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The Time Is Now for College/Employer Partnerships for Secure Software Development Apprenticeships

Cybersecurity Apprenticeship Employer Summit

November 14, 2018

Girish Seshagiri

CMMIDEV/5℠
Exp. 2017-03-07 / Appraisal #21757

(ISC)² OFFICIAL TRAINING PROVIDER

(ISC)² INSPIRING A SAFE AND SECURE CYBER WORLD.

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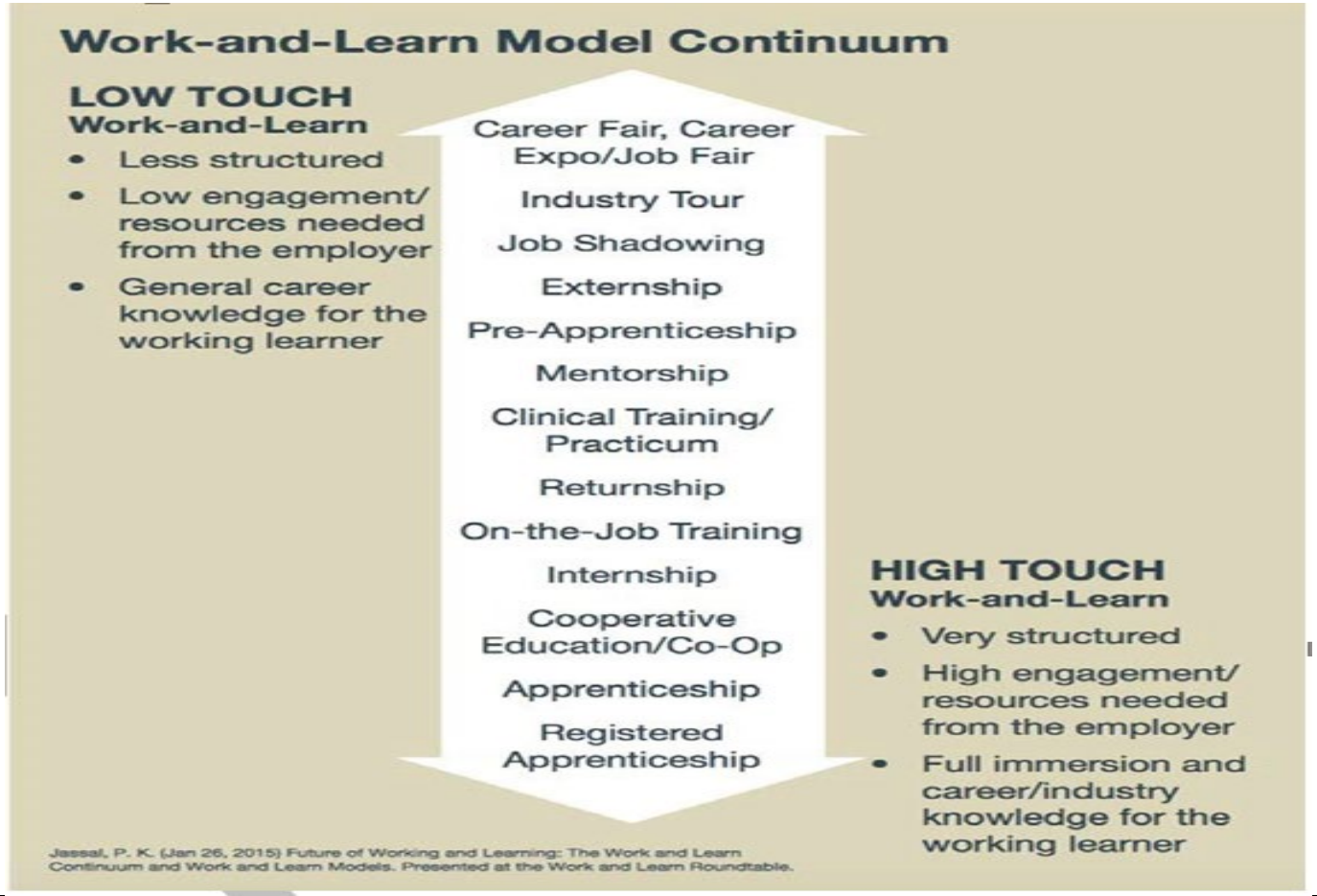
Dual Model Apprenticeship – "Because nothing else works"



"ASKs"

- Act with a sense of urgency to connect cybersecurity education directly to a job – Do nothing is not an option
- Form a core group to launch an employer-led dual model apprenticeship partnering with Trident Technical College to address your needs for workforce capable of developing software which is secure from cyber attacks
- Be the leader in industry/government/academic collaboration to rapidly scale implementation of employer-driven dual model apprenticeship for in-demand and hard-to-fill cybersecurity occupations in South Carolina **(because nothing else works)**
- Join the NICE Apprenticeship Working Group and attend monthly meetings
  https://www.nist.gov/itl/applied-cybersecurity/nice/about/working-group/apprenticeship-sub-working-group

Topics

- Jobs and Cost of Status Quo
- Dual Model Apprenticeships
- Cybersecurity
- CICESS Secure Software Development Dual Model
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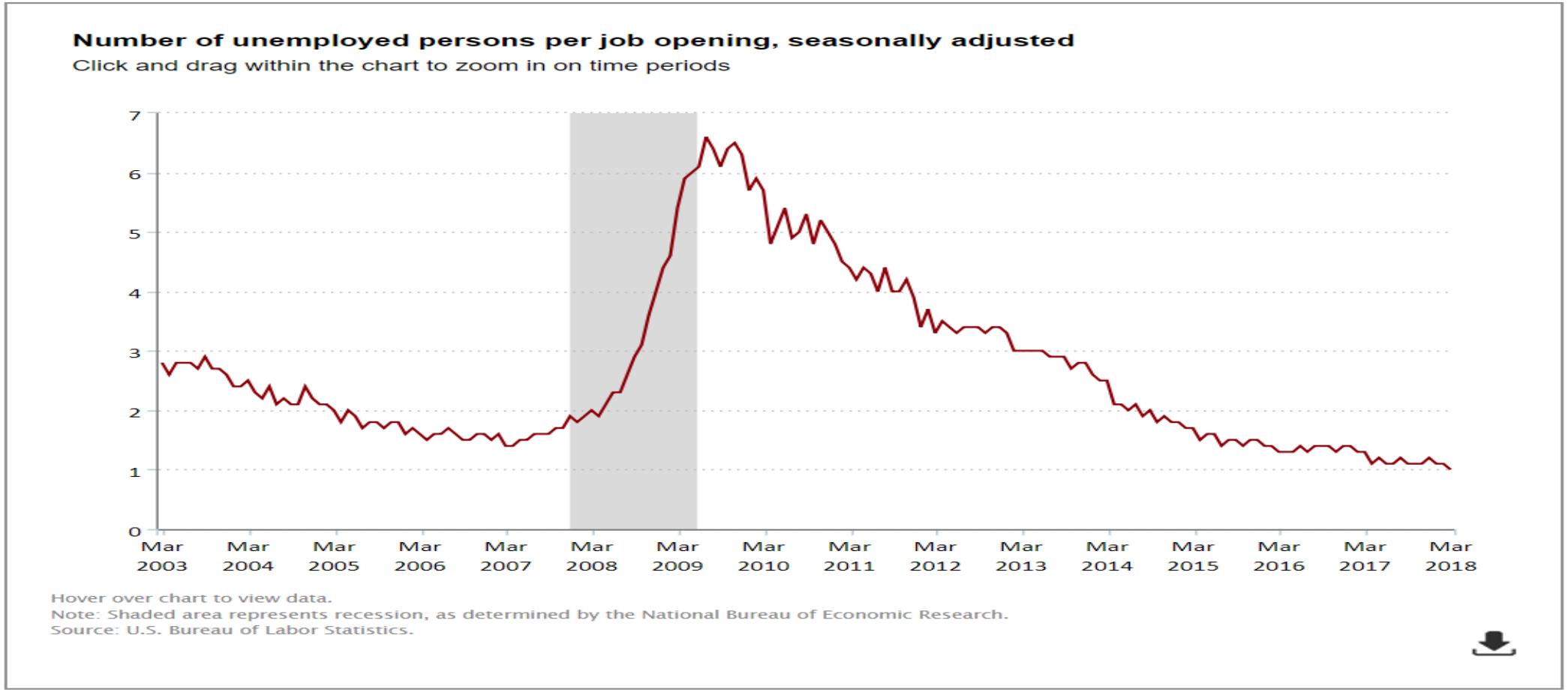
Number of Job Seekers = Number of Job Openings



Tech Occupations Employment Patterns -United States, 2016-2026

Description	2016 Jobs	2026 Jobs	2016 –2026 Change	2016 –2026 % Change	Annual Openings	Typical Entry Education
Software Developers, Applications	801,825	989,671	187,846	23%	75,884	Bachelor's degree
Computer User Support Specialists	606,393	706,548	100,155	17%	57,674	Some college, no degree
Computer Systems Analysts	572,406	706,954	134,548	24%	54,023	Bachelor's degree
Software Developers, Systems Software	414,911	482,250	67,339	16%	35,489	Bachelor's degree
Network and Computer Systems Administrators	379,360	425,826	46,466	12%	29,528	Bachelor's degree
Computer Network Support Specialists	191,794	212,300	20,506	11%	16,861	Associate's degree
Computer Network Architects	159,250	178,510	19,260	12%	12,807	Bachelor's degree
Web Developers	131,808	171,200	39,392	30%	14,452	Associate's degree
Database Administrators	115,547	132,586	17,039	15%	9,600	Bachelor's degree
Information Security Analysts	98,165	117,821	19,656	20%	9,153	Bachelor's degree

Source: EMSI Analyst. 2018.2 – QCEW Employees

CyberSeek™

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Cybersecurity Supply/Demand Heat Map

States | Metro Areas

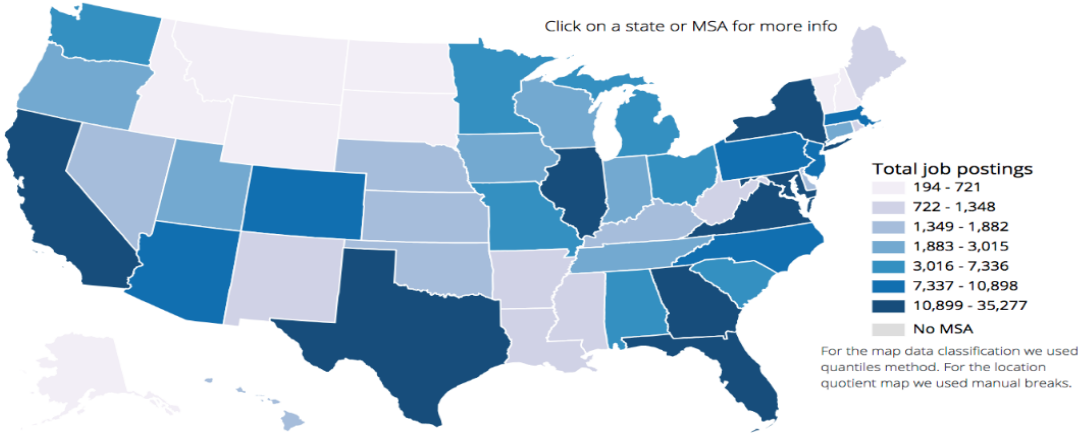
All Data | Public Sector Data | Private Sector Data

Total job openings

Search State

Cybersecurity talent gaps exist across the country. Closing these gaps requires detailed knowledge of the cybersecurity workforce in your region. This interactive heat map provides a granular snapshot of demand and supply data for cybersecurity jobs at the state and metro area levels, and can be used to grasp the challenges and opportunities facing your local cybersecurity workforce.

Share | Embed



National level

TOTAL CYBERSECURITY JOB OPENINGS

301,873

TOTAL EMPLOYED CYBERSECURITY WORKFORCE

768,096

SUPPLY OF CYBERSECURITY WORKERS

Very Low

CYBERSECURITY WORKFORCE SUPPLY/DEMAND RATIO

National average 2.5

GEOGRAPHIC CONCENTRATION

Average

LOCATION QUOTIENT

National average 1.0

TOP CYBERSECURITY JOB TITLES

- Cyber Security Engineer
- Cyber Security Analyst
- Network Engineer / Architect
- Cyber Security Manager / Administrator
- Systems Engineer
- Software Developer / Engineer
- Vulnerability Analyst / Penetration Tester
- Systems Administrator
- IT Auditor

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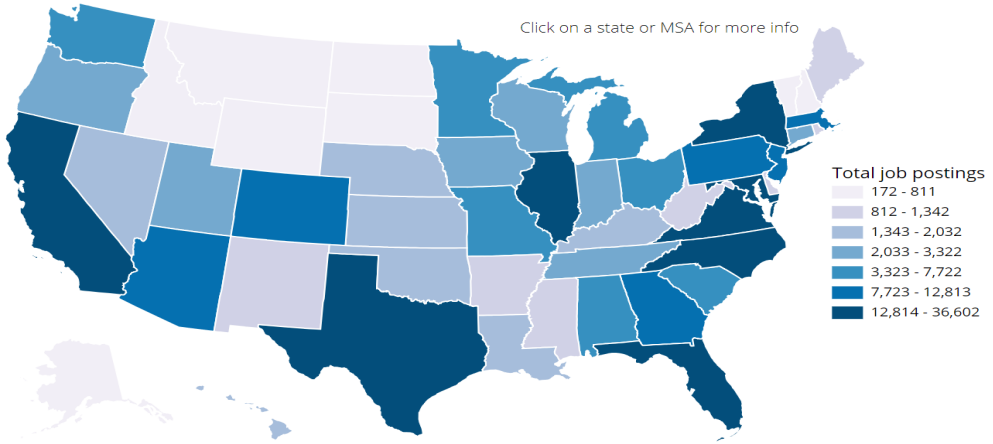


National level

TOTAL CYBERSECURITY JOB OPENINGS

313,735

TOTAL EMPLOYED CYBERSECURITY WORKFORCE

715,715

SUPPLY OF CYBERSECURITY WORKERS

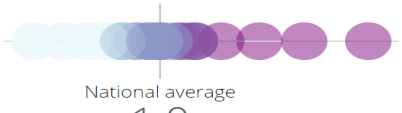
Very Low

CYBERSECURITY WORKFORCE SUPPLY/DEMAND RATIO

GEOGRAPHIC CONCENTRATION

Average

LOCATION QUOTIENT



TOP CYBERSECURITY JOB TITLES

- Cyber Security Engineer
- Cyber Security Analyst
- Network Engineer / Architect
- Cyber Security Manager / Administrator
- Systems Engineer
- Software Developer / Engineer
- Systems Administrator
- Vulnerability Analyst / Penetration

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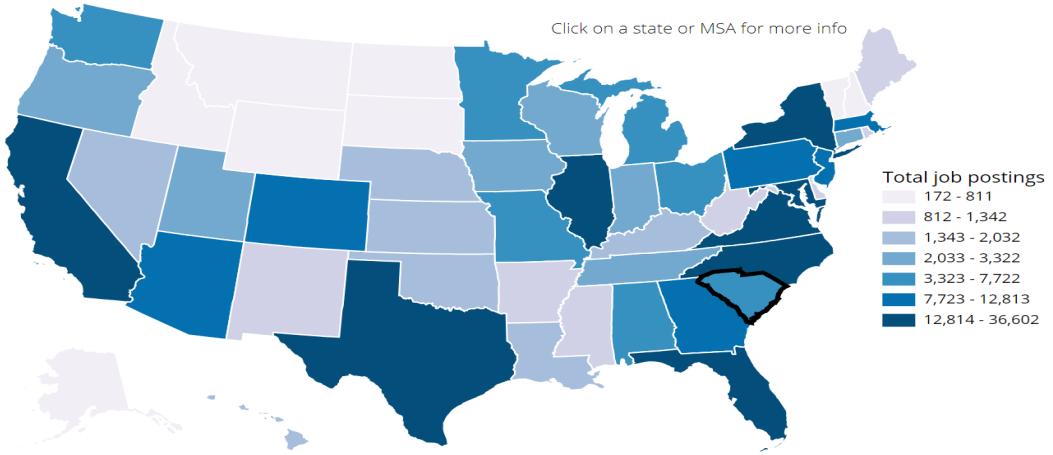


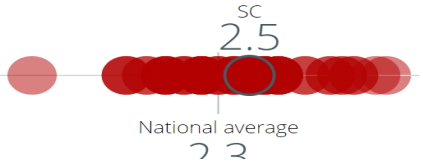
South Carolina

TOTAL CYBERSECURITY JOB OPENINGS
3,380

TOTAL EMPLOYED CYBERSECURITY WORKFORCE
8,374

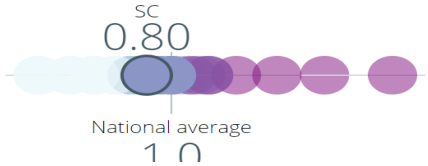
SUPPLY OF CYBERSECURITY WORKERS
Very Low

CYBERSECURITY WORKFORCE SUPPLY/DEMAND RATIO



GEOGRAPHIC CONCENTRATION
Low

LOCATION QUOTIENT



TOP CYBERSECURITY JOB TITLES

- Cyber Security Engineer
- Cyber Security Analyst
- Network Engineer / Architect
- Systems Engineer
- Cyber Security Manager / Administrator
- Systems Administrator
- Cyber Security Specialist / Technician

Topics

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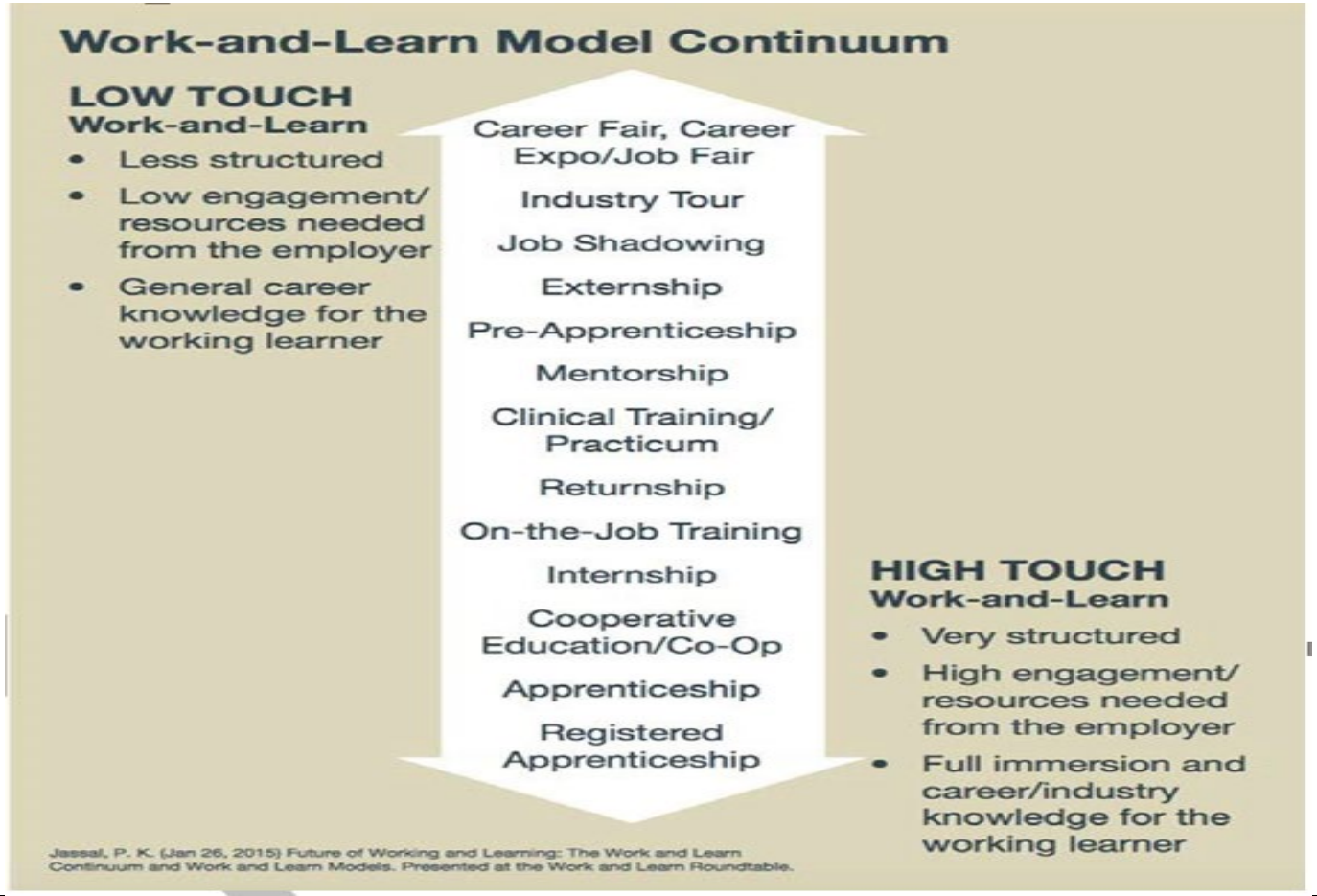
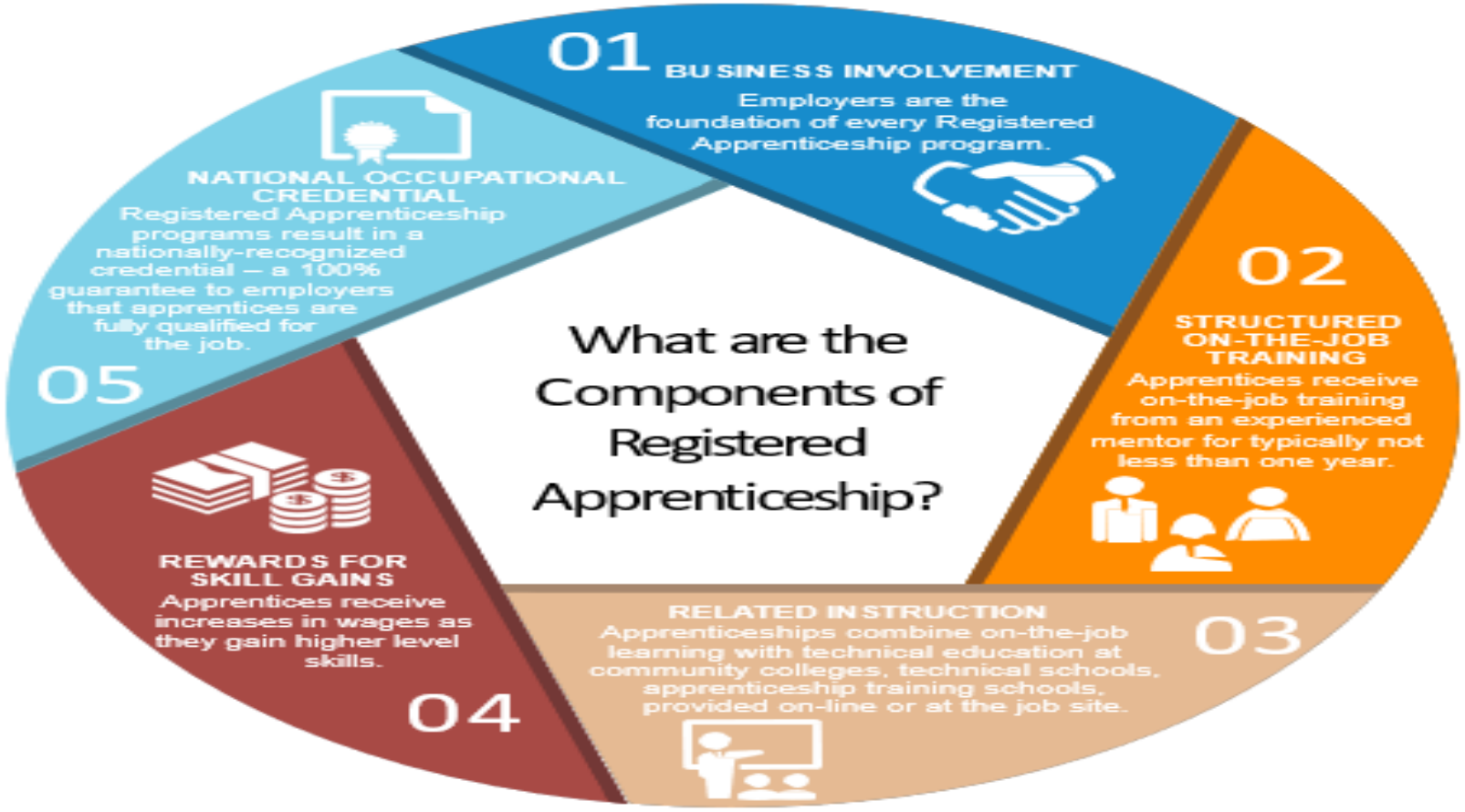


Dual Model Apprenticeship – Core Components



Administration and Apprenticeship

TASK FORCE ON APPRENTICESHIP EXPANSION

Final Report to:

The President of the United States

May 10, 2018

Congress and Apprenticeships

THE HILL

Addressing the skills gap in America through apprenticeships

BY SEN. CHRIS COONS (D-DEL.), KEVIN O'CONNOR, NORM ABRAM, RICHARD TRETHEWEY, TOM SILVA, ROGER COOK, NATHAN GILBERT, OPINION CONTRIBUTORS — 05/08/18 09:30 AM EDT

32 COMMENTS

THE VIEWS EXPRESSED BY CONTRIBUTORS ARE THEIR OWN AND NOT THE VIEW OF THE HILL

http://thehill.com/blogs/congress-blog/education/386592-addressing-the-skills-gap-in-america-through-apprenticeships

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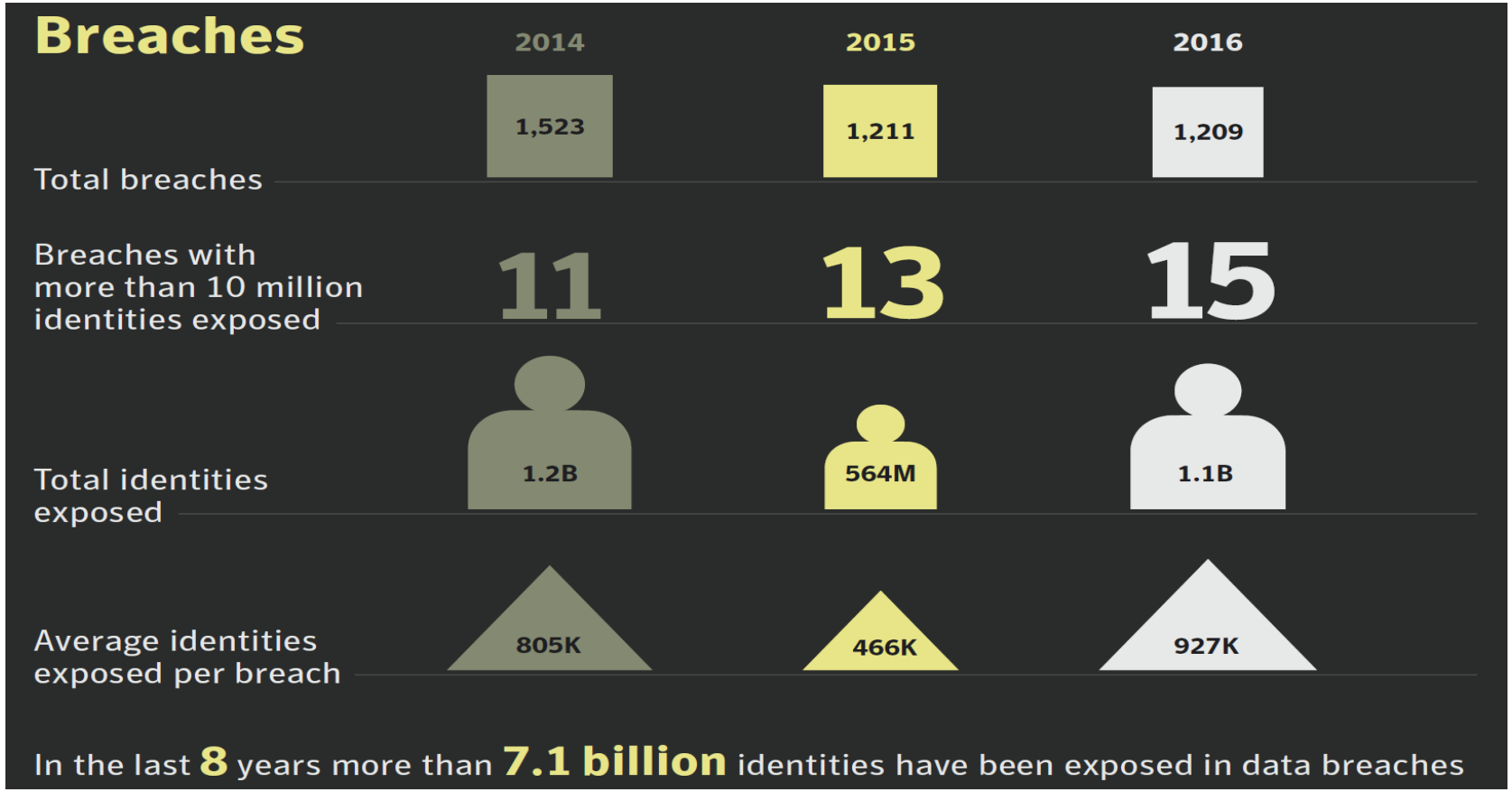
Personal Identity Breaches



Cybersecurity

- **Defective software** is insecure
  - 90% of attacks are successful by exploiting defects in the software application layer
  - 1 in 20 software defects are vulnerabilities that can be exploited to launch cyberattacks
  - "If you have a quality problem, you have a security problem"
- **Consequences of poor quality software**
  - Impacts - Democracy, loss of life and limb besides just financial loss
  - Potentially more catastrophic than a bridge falling down
- High priority national goal to move from reactive to proactive – **from threat detection to threat prevention**

Topics

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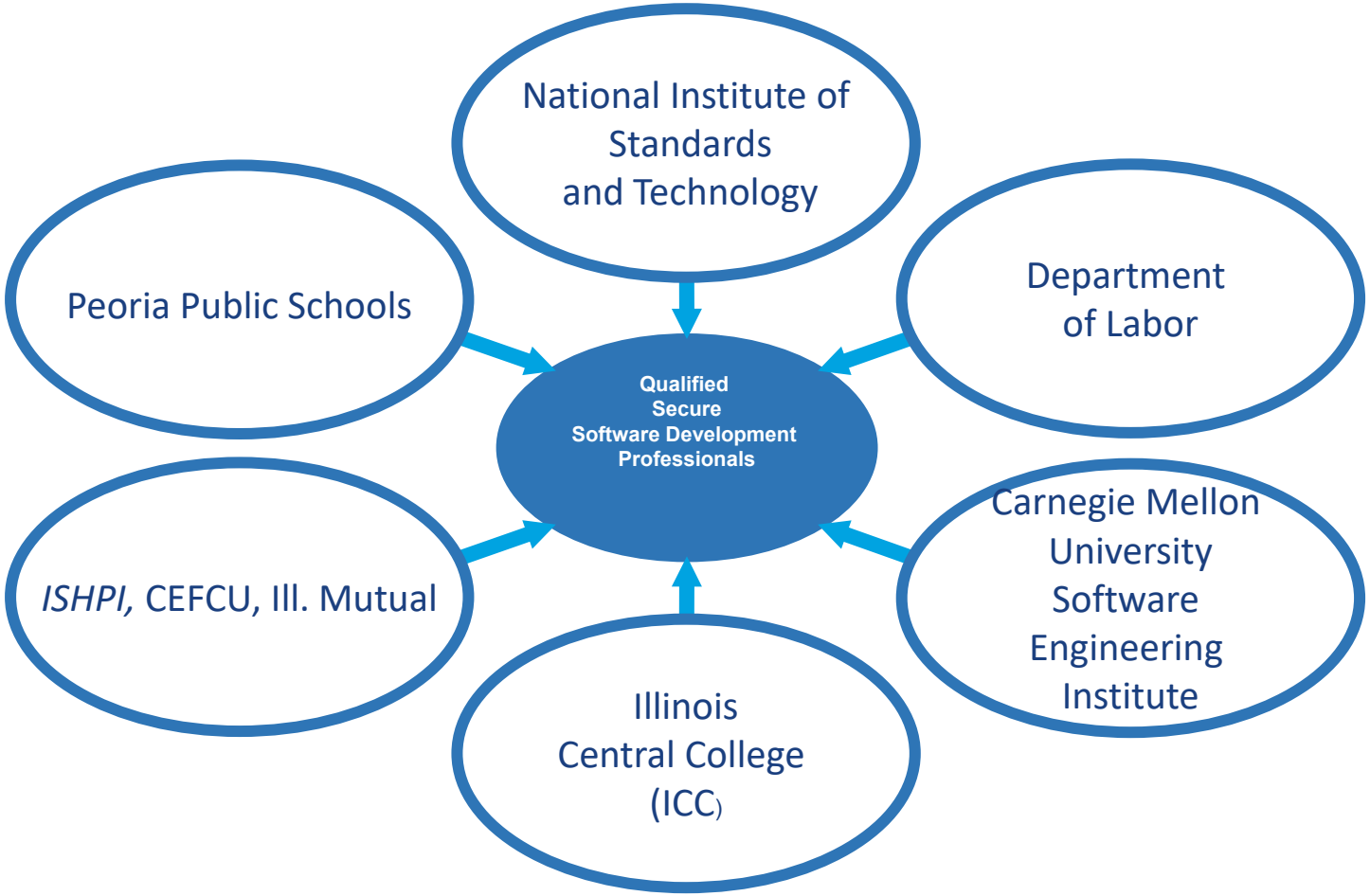
CICESS

- Community Initiative Center of Excellence for Secure Software
- Solving Cybersecurity Skills Shortage With Apprenticeships and Certifications
- Launched successfully in Fall 2015, partnering with Illinois Central College and the Peoria Public Schools

A Unique Collaboration – Industry, Government, Academe



Secure Software Development AAS Degree

CS I: Programming in Java

CS II: Programming in Java

CS III: Advanced Programming in Java

Structured Query Language

Introduction to Relational Database

C# Programming

Mobile Application Programming

Introduction to Computer Security

Secure Coding

Introduction to Assured Software Engineering

Database Administration

Structured System Analysis

Two electives in computer programming, web, or networking, depending on employer needs

Students must also take 19 credit hours in general education courses.

On-the-Job Training Curriculum

Applied Knowledge			
Software Engineer's Job	Managing your Time	Postmortem	
Time Management	Managing Commitments	Process Improvement	
Time Tracking	Managing Schedules	Estimating Product Size	
Period Planning	Project Plan	Process Discipline	
Product Planning	Introduction to Statistics	Earned Value Management	
Secure Software Skills			
Software Development Process		Personal Commitment to Quality	
Defects and Software Quality		Software Inspection/Peer Review	
Economics of Defect Removal		Software Requirements	
Defect Management		Secure Life-Cycle Practices and Standards	
Product Quality		Creation & use of Personal & Peer Review Checklists	
Process Quality			
Personal Skills		**Workplace Skills**	
Integrity	Dependability	Planning & Organizing	Ethics, Fraud & Security Training
Initiative	Reliability	Problem Solving	Business Fundamentals
Teamwork	Adaptability	Decision Making	Self Management
Respect	Professionalism	Customer Focus	Working Tools/Technology
	Communication		

Apprenticeship Dual Model - Computer Programming (Secure Software)

2-3-year dual model "learn and earn" program

On the job training	Class room instruction
Employment contract executed between company and apprentice Dual work study model with increasing hours under company supervision and mentorship as training progresses Standard apprenticeship topics defined by industry and aligned with Carnegie Mellon University / Software Engineering Institute	Full time student AAS degree in Secure Software Development at local community college Dual work study model with more classroom hours at the beginning Curriculum created by Carnegie Mellon University and adopted to meet industry requirements

Practicum examination and standard industry certifications to validate competency

CICESS Value Proposition

- Augmentation of your current workforce development methods
- Ability to plan for and satisfy future needs for hard-to-fill secure software developers
- Ability to build a secure software talent pipeline that includes women and minorities who are trained, mentored, and certified
- A cost-effective solution to training and retaining new workers in secure software development
- High retention rates when apprentices become full-time employees

Sense of Urgency and Bias for Action

1. Research SW Developers jobs in-demand? Other cybersecurity skills in-demand?
2. Seek employers willing to partner with community colleges, and invest in 2,000 hours of paid apprenticeships to build pipeline and address skills shortage
3. Form core group of employers to pursue secure software development dual model apprenticeship pathways to middle class jobs
4. Design and implement dual model apprenticeships based on standards, and partnering with Trident Technical College
   - Standard Secure software development curriculum
   - Aligned with NIST framework
   - DoL registered apprenticeship occupational standard
   - Industry standard certifications
5. Launch cohort in 2019 in Charleston and other SC locations

Why Apprenticeships?

Because Nothing Else Works

"ASKs"

- Act with a sense of urgency to connect cybersecurity education directly to a job – Do nothing is not an option
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Contact

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