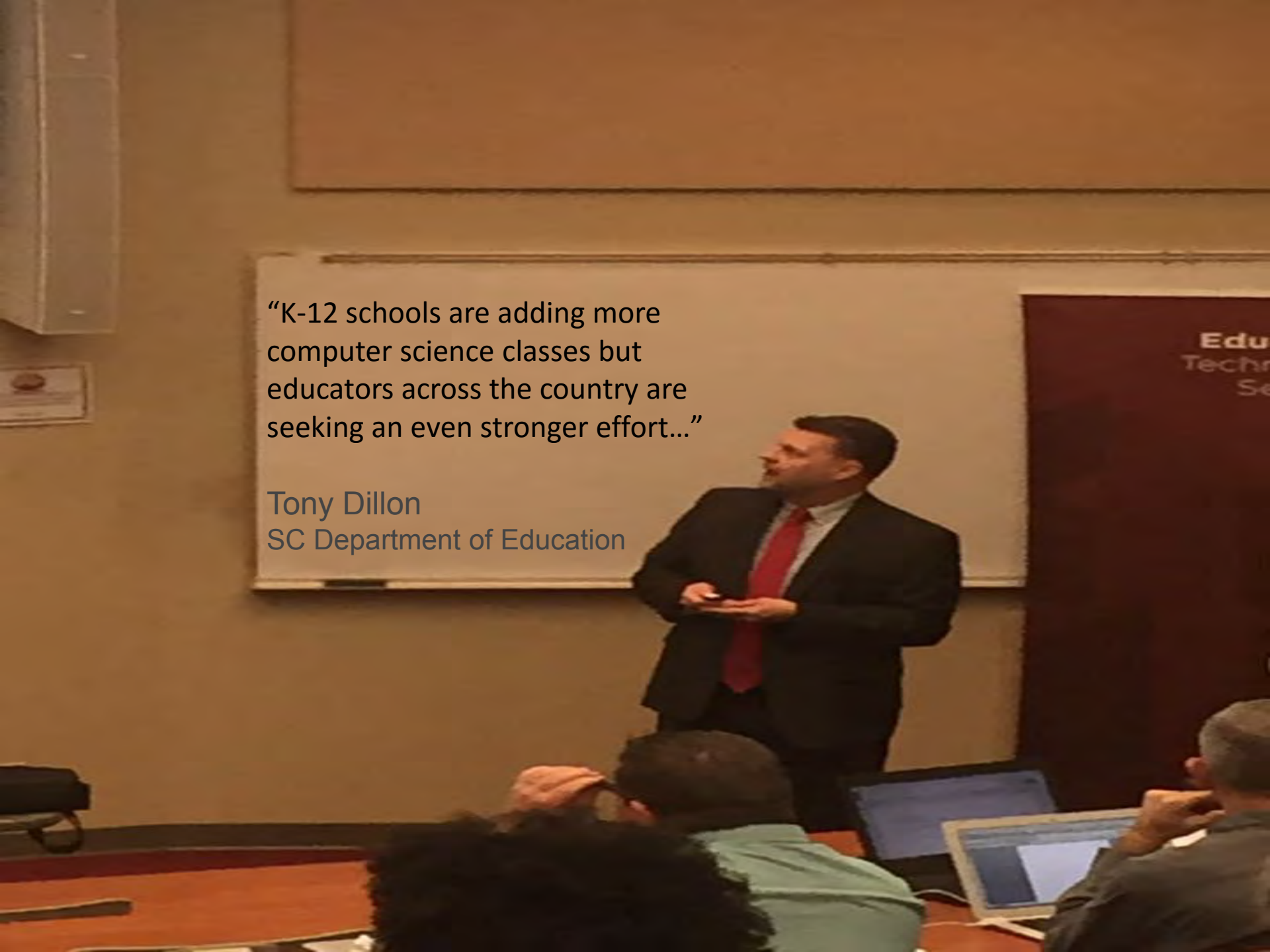
Claflin University, JST Iowa Room 131

Next Steps for Cyber Security

February 16, 2017

9:00 am – 4:00 pm

9:00 am	*Opening Comments:* **Tom Scott, SC Cyber** **Dr. Karl Wright, Claflin University** **Tony Dillon, South Carolina Department of Education**
9:30 am	**Britt Dove, South Carolina State Law Enforcement Divisions (SLED)** SLED's role in Cyber Security for the State of South Carolina **Chris Bomar, SC Attorney General's Office** Impact of Cyber Forensics on the State of South Carolina
10:00 am	**Dr. Cheryl Swanier, Claflin University** **Dr. Barbara Speziale, Clemson University** Role of Colleges and Universities with Cyber Security Initiatives
10:30 am	**Bill Littleton, SPAWAR** Overview of Gen Cyber Camps **Col. Dave Coldren, National Guard** Overview of Student Competitions Available for Middle Schools and High Schools
11:00 am	**Chuck Brooks, ETG** Overview of Curriculum Resources Available for Cyber Security Programs
11:30 pm	**Lunch (Sponsored By: SC Cyber & Southern Educational Systems)**
12:30 pm	**South Carolina State Cyber Security Lab Tour – Dr. Nikunja Swain, South Carolina State University** **- Shaun Moorer, South Carolina State University**
1:00 pm	**Glenn Starkman, Soteria** Overview and Vision of Node SC
1:30 pm	**Robert Crenshaw, Apprenticeship Carolina**


“K-12 schools are adding more computer science classes but educators across the country are seeking an even stronger effort…”
Tony Dillon
SC Department of Education

Anthony L. Dillon

Education Associate

Office of Career and Technology Education

SC Department of Education

Cyber Symposium

Discussion Topics

- A. Enrollment Data
- B. Trends in Enrollment Data
- C. Computer Science in SC
- D. Other Topics

Courses under each cluster are offered at career centers and comprehensive high schools:

42 Career Centers

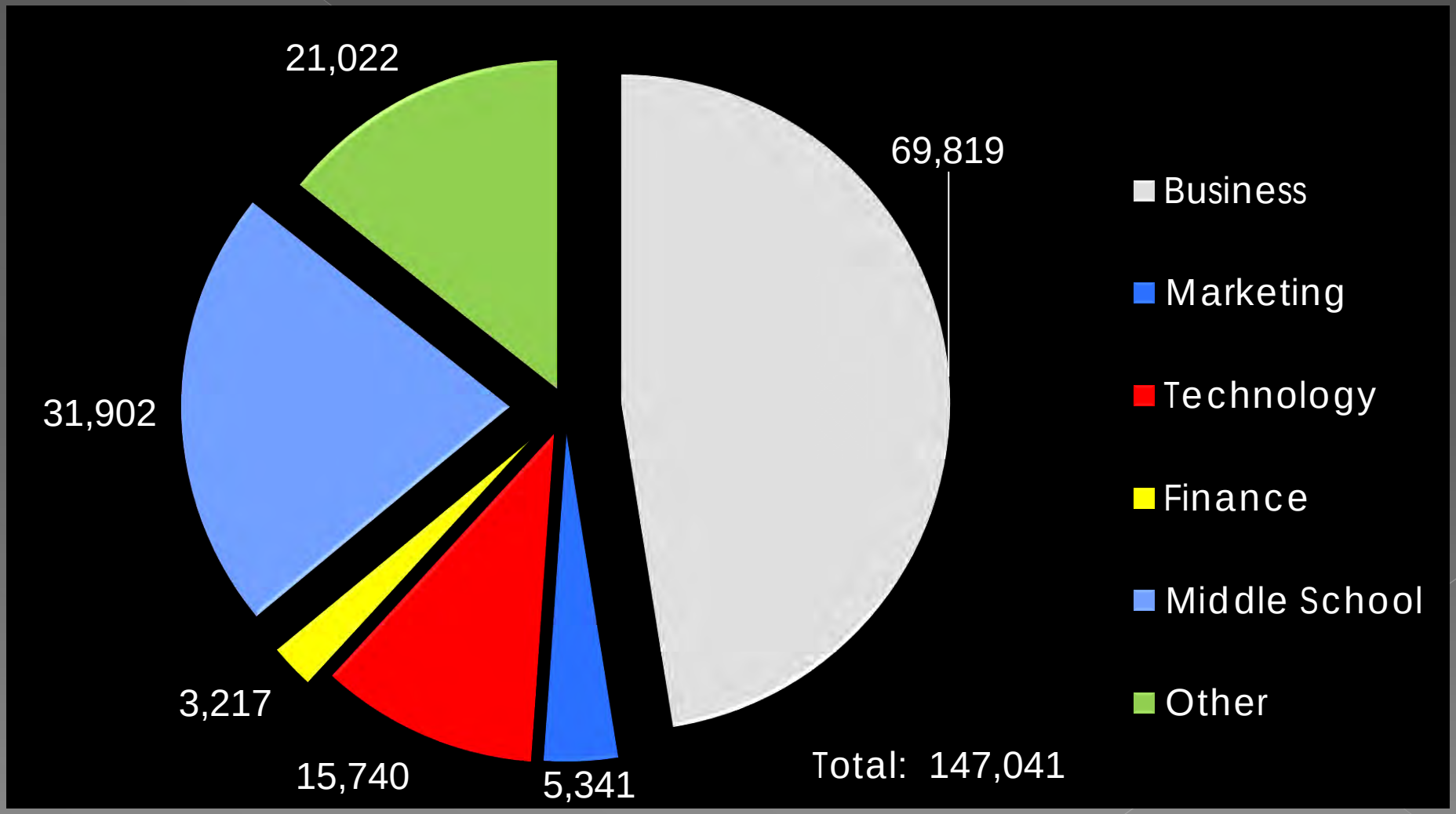
- 32 Single districts
- 10 Multi-district (Serve more than one school district)

196 Comprehensive High Schools

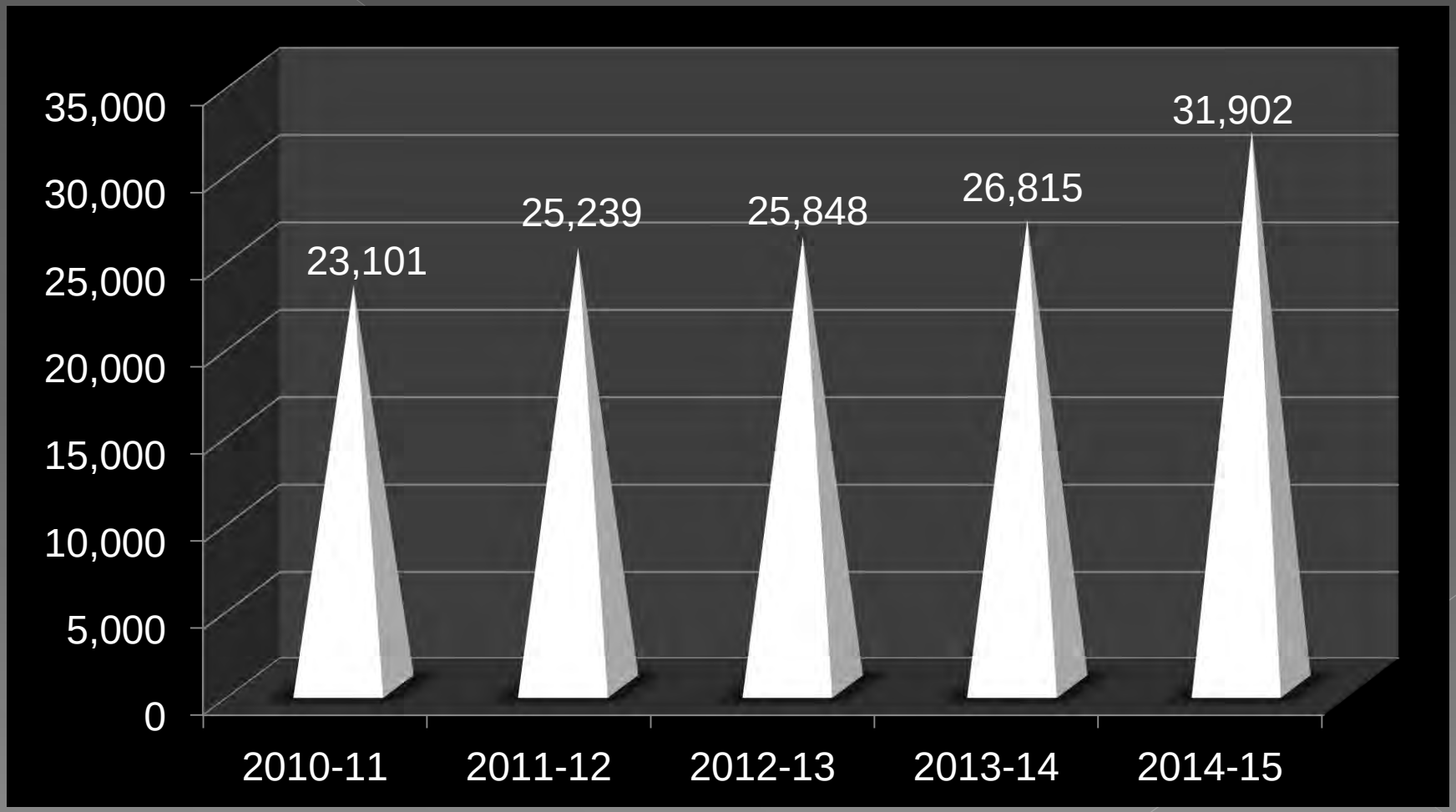
Career and Technology Education High School Course Enrollment 2014-15

Cluster	Gender		Race/Ethnicity				Total
	Male	Female	Black	White	Hispanic	Other	
Agriculture, Food, and Natural Resources	7,427	4,498	1,933	9,295	432	265	11,925
Architecture and Construction	5,684	412	2,236	3,315	400	145	6,096
Arts, Audio-Video Technology, and Communications	4,183	3,042	2,034	4,374	485	332	7,225
Business, Management, and Administration	35,742	34,077	26,423	36,088	4,498	2,810	69,819
Education and Training	553	4,724	2,565	2,264	297	151	5,277
Finance	1,676	1,541	1,374	1,518	206	119	3,217
Health Science	6,217	19,346	9,011	14,179	1,283	1,090	25,563
Hospitality and Tourism	2,125	3,274	2,712	2,126	362	199	5,399
Human Services/Family and Consumer Sciences	4,683	11,545	7,245	7,317	1,076	590	16,228
Information Technology	9,692	6,048	4,882	9,099	913	846	15,740
Law, Public Safety, Corrections, and Security	1,663	987	822	1,586	164	78	2,650
Manufacturing	4,915	308	1,295	3,477	275	176	5,223
Marketing	2,979	2,362	2,033	2,825	273	210	5,341
Science, Technology, Engineering, and Mathematics	9,154	1,989	2,401	7,465	671	606	11,143
Transportation, Distribution, and Logistics	5,982	370	1,786	3,904	495	167	6,352
TOTAL ENROLLMENT: ALL CLUSTERS	102,675	94,523	68,752	108,832	11,830	7,784	197,198

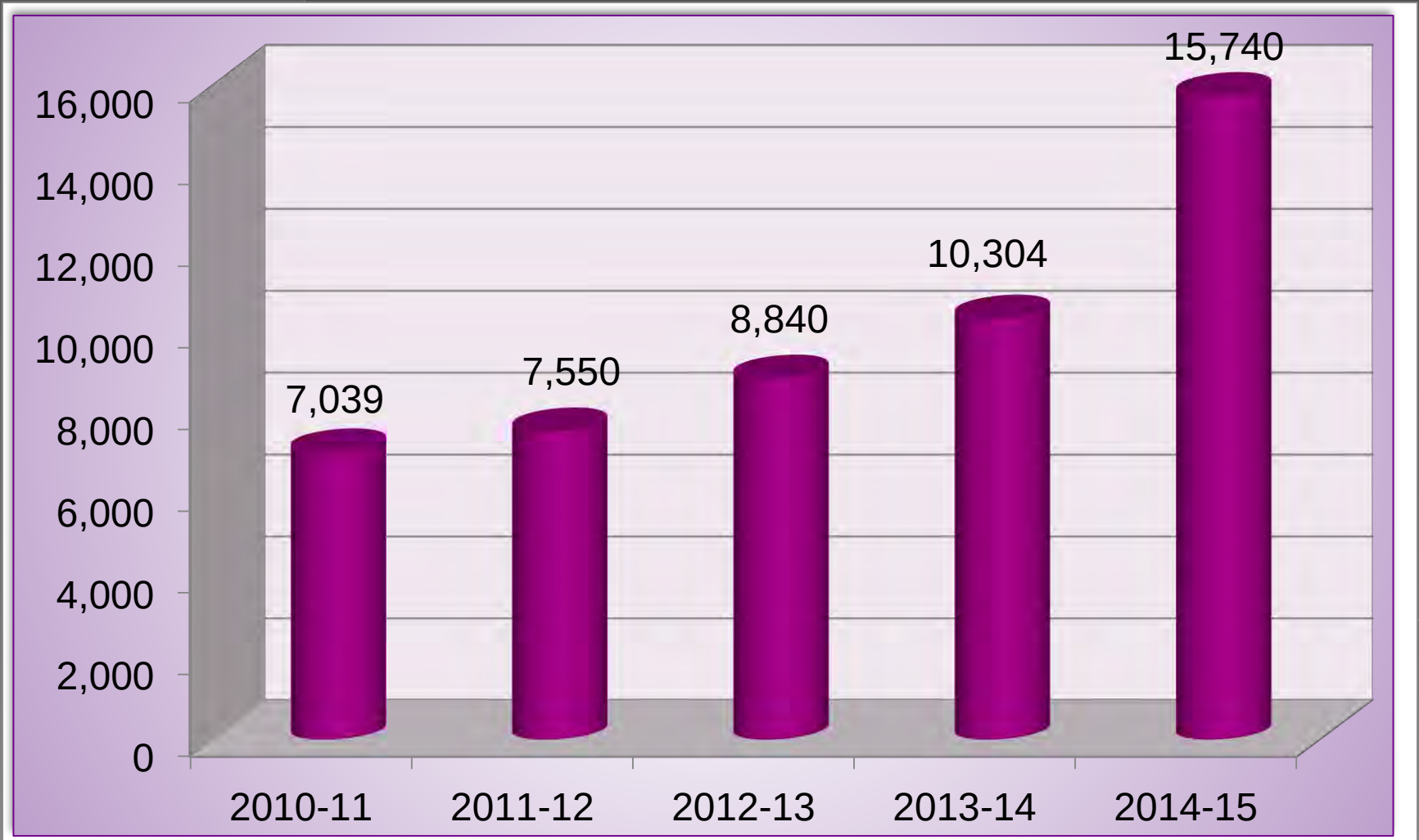
Student Enrollments: Comparison from 2014-2015



Middle School
Yearly Student Enrollment



Information Technology Cluster Yearly Student Enrollment



Enrollment Changes:

One Year Comparison - 2015 to 2016

- **Technology - Up 35%**
- New Enrollment = 15,740

Technology Enrollment Percentages

- <u>GENDER:</u>
- Males 9,692 = 62%
- Females 6,048 = 38%
- <u>RACE:</u>
- Whites 9,099 = 58%
- Blacks 4,882 = 31%
- Hispanic 913 = 6%
- Other 846 = 5%

Technology Courses:

Course Offerings

- **Advanced Animation**
- **Advanced Cyber Security**
- **Computer Forensics**
- **Computer Programming 1**
- **Computer Programming 1 with C++**
- **Computer Programming 1 with JAVA**
- **Computer Programming 1 with Visual Basic**

Technology Courses:

Course Offerings

- **Computer Programming 2**
- **Computer Programming 2 with C++**
- **Computer Programming 2 with JAVA**
- **Computer Programming 2 with Visual Basic**
- **Computer Service Technology 1**
- **Computer Service Technology 2**
- **Computer Service Technology 3**
- **Computer Service Technology 4**

Technology Courses:

Course Offerings

- **Cyber Security Fundamentals**
- **Database Design and Programming with SQL**
- **Database Programming with PL/SQL**
- **Exploring Computer Science**
- **Foundations of Animation**
- **Game Design and Development**

Technology Courses:

Course Offerings

- **GIS Technology 1**
- **GIS Technology 2**
- **Image Editing 1**
- **Image Editing 2**
- **Information Technology Foundations (IC3)**
- **IT Fundamentals**
- **Java Fundamentals and Java Programming**

Technology Courses:

Course Offerings

- **Networking 1**
- **Networking 2**
- **Networking 3**
- **Networking 4**
- **SAS Programming 1**
- **SAS Programming 2**

Career and Technology Education High School Course Enrollment by Cluster 2014-15

Course Code	SCDE Official Course Name	Gender		Race/Ethnicity				Total
		Male	Female	Black	White	Hispanic	Other	
Information Technology								
5351	Advanced Animation	16	5	7	10	2	2	21
5372	Advanced Cyber Security	16	0	2	12	2	0	16
5374	Computer Forensics	109	75	44	131	7	2	184
5050	Computer Programming 1	996	248	249	826	80	89	1,244
5051	Computer Programming 2	194	30	38	166	13	7	224
5056	Computer Programming with C++ 1	45	14	2	52	1	4	59
5052	Computer Programming with Java 1	116	20	18	89	14	15	136
5053	Computer Programming with Java 2	23	2	5	18	1	1	25
5054	Computer Programming with Visual Basic 1	197	36	46	159	9	19	233
5055	Computer Programming with Visual Basic 2	8	2	0	10	0	0	10
5320	Computer Service Technology 1	411	74	196	259	14	16	485
5321	Computer Service Technology 2	104	10	35	74	3	2	114
5322	Computer Service Technology 3	20	0	4	16	0	0	20
5323	Computer Service Technology 4	13	0	3	10	0	0	13

Computer Science

- Strong push for K12 Computer Science
  - President of USA
  - SC Governor
  - EOC (Education Oversight Committee)
  - SCDE
  - Business / Industry

  - **SUPPORT OF THE HOUR OF CODE**

Computer Science for ALL

- CS for All Announcement by the White House: https://www.whitehouse.gov/blog/2016/01/30/computer-science-all

- https://www.whitehouse.gov/sites/whitehouse.gov/files/images/FACT%20SHEET%2BPresident%20Obama%20Announces%20Computer%20Science%20For%20All%20Initiative_0.pdf

- NSF Resources: http://www.nsf.gov/news/special_reports/csed/
-
- CS for All Website - https://innovation.ed.gov/what-we-do/stem/computer-science-for-all/

Computer Science

Twelve states have taken concrete policy actions to support CS education since the President's call to action:

- **Colorado** (allowing CS to count towards graduation)
- **Delaware** (designating CS as a statewide program of study)
- **Florida** (adopting new K-12 CS standards)
- **Hawaii** (integrating CS into other core subjects)
- **Idaho** (creating a CS curriculum)
- **Indiana** (adopting new K-8 CS standards)
- **Louisiana** (allowing CS to count towards graduation)
- **Pennsylvania** (allowing CS to count towards graduation)
- **Rhode Island** (setting a goal to get CS into all K-12 schools)
- **Utah** (establishing CS training and resources)
- **Virginia** (embedding CS into its K-12 standards)
- **West Virginia** (requiring all secondary schools to offer a CS course this fall)

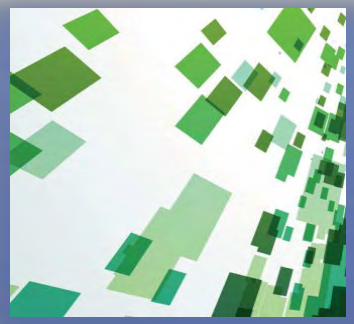
- In addition, 27 governors have called on Congress to support CS education.

Computer Science

- Strong push for Computer Science (Vendors)
  - ECS – Exploring Computer Science
  - PLTW – Project Lead the Way –
  - Google – CS First
  - NICERC – Cyber Essentials
  - Code.org
  - UTeach
  - CIW
  - Code Changers
  - Microsoft
  - Oracle

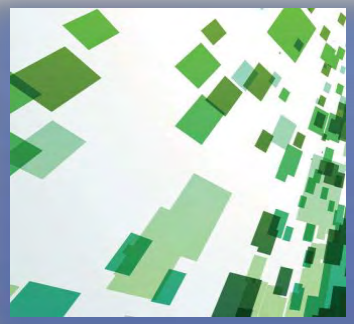
Computer Science

- New direction for all of K-12 Computer Science for the state of SC
  - Need for K-12 standards
  - Need for Teacher Training
- Joint Taskforce formed which includes:
  - SCDE and EOC (Education Oversight Committee)
  - Lead colleges and universities
  - Other SC leaders



Computer Science - Phases

- Phases:
  - Phase 1 – Planning and Data Collection
  - Phase 2 – Writing of Standards
  - Phase 3 – Public Review
  - Phase 4 – Revisions
  - Phase 5 – Approval
  - Phase 6 – Professional Learning and Implementation



Computer Science - Timeframe

- Proposed Timeline:
  - Phase 1 – June to August 2016
  - Phase 2 – September to November 2016
  - Phase 3 – December 2016 to January 2017
  - Phase 4 – January to February 2017
  - Phase 5 – February to April 2017
  - Phase 6 – May 2017 to August 2018

Action Items:

- Some of the action items being discussed are:
  - **HS Graduation Requirements**
  - **Definition of Computer Science**
  - **Math credit for computer science**
  - **Teacher Licensure / Endorsement**

Computer Science – Graduation Requirements

- **SC Graduation Requirements for Computer Science**
- 1. The course must provide **90% to 100%** of hands-on instruction as it relates to the computer functions, operation, and manipulation of the computer.
- 2. The course must emphasize **one or both** of the following areas of instruction:
- i. Programming (Coding)
- ii. ~~Software applications~~
- 3. The required computer science unit may consist of a combination of two half-units of courses that qualify as computer science.
- 4. Courses in which the computer is used as a tool and/or an enhancement for learning subject matter would **not** qualify based on the above criteria for computer science designation.

Computer Science – Bill 3427

- http://www.scstatehouse.gov/sess122_2017-2018/prever/3427_20170111.htm

Statements in Bill

- **(D) Beginning in the 2018-2019 School Year, the Department of Education will:**
- (1) employ one full-time employee whose sole responsibility is to coordinate and lead the South Carolina Computer Science Education Initiative, provided the employee must have prior work experience in the computer science industry;
- (2) support K-12 academic and computer science teachers in designing interdisciplinary, project-based instruction and assignments that engage students in applying literacy, math, and computational thinking skills to solve problems;
- (3) design career pathways consisting of four or more courses that connect students to postsecondary programs, degrees, or postsecondary credentials in high-demand career fields including, but not limited to, cybersecurity, information systems, informatics, computer engineering, and software development as identified by the Department of Commerce;
- (4) offer teacher endorsements to new computer science teachers who complete a two to four-week, full-day summer institute;

Statements in Bill

- (5) create clear pathways to teacher certification and licensure so as to ensure that all teachers, regardless of their backgrounds, have the appropriate content knowledge and pedagogical skills needed to teach standards-based computer science and information technology curricula;
- (6) leverage federal, state, foundation, and private sector funds to support intensive, ongoing professional development in computer science and information technology content knowledge and the pedagogical skills needed to manage diverse learners, create classroom assessments, and embed literacy and math in student-driven, project-based instruction and assignments;
- (7) provide information and materials which identify emerging career opportunities in computer science and related fields to parents, students, teachers, and guidance counselors; and
- (8) develop partnerships with business, industry, higher education, and communities to provide afterschool and extracurricular activities that engage students in computer science.

Exploring Computer Science

Anderson County Schools
- T. L. Hanna High
- Westside High

Beaufort County Schools
- Battery Creek High Schools
- Beaufort Senior High
- Bluffton High
- Hilton Head Island High
- Whale Branch High

Berkeley County Schools
- Berkeley High
- Goose Creek High
- Hanahan High
- Stratford High

Charleston County Schools
- St. Johns High
- Wando High

Clarendon County Schools
- East Clarendon Middle-High

Colleton County Schools
- Colleton County High

Dorchester County Schools
- Fort Dorchester High

Edgefield County Schools
- Strom Thurmond Career Center

Florence County Schools
- Florence County Career Ctr
- Hannah Pamplico High
- South Florence High
- West Florence High
- Wilson High

Greenville County Schools
- J. L. Mann High Academy

Horry County Schools
- Academy for Arts & Sci & Tech
- Carolina Forest High
- Conway High
- Green Sea Floyds High
- Loris High
- North Myrtle Beach High

Kershaw County Schools
- Camden High

Laurens County Schools
- Laurens District 55 High

Lexington County Schools
- Lexington High
- Lexington Technology Ctr
- River Bluff High
- Swansea High
- White Knoll High

Marion County Schools
- Creek Bridge High

Pickens County Schools
- D. W. Daniel High

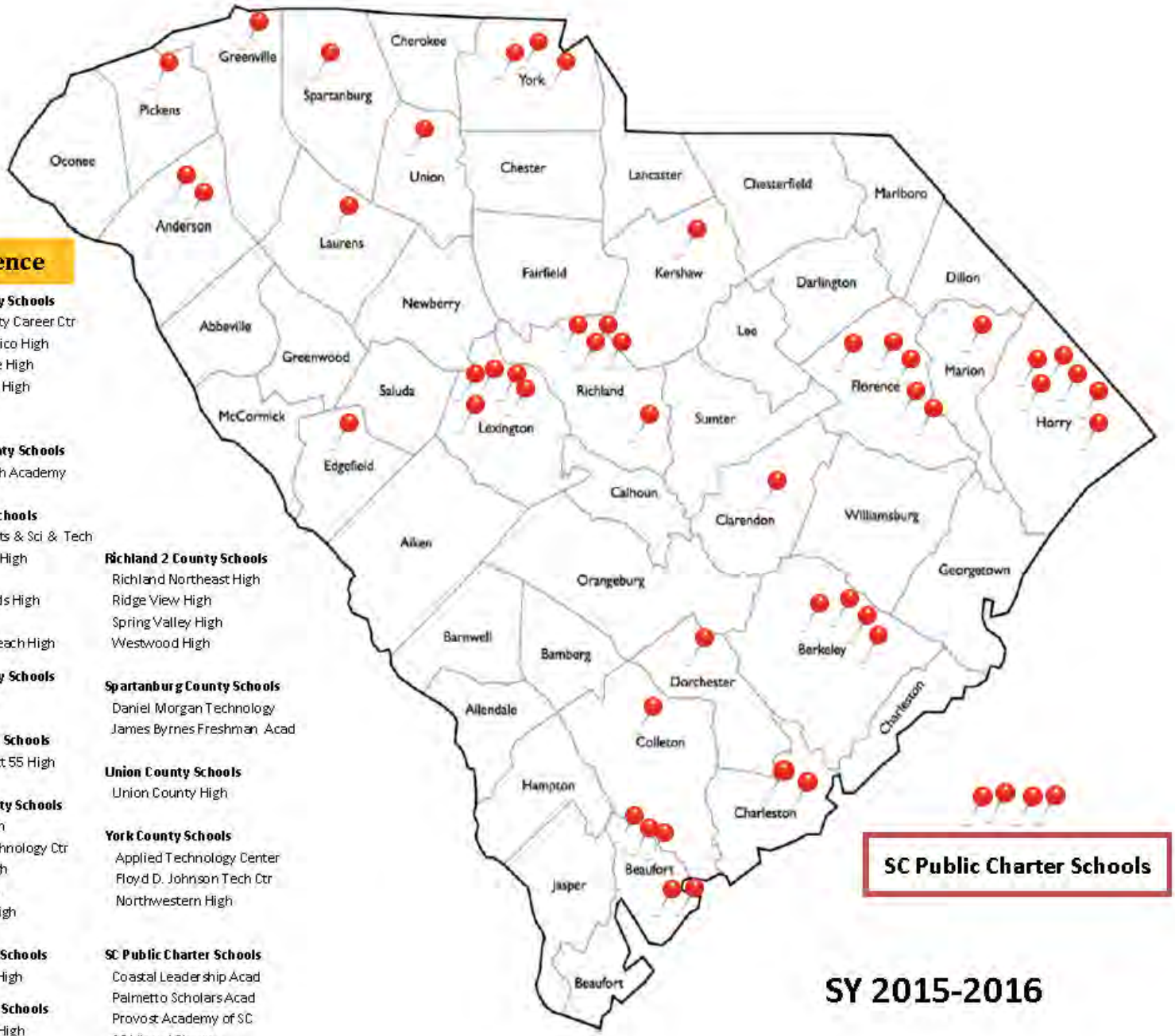
Richland 2 County Schools
- Richland Northeast High
- Ridge View High
- Spring Valley High
- Westwood High

Spartanburg County Schools
- Daniel Morgan Technology
- James Byrnes Freshman Acad

Union County Schools
- Union County High

York County Schools
- Applied Technology Center
- Floyd D. Johnson Tech Ctr
- Northwestern High

SC Public Charter Schools
- Coastal Leadership Acad
- Palmetto Scholars Acad
- Provost Academy of SC
- SC Virtual Charter



SC Public Charter Schools

SY 2015-2016

Exploring Computer Science - Curriculum

- SC State Standards for Course –
- http://ed.sc.gov/scdoe/assets/file/programs-services/148/documents/ExporingComputerScience.pdf

- Exploring Computer Science -
- - http://www.exploringcs.org/curriculum
- - http://csta.acm.org/Curriculum/sub/ExploringCS.html

Project Lead The Way

Aiken County School District
Jackson STEM Middle School

Anderson County

Beaufort County Schools
Beaufort High School
Hilton Head Christian Academy

Charleston County Schools
St. Johns High School
Charleston Charter School for Match and Science

Dillon 03
Latta High School

Georgetown County School District
Andrews High School
Georgetown High School

Greenville County School District
Greenville Senior High School

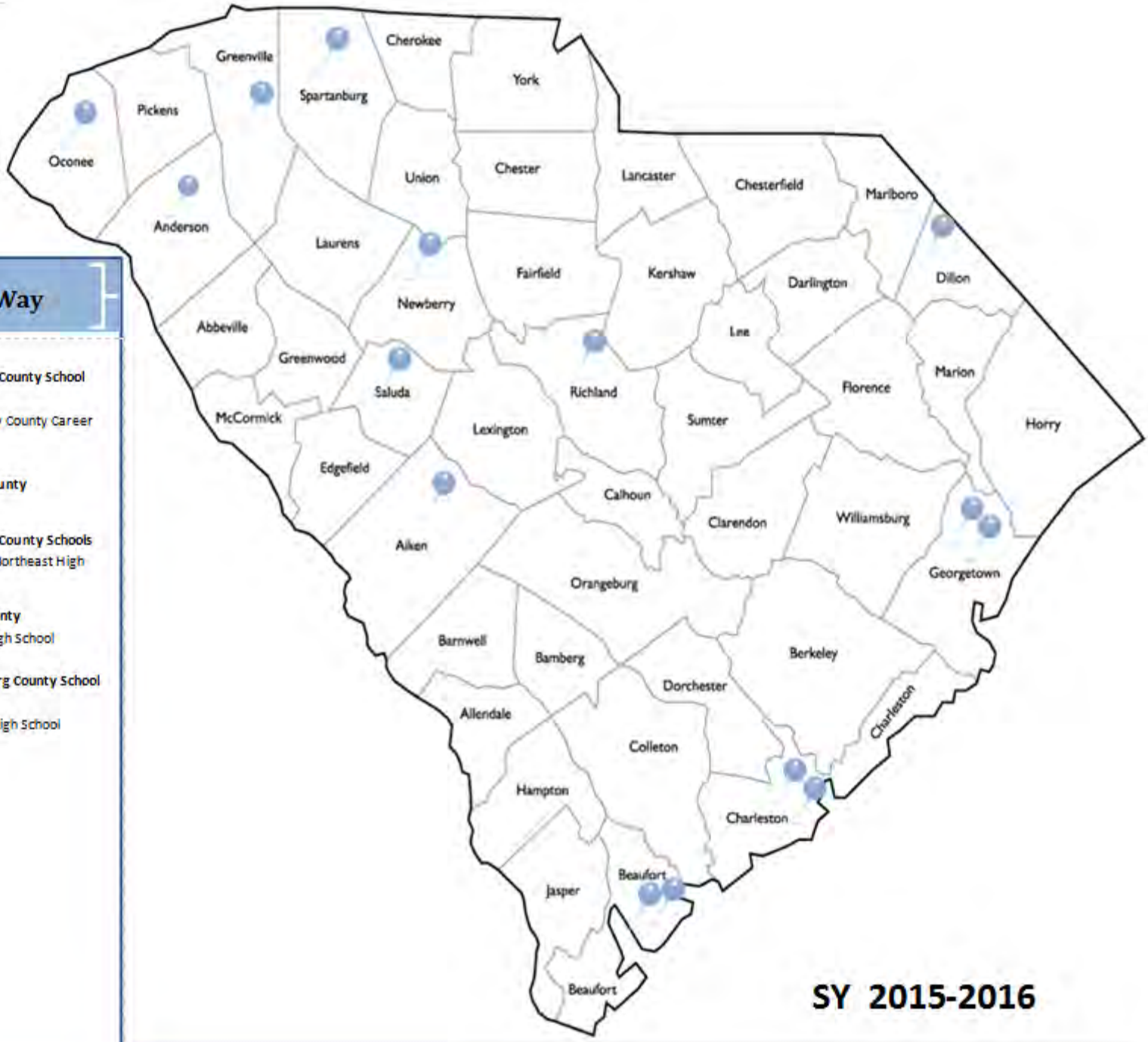
Newberry County School District
Newberry County Career Center

Oconee County

Richland 2 County Schools
Richland Northeast High

Saluda County
Saluda High School

Spartanburg County School District 6
Dorman High School



SY 2015-2016

Computer Science - Curriculum

- **NEW Elementary Courses (10 hour modules)**
  - **K = Animals and Algorithms**
  - **1st = Animated Storytelling**
  - **2nd = Grids and Games**
  - **3rd = Programming Patterns**
  - **4th = Input/Output: Computer Systems**
  - **5th = Infection: Modeling and Simulation**

Computer Science - Curriculum

- **NEW Middle School Courses (9 week units)**
  - **Computer Science for Innovators and Makers**
  - **App Creators**

National Certifications – Proviso 1A.73

- Proviso 1A.73 was passed and went into effect July 1, 2016.
  - Approximately $3 million dollars for national certifications and credentials.


CYBER
CRIME
INTERNATIONAL
IDENTITY
TERRORISM
SERVICE
WARFARE
NETWORKS
ILLEGAL
UNAUTHORIZED
ACTIVITIES
CHILD
COMMUNICATIONS
INTERNET
ATTACKS
DATA
CASES
PORNOGRAPHY
THEFT
COMPUTER
CRIMINAL
MAIL
INFORMATION
ALTERING
SEVERAL


CRIME SCENE-DO NOT ENT

“Private sector jobs pay higher salaries than government jobs, but there is a need for cybersecurity experts and computer science majors in government law enforcement fields.”

Lt. Britt Dove
SLED Computer Crime Center

The World Economic Forum estimated the economic cost of cybercrime was around $3 trillion in 2016.

Deloitte noted the hidden impact of an incident could amount to 90 percent of the total response cost and may not be felt until more than two years after the event.

“Jobs in forensic computer investigations must take into consideration the “mental play” the cases have on them – with particular regard to the cases involving computer crimes against children.”

-- Chris Bomar, a forensic computer investigator S.C. Attorney General’s Office

"We are facing an arms race in terms of security,"

Derek Manky, *Fortinet Global Security Strategist*

Role of Colleges and Universities in Cyber Security Initiatives

Cheryl A. Swanier, PhD
Claflin University

February 16, 2017

INTRODUCTION

“ Computers are rarely found in isolation. They are connected with one another through LANs, MANs, WANs and the Internet.”

PROBLEM

- “The connectedness has made the security of computers and information a major challenge.
- “The people who use computers and the Web increasingly encounter viruses and worms, the theft of personal information, software that monitors their web-surfing habits, and defaced web sites.

Massive Problem

The sheer number of connected devices, or the "Internet of Things," presents an unprecedented opportunity for hackers. "We're facing a massive problem moving forward for growing attack surface." Derek Manky.

Cyber Security Threats

- Headless Worms
- Machine-to-Machine Attacks
- Jailbreaking
- Ghostware
- Two-faced Malware

ATTACKS

"In the coming year, hackers will launch increasingly sophisticated attacks on everything from critical infrastructure to medical devices." - DEREK MANKY

THREAT LANDSCAPE

"Every minute, we are seeing about half a million attack attempts that are happening in cyber space."

– Derek Manky

The Rise of Machine-to-Machine Attacks

Research company Gartner predicted

> there will be 6.8 billion connected devices in use in 2016, (a 30 percent increase over 2015).

> By 2020, that number will jump to more than 20 billion connected devices

> for every human being on the planet, there will be between two and three connected devices (based on current U.N. population projections).

WHAT ARE THE ISSUES?

- What resources are needed to establish and maintain a cyber security program?
- How can faculty be prepared to teach in this field?
- What partnerships with business, industry, and government should be developed?
- What components of a universities existing computer and information technology programs can serve as the basis for a cyber security program?
- How can universities obtain the resources needed to start and maintain a cyber security program?

SOLUTIONS

- Start by teaching basic classes
- Offer minors in cyber security
- Write grants for tools to build cyber security software
- Infuse cyber security throughout the curriculum
- Set aside funds to hire faculty with expertise in cyber security

CHALLENGE

- Provide supplementary training for people who are already in the workforce
- Provide specialized training for computer experts
- Strengthen the nation's cybersecuirty workforce
- Support faculty development activities to improve and spread instructional capability in information assurance and computer security
- Continue partnerships between colleges/uniersities, secondary schools, business, industry, and government

Recommendation

- Improve cyber security education by broadening course offerings
- Build the cyber security workforce by addressing workforce needs

WATT FAMILY INNOVATION CENTER
CLEMSON UNIVERSITY

Cybersecurity Education in SC Colleges and Universities

Barbara J. Speziale, Ph.D.
Watt Family Innovation Center
Clemson University

CLEMSON UNIVERSITY

WATT FAMILY INNOVATION CENTER
CLEMSON UNIVERSITY

Cybersecurity Education Survey

https://www.surveymonkey.com/r/sccybered

Sent to all '.edu' attendees from the SC Cyber Upstate Symposium

On behalf of the SC Cyber initiative, I am compiling a list of all Cybersecurity courses, programs, degrees, certificates and/or badges offered by educational institutions in South Carolina. Please help this effort by describing the offerings at your institution. Please complete this survey by February 10, 2017.

Survey results will be digested to present a short report at the Cyber Security & Education Symposium on February 16 at Claflin University.

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Survey Questions

1. Your name and contact information (email address, phone number, institution)

2. Your role at your institution is (check all that apply):

Teaching faculty	Administrator
Research faculty	Student
External Advisor	Other

3. For Questions 4, 5, and 6, please indicate the specificity of your response. Will you describe cybersecurity resources in your: department, college, entire institution, or other entity (such as an institute or center)?

department	institution
college	other (*e.g.* institute or center)

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Survey Respondents

Clemson University (3 departments)

Claflin University

Denmark Technical College

Aiken Career Center

CLEMSON UNIVERSITY

WATT FAMILY INNOVATION CENTER
CLEMSON UNIVERSITY

Responses: Resources

Number of faculty in cybersecurity research	1 - 3
Number of faculty teaching cybersecurity	1 - 3
Budget allocated to Cybersecurity education activities	? To $5000
Cybersecurity research facilities	Labs
Cybersecurity specialized teaching facilities	Labs

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Responses: Cybersecurity coursework areas

AREA	NUMBER OF RESPONSES
Fundamental concepts	5
Cryptography	1
Security ethics	3
Security policy	1
Digital forensics	2
Access control	3
Security architecture and systems	3
Network security	5
Attack/defense	3
Secure software design and engineering	2
Cyberphysical Systems	2

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Responses: Degree Programs

Undergraduate courses - business/management focus	1 (Claflin)
Undergraduate courses - technical focus	2 - 10
Undergraduate major - bachelor's degree	
Undergraduate major - associate's degree	
Undergraduate minor	1 (Claflin)
Undergraduate certificate and/or badge	
Non-credit programs	
Graduate courses - business/management focus	2 - 10
Graduate courses - technical focus	
Graduate degree program - Master's level	
Graduate degree program - Doctoral level	
Institute or Center	

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Trident Technical College

Cybersecurity Certificate in Applied Science

Credit Requirements: 30 Semester Credit Hours

This certificate program is designed for individuals who have experience or training in systems and network operations. It is designed to provide expertise in information assurance and cybersecurity to prepare you for employment in the fast growing field of cybersecurity. It is ideal if you are employed or are pursuing employment in a business that includes a cybersecurity workforce as part of the organization. This program presents the knowledge and skills needed to develop and implement security of systems and infrastructure in business and industry. This program will help you prepare for COMPTIA Linux+, Security +, EC-Council Certified Ethical Hacking, as well as a number of other certification exams

Admission into this program requires proof of high school graduation (or GED) and qualifying scores on SAT, ACT or the TTC placement test.

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CLEMSON UNIVERSITY

Trident Technical College

Cybersecurity
Certificate in Applied Science

COURSE NUMBER	COURSE NAME
CPT 282	Information Systems Security
IST 165	Implementing and Administering Windows
IST 190	Linux Essentials
IST 268	Computer Forensics
IST 293	IT and Data Assurance
IST 191	Linux Systems Administration
IST 291	Fundamentals of Network
IST 294	IT and Data Assurance
IST 269	Digital Forensics
IST 292	Fundamentals of Network Security

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NSF Award: DUE1204800

ACE
ADVANCED CYBERFORENSICS EDUCATION

- Provides faculty training for cyberforensics educators
- Fosters cooperation between educators and workforce employers
- Assists Community Colleges to develop cyberforensics programs
- Encourages educators using cyberforensics for STEM engagement

Promoting Cyberforensics Education in the 21st Century

- Faculty Development
- Program Development
- Workforce Development
- K-12 Outreach

TRIDENT TECHNICAL COLLEGE
South Carolina's State Lead Institution Consortium Member

Email: CyberACE@tridenttech.edu

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Denmark Technical College

Cybersecurity Certificate

Purpose:

The purpose of the Cybersecurity certificate is to provide students with the foundational concepts and skills necessary to protect and defend information systems from attack and to limit access to network resources.

Additionally, the program will prepare students for employment in a variety of entry level careers in Cybersecurity and lead to certifications in the Cybersecurity/ Information Assurance field which include – Network+ and Security+.

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CLEMSON UNIVERSITY

Denmark Technical College

Cybersecurity Certificate

Total Credits: 30

COURSE NUMBER	COURSE NAME
CPT 104	Introduction to Information Technology
CPT 282	Information Systems Security
IST 293	IT and Data Assurance I
IST 294	IT and Data Assurance II
IST 190	LINUX Essentials
IST 193	LINUX Security Administration
IST 268	Computer Forensics
IST 245	Local Area Networks
IST 291	Fundamentals of Network Security I
IST 292	Fundamentals of Network Security II

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Clemson University

Cybersecurity Courses

COURSE NUMBER	COURSE NAME
CPSC 4200/6200	Computer security principles
CPSC 4240/6240	System administration and security
CPSC 4810/6810	Usable privacy and security
CPSC 8810	Advanced networking and security
CPSC 8810	Security in emerging computing and networking systems
ECE4490	Computer and Network Security
ECE4930/6930	Advanced Security Seminar
ECE8930	Adversarial Distributed Systems
ECE8930	Botnet Technologies
ECE8930	Internet Censorship and Surveillance Circumvention Technologies

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Clemson University

Cybersecurity Courses

COURSE NUMBER	COURSE NAME
ECE8930	Contemporary Topics in Computer Security
ECE8930	Malware Use and Design
ECE8930	Penetration Testing
HON 2060	Honors Course: Privacy, Cybersecurity and Freedom
MATH 8570	Introduction to Cryptography
MATH 8560	Information Theory and Coding Theory
MATH 9850	Lattices and Cloud Data Security
MATH 9850	Computational Algebra
MATH 9850	Computational Number Theory
MATH 9850	Computational Algebraic Geometry

CLEMSON UNIVERSITY

PCDC 2017

PCDC Competition : April 8th -10th, 2017

Hosted at: Trident Tech

2017 Palmetto Digital Forensics Competition

PDFC Competition : April 8th, 2017

Hosted at: Trident Tech

Participating Schools

High School – Saturday, 8 April

- Palmetto Scholars Academy – North Charleston - 1st place 2016
- Porter Gaud- Charleston-2nd
- Stratford –Goose Creek, 3rd place 2016

Qualified through CyberPatriot:

- Blythewood
- Wando – Mt. Pleasant
- South Aiken
- Home School Network
- Ashley Ridge – Summerville

Collegiate – Sunday, 9 April

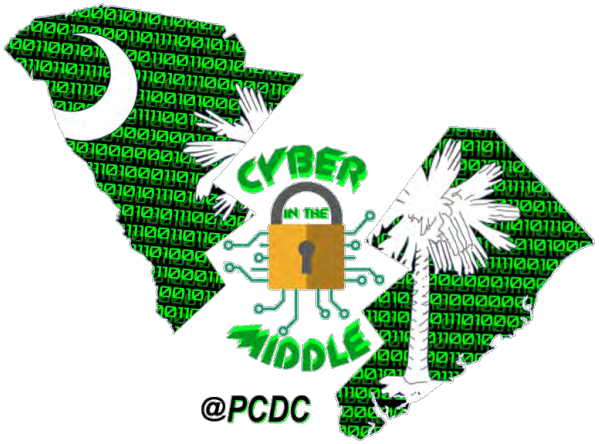
- Clemson – 1st place 2016
- South Carolina –2st place 2016
- The Citadel – 3rd place 2016
- Trident Technical College

Qualified through SECCDC:

- Claflin University
- ECPI University
- Charleston Southern University
- College of Charleston

Cyber-In-The Middle

- **PCDC's Inaugural Middle School Program –** Dave Coldren (Lead)
- Trying to influence 7th & 8th graders before they decide on high school track
- Students must be accounted for at all times, have their own badges-need volunteers
- All must have consent forms signed by parent
- Morning 9-1200, Afternoon 1-4
- Curriculum will have 3 (45 minute) modules:
  - PCDC Events (broken into 3 groups)
    - Blue/Red/Gold Teams
    - Forensics
    - Mini-Expo: CyberPatriot/Node SC/SC Cyber
  - Computer Deconstruction (and Reconstruction)
  - Into to Cyber (modified from Cyber Camp)



PCDC Success Stories

Josiah Bryan Captain of the 2015 2nd Place Charleston Southern University Team is now working for SPAWARSYSCEN Pacific in San Diego

- Many of the college students that were imbedded on Pro Day teams in 2015 received on-the-spot job offers from teams competing on that day.
- Not to be out done, SPAWARSYCEN Atlantic is hiring the 2016 MVP and 2016 TTC team lead!

Several of the High School students that competed in 2015 worked as summer interns at SPAWARSYSCEN Atlantic

Encouraging the Next Workforce

Supporting programs and partnerships that help make our communities better, stronger, and more vibrant places to live, work, and do business

Ms. Shanda Johnson
STEM Outreach IPT Lead
DoD STEM Education and Outreach Advocate of the Quarter Award (1QFY17)

FY16 Community Impact and Volunteer Data

- 69,000+ Students
- 300+ Volunteers
- 21,000+ Total Hours
- 74+ First Robotics Teams
- 11 Educational Partnership Agreements

DoD Math Games - Cyber Security Summer Camp - DimensionU - Cyber Defense Competitions
SeaPerch - FIRST Robotics Leagues - STEM Festivals - DARPA robotics challenge
NOLA Redsticks Robotics - School Tours - Career & Science Fairs - Girls Day Out - Lunch Buddies

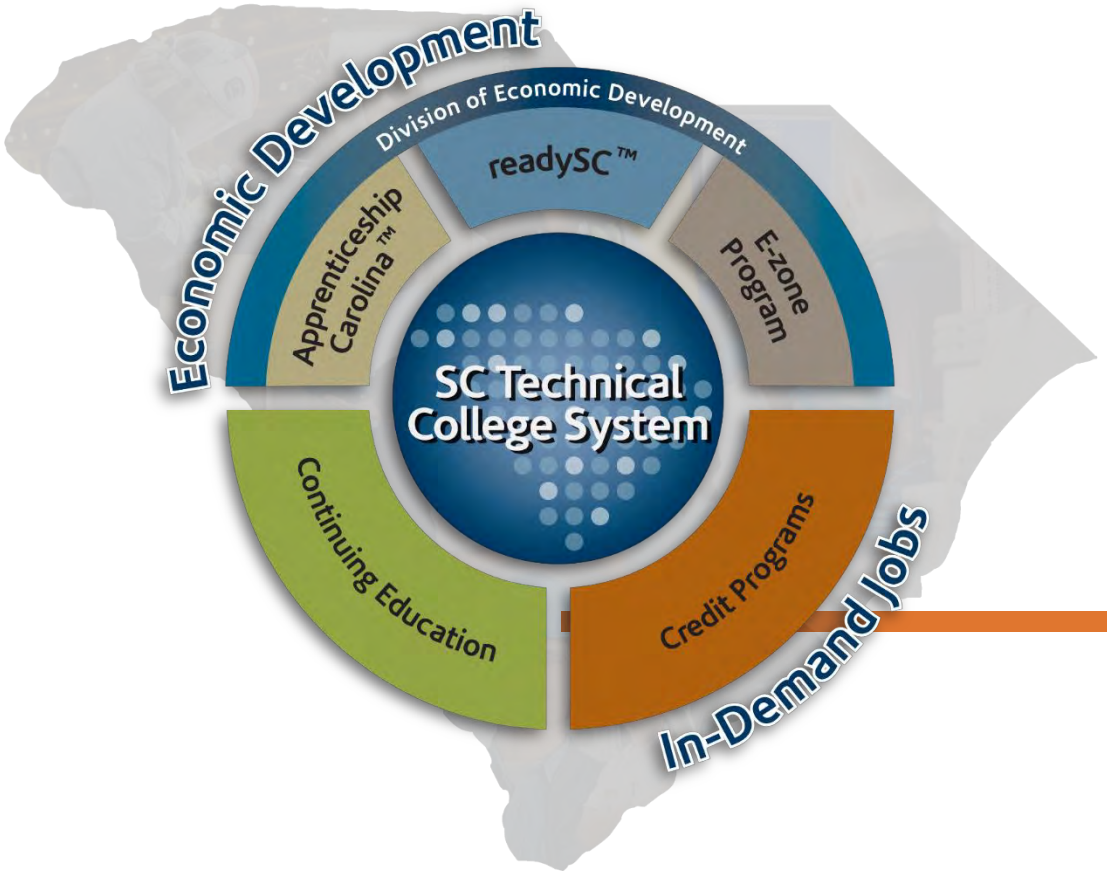
2015 Cyber Security Trends

Hacking

the Internet of Things

ecpi UNIVERSITY

SC STATE CYBER LAB



SC Technical College System

Organizational Structure

Our Mission

Making certain all employers in South Carolina have access to information and consultative services, at no charge, regarding sponsorship of a demand-driven registered apprenticeship program.

Youth Apprenticeship Carolina™
SC Technical College System

Earn and Learn

Youth Apprenticeship provides South Carolina high school students the unique opportunity to earn while they learn. By combining high school and/or technical college curriculum with critical on the job training at a local business, students can pull in a pay check while earning a national credential at the same time as their high school diploma.

Youth APPRENTICESHIP CAROLINA™
SC TECHNICAL COLLEGE SYSTEM

Partnership = Success

Benefits of Youth Apprenticeship

Employers and high school apprentices alike benefit from the partnership created through a youth apprenticeship program

1. Employers create crucial pipelines while decreasing costly turnover
2. Employers can influence, mold and shape future employees
3. Students bring in a paycheck while they learn
4. Students can earn a national credential, high school diploma, technical college dual credit, and work experience
5. Enhance employability by learning in-demand skills for good paying jobs in the state

State Tax Credit

$1,000 per apprentice per year
for up to four (4) years

Youth Apprenticeship By the Numbers

158 Companies with a registered youth program

32 counties have a registered youth apprenticeship program

Youth Apprenticeship By the Occupations

Sample of Current Occupations

- Accounting Technician
- Child Care Development Specialist
- Advanced Manufacturing: Industrial Maintenance Technician
- Advanced Manufacturing: Machine Tool Operator
- Advanced Manufacturing: CNC Operator
- Hospitality: Guest Services
- Hospitality: Culinary Arts
- IT: Computer Programmer
- IT: Help Desk Technician
- Health Care: Nurse Assistant
- Construction: Construction Craft Laborer
- Construction: Plumber
- Automotive: Automobile Technician/ Auto Body Repairer
- Photographer / Public Affairs
- Water and Waste Water Operator

Youth Apprenticeship Carolina™
SC Technical College System

How does it Work?

Program Components

Job-Related Education

144 hours of job-related education per year

Education reinforces skills learned on-the-job

Education provided by local technical college, company, vendor or combination

Supervised On-the-Job Learning

2,000 hours per year of supervised on-the-job learning

Length of program dependent on occupation

Customized by the employer

Provided at the employer's designated job site

Scalable Wage Progression

Wages incrementally increase throughout the program

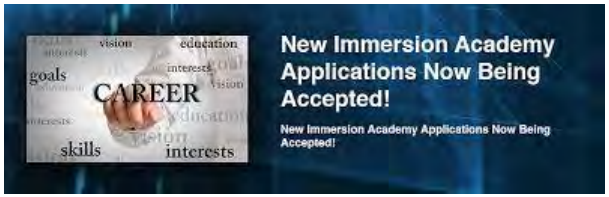
CYBER Apprenticeship Panel

Dr. Leigh Armistead, Peregrine Technical Solutions

Lonnie Emard, ACS

Girish Seshagiri, ISHPI

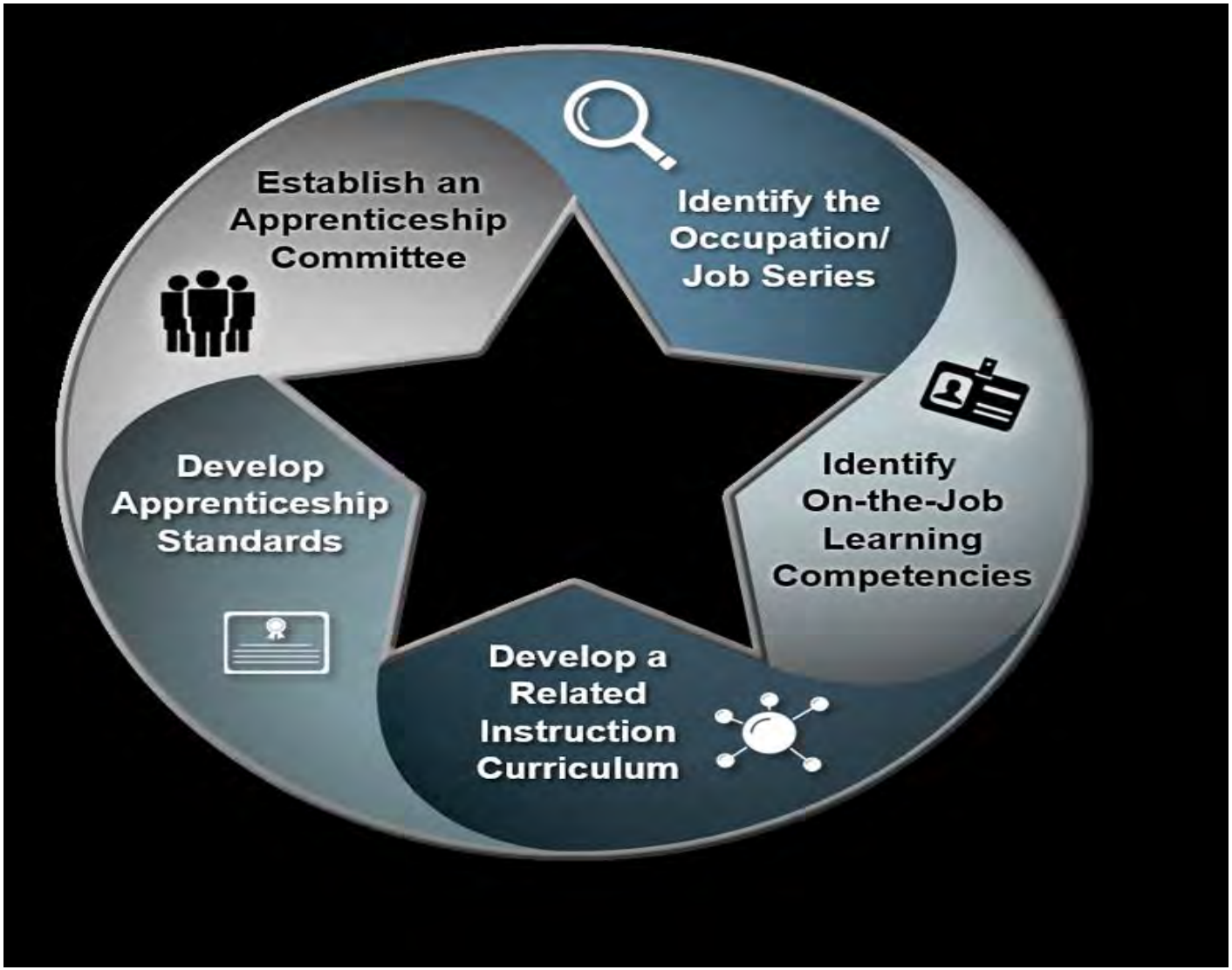
Everybody has the same issue



Goals of this Effort?

- Develop long-term relationships with employees who are committed to the company
- Hire shareholders and teach them new skillsets
- Train them, invest in them and keep them current technically
- Grow new staff and to meet our requirements
- Use the registered apprenticeship as a model
- Assuming success, expand to include more new hires
- Update our curriculum to meet changing standards from the DoD
- Support other companies interested in cyber apprenticeships

Elements of an apprenticeship

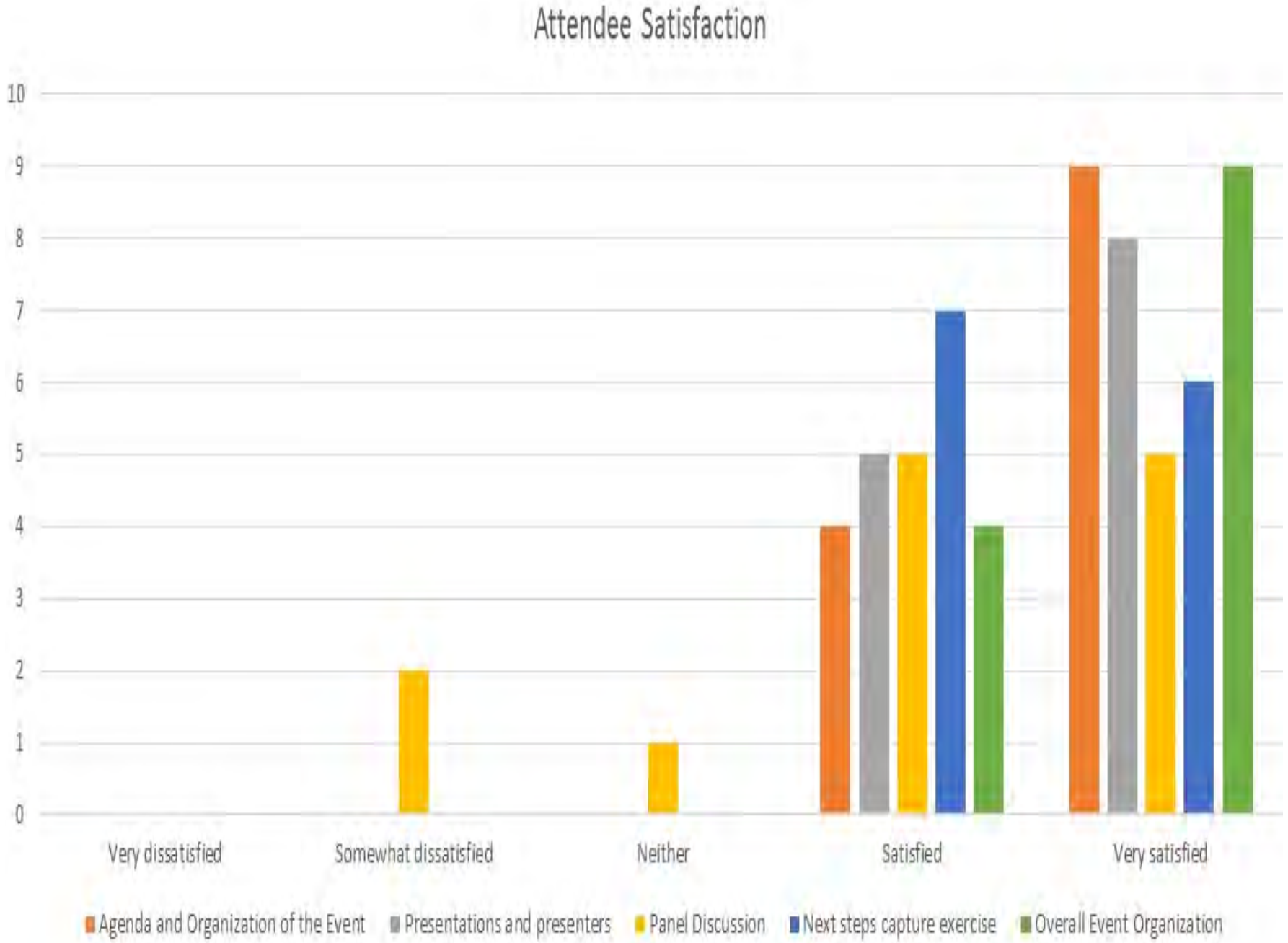


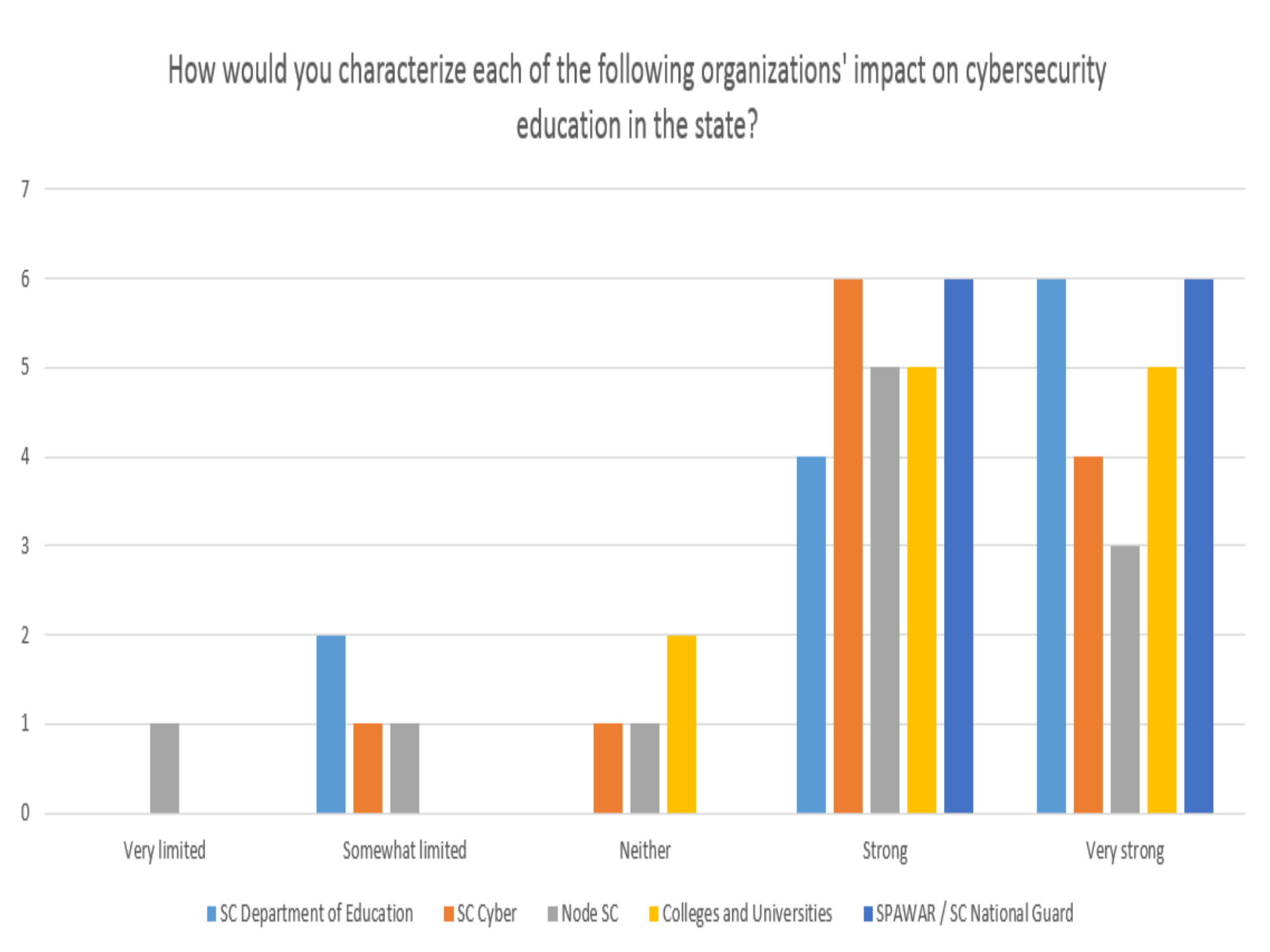
Cyber Education Symposium

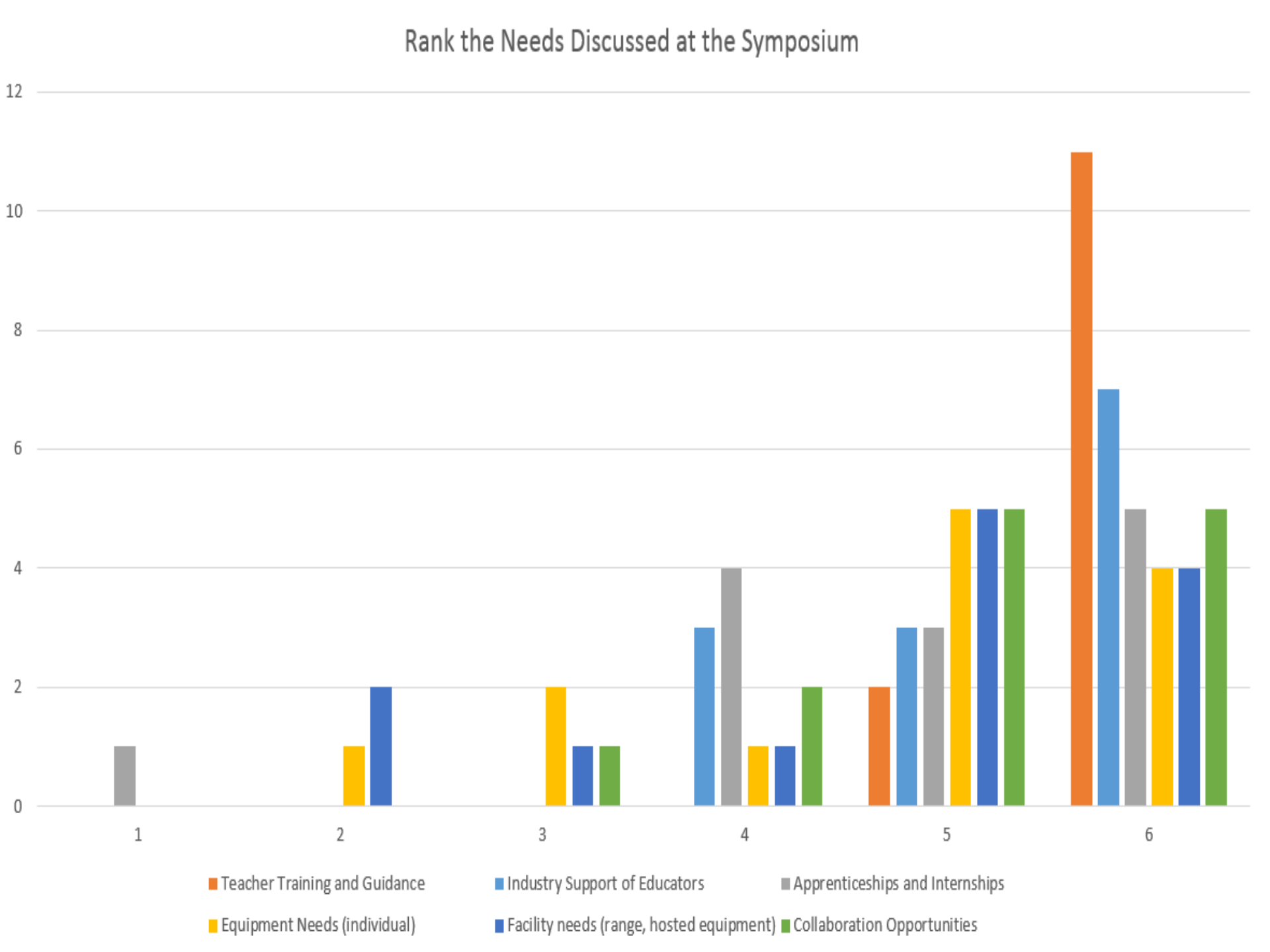
Participant Evaluations

Claflin University

February 2017

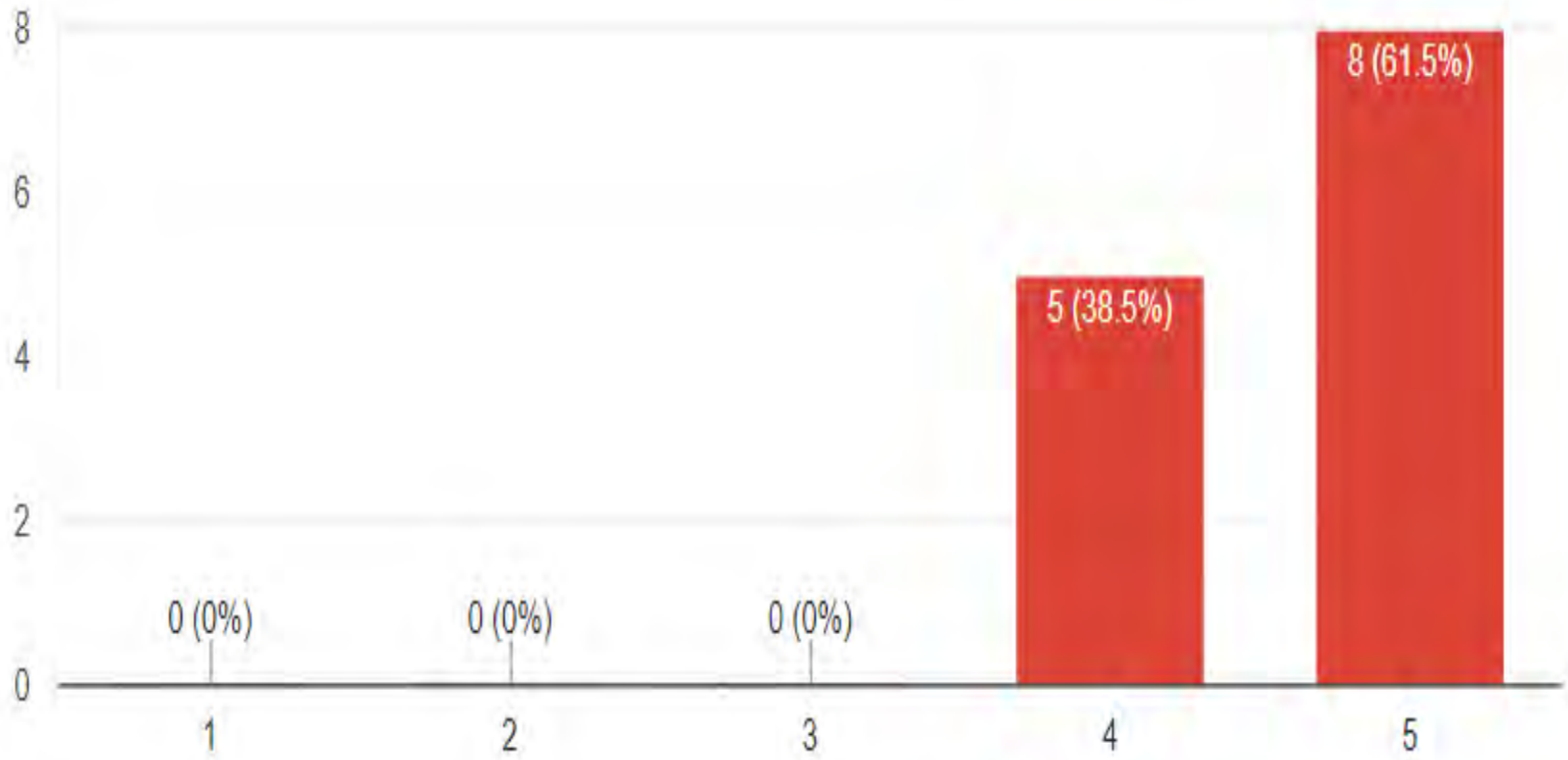

Attendee Satisfaction
10
9
8
7
6
5
4
3
2
1
0
Very dissatisfied
Somewhat dissatisfied
Neither
Satisfied
Very satisfied
Agenda and Organization of the Event
Presentations and presenters
Panel Discussion
Next steps capture exercise
Overall Event Organization


How would you characterize each of the following organizations' impact on cybersecurity education in the state?
7
6
5
4
3
2
1
0
Very limited
Somewhat limited
Neither
Strong
Very strong
SC Department of Education
SC Cyber
Node SC
Colleges and Universities
SPAWAR / SC National Guard


Rank the Needs Discussed at the Symposium
12
10
8
6
4
2
0
1
2
3
4
5
6
Teacher Training and Guidance
Industry Support of Educators
Apprenticeships and Internships
Equipment Needs (individual)
Facility needs (range, hosted equipment)
Collaboration Opportunities

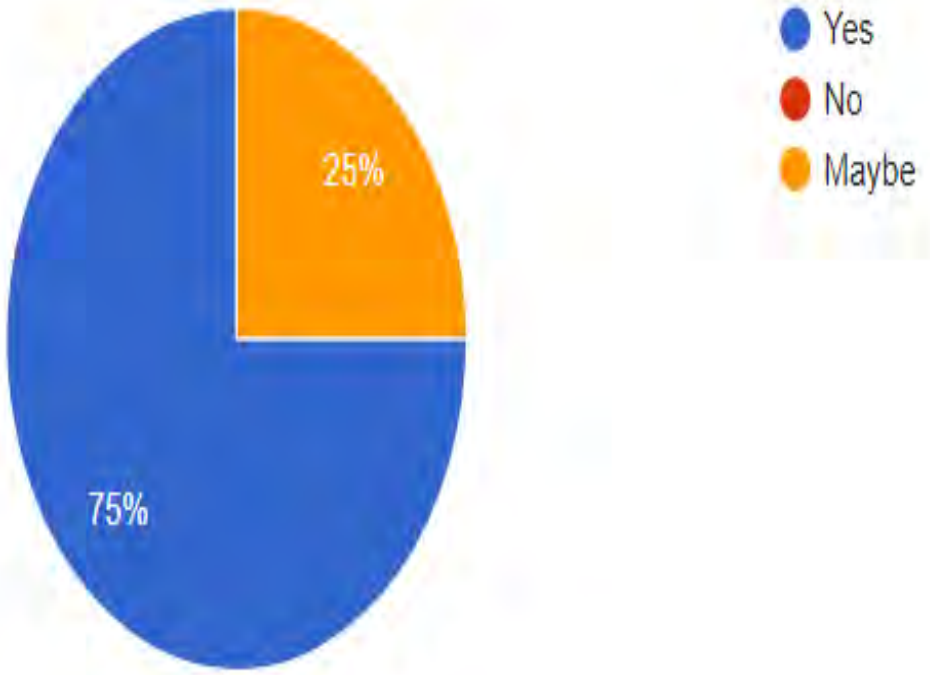
Overall, how valuable was the Symposium?

13 responses



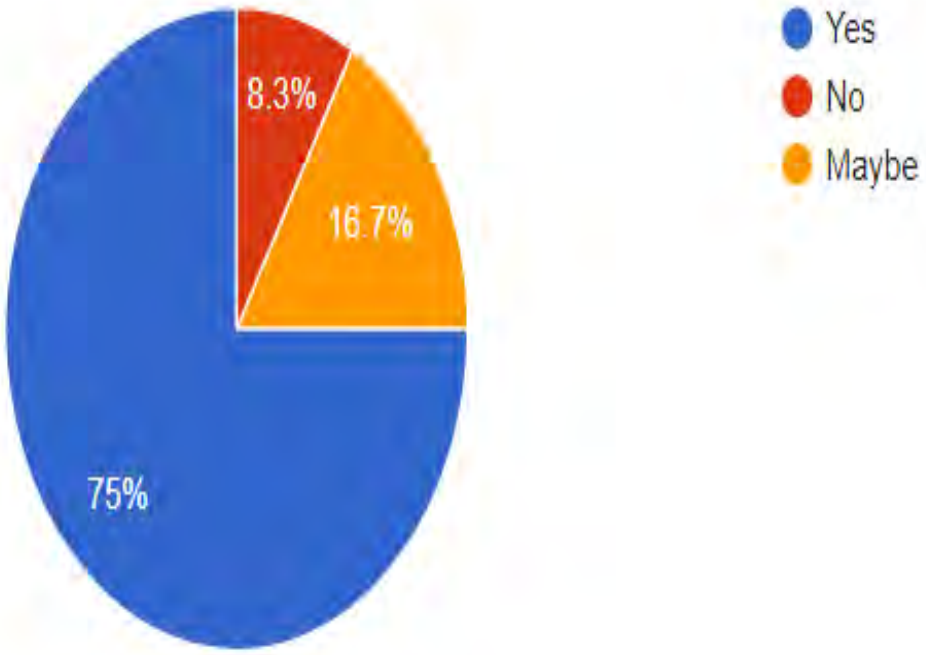
Are you willing to be on a committee?

12 responses



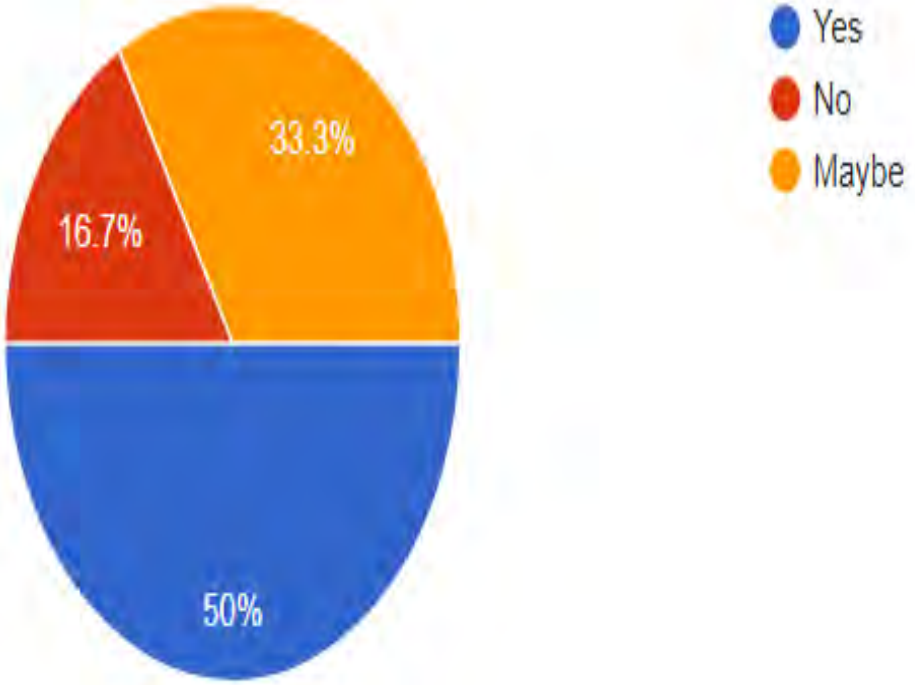
Are you willing to work with secondary and higher education institutions to promote cybersecurity education?

12 responses



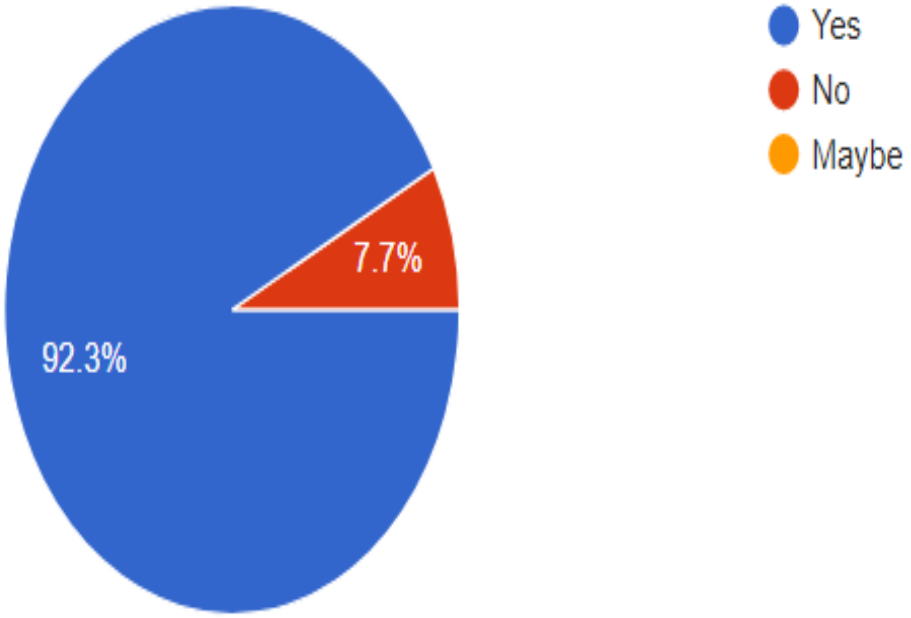
Are you willing to host an event at your school or facility?

12 responses



Based on your experience, would you attend another Symposium or similar event?

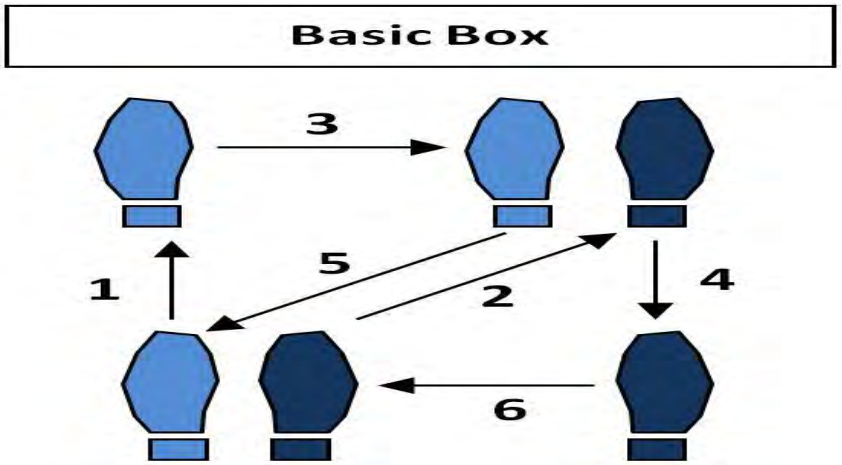
13 responses



NEXT STEPS-1

1. COMMUNITY DRIVEN COMMUNICATIONS
2. FACULTY RETENTION
3. INDUSTRY COMMITMENT
4. TEACHER LEARNING OPPORTUNITIES
    a. TRAIN THE TRAINER
    b. NEED CONNECTION TO CLASSROOM
        i. PRACTICAL AND REALISTIC
        ii. CYBER SECURITY PEDAGOGY
5. IT STAFF ALSO NEED TO BE TRAINED
6. GOOGLE – FACULTY IN RESIDENCE
7. TEACHER GUIDANCE
    a. CYBER SECURITY EDUCATOR COOKBOOK
8. EDUCATION VERSUS CERTIFICATION
9. APPRENTICESHIPS / EXTERNSHIPS / INTERNSHIPS
    a. WHAT ARE THE SKILL SETS NEEDED
10. USE ADVANCED TECHNOLOGY SKILLS FOR RECERTIFICATION OF TEACHERS
    a. GO BEYOND PROFICIENCY LEVELS
11. NEED TO CONVENE WITH SUB COMMITTEES TO FOCUS ON SPECIFIC TECHNOLOGY TOPICS BASED AROUND EDUCATION, GOVERNMENT, AND BUSINESS.
12. EQUIPMENT NEEDS
    a. NEED ISOLATED NETWORKS
13. BREAK BARRIERS OF LOCKING DOWN THE SYSTEM

NEXT STEPS-2

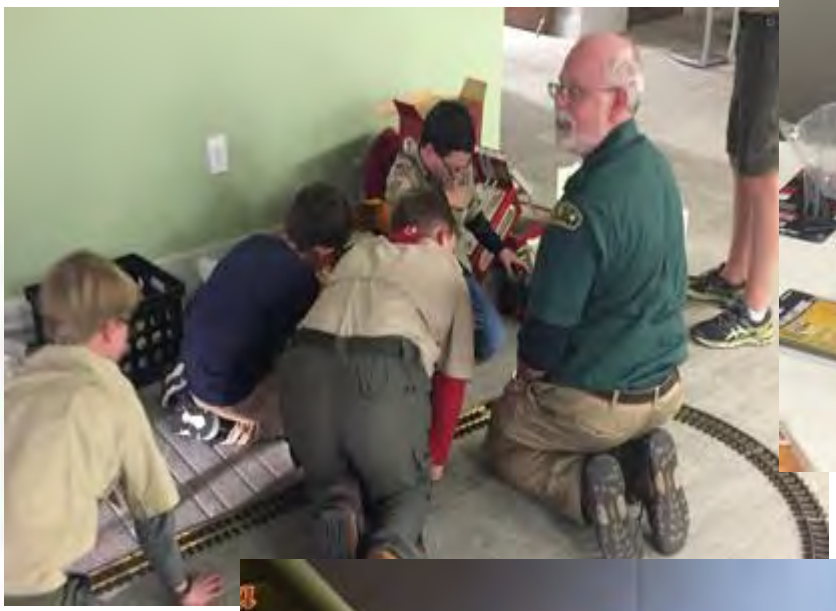


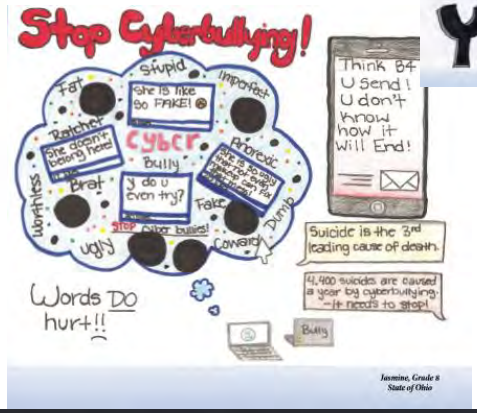
1. COMMUNICATION SKILLS NEEDED
2. TECHNICAL WRITING SKILLS NEEDED
3. GRANT OPPORTUNITIES
4. COMPETITIONS AND EVENTS
    a. PROMOTE PCDC – APRIL 8 THRU 10
    b. PROMOTE CYBER SECURITY CAMP
        i. BURKE HS – JUNE 19-23
5. BUILD A CYBER RANGE THAT IS AVAILABLE FOR ALL STAKEHOLDERS
6. CONTACT LIST OF POTENTIAL EDUCATORS THAT CAN TEACH HIGH LEVEL TECHNOLOGY
    a. JOB BOARD – ALL INDUSTRIES
        i. APPLICANT ENGINE – WITH RESUME
7. NEED INDUSTRY PARTICIPATION AND FEEDBACK.
8. NEED ADVISORY BOARD FOR ALL STAKEHOLDERS AROUND CYBER SECURITY
9. PROMOTE CYBER SECURITY SUMMIT
    a. MAY 23 IN COLUMBIA, SC
10. BREAK INTO 7 CONGRESSIONAL REGIONS
    a. HOST A MEET/GREET SESSION AND DISCUSS TOPICS AROUND CYBER SECURITY
11. NEED TO REVISIT REQUIRED CREDENTIALS ON ALL TECHNOLOGY PROGRAMS IN SCHOOLS
    a. PACE AND DIRECT PROGRAMS
12. PROFESSIONAL LEARNING PATHWAYS NEEDED FOR TEACHERS WANTING TO RETOOL
13. GET JOURNALISM DEGREE

SC CYBER

K-12 Programs

BOY SCOUTS OF AMERICA®





Helping Keep Kids Safe Online

Cybersecurity Awareness

Kids SafeOnline
SC Cyber Consortium
Poster Contest

MS-ISAC

MULTI-STATE
Information Sharing & Analysis Center™

SC Cyber – 1301 Gervais Street Suite 213 – Columbia, SC 29201
803-777-6951 | info@sccyber.org

2016 Cyber Security Calendar

Neela, Grade 4
State of Delaware

MS-ISAC **MULTI-STATE** Information Sharing & Analysis Center™

StaySafeOnline.org

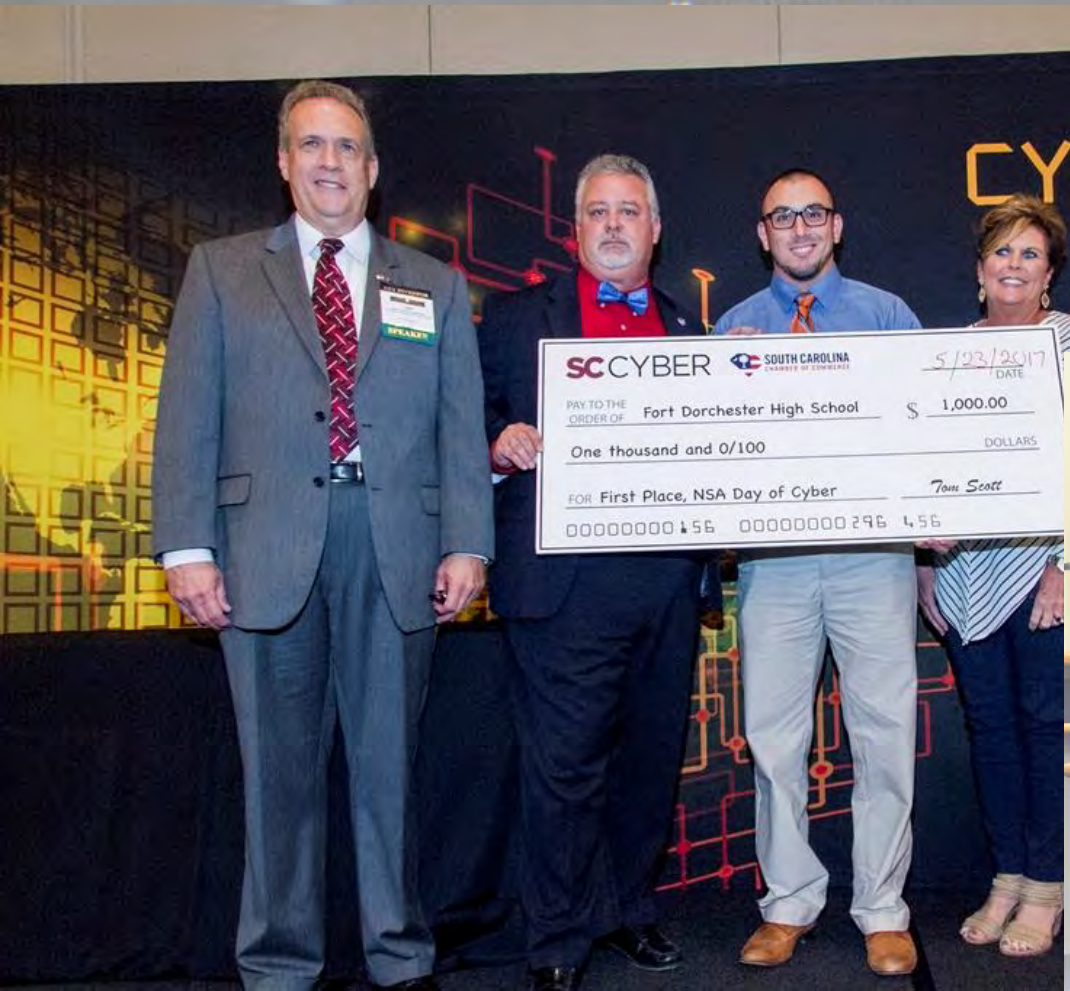
NASCIO

PRESENTS: NSA Day of Cyber School Challenge

NATIONAL SECURITY AGENCY
UNITED STATES OF AMERICA

DAY OF CYBER

AN INTERACTIVE EXPERIENCE SPONSORED BY NSA



SAVE THE DATE

Next Steps in SC Cyber Education….

Symposium 2017-18

@ Claflin University

December 2017

Questions?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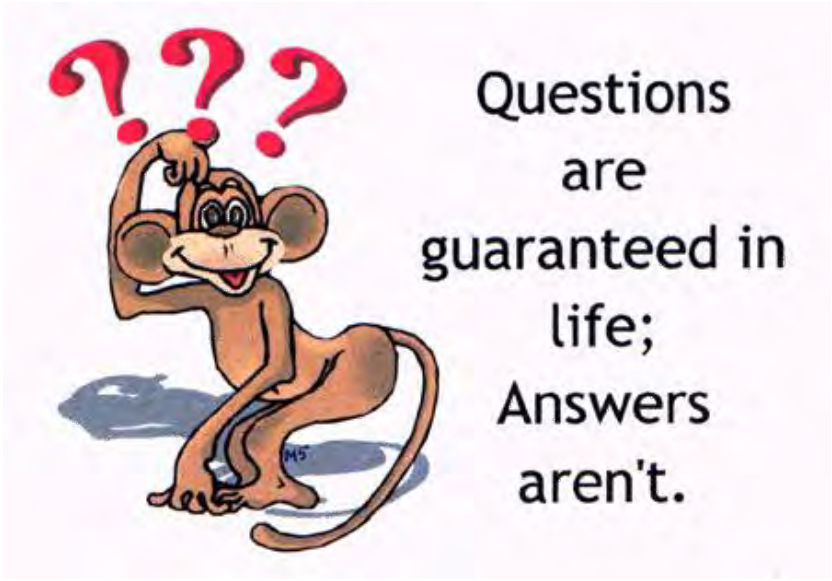
Questions
are
guaranteed in
life;
Answers
aren't.