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The Future of Cybersecurity Education:

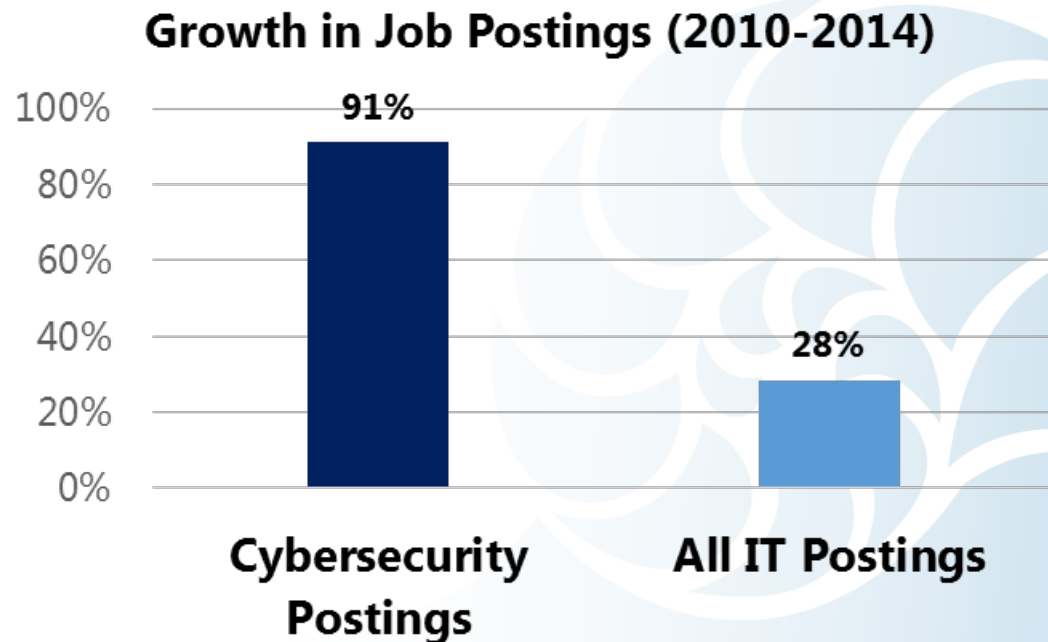### University-Level Cybersecurity Education

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SAM'16

Outline

- Critical shortage: cybersecurity workforce development

- Innovative strategies
  - Develop cutting edge curricula
  - Build bridges
  - Provide flexible and accelerated options
  - Engage and prepare students

- The future of cybersecurity

Critical Need: Cybersecurity Talent

- Cybersecurity workforce demand is expected to rise to 6 million (globally) by 2019, with a projected shortfall of 1.5 million," Michael Brown, CEO, Symantec

- 209,000 cybersecurity jobs unfilled in 2015 – Bureau of Labor Statistics

- Cybersecurity postings have **grown 91%** from 2010-2014 – Burning Glass Report

Growth in Job Postings (2010-2014)

	Cybersecurity Postings	All IT Postings
	91%	28%

E. El-Sheikh – SAM 2016

Develop Cutting Edge Curricula

- Curricula must be developed and continuously updated to stay ahead of attackers:

  - NSA-DHS National Center of Academic Excellence in Cyber Defense Education

    - 209 CAE-CDE institutions in the US

  - National Initiative for Cybersecurity Education (NICE)

  - Advisory boards

Develop Cutting Edge Curricula

- NICE Workforce Development Framework
  - 7 categories and 32 specialty areas

Build Bridges

- Foster partnerships among K12, higher education institutions, employers and government
  - Develop K12 bridge programs: summer camps, competitions, online training, dual enrollment, etc.

  - Multi-institution partnerships: 2 year – 4 year programs, articulation agreements, collaborative programs

  - Internships, coops, scholarships
    - Scholarships For Service Program
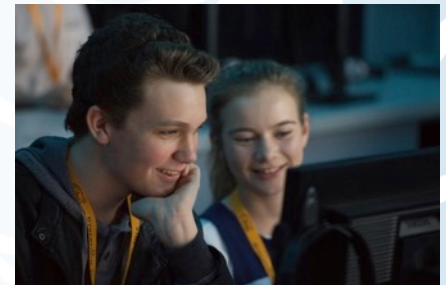
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Provide Flexible & Accelerated Options

- Create flexible pathways
  - Condensed certificate programs that address needed skills
  - Training programs for military and veterans
  - Accelerated BS/MS programs
  - Online/distance programs and training

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Engage and Prepare Students

- Prepare students to enter the workforce and become future cyber leaders

  - High Impact Practices (HIPs): capstone projects, research experiences, etc.

  - Build a community: student clubs, professional organizations, scholars program

  - Integrate important skills: communication, project management, team work

  - Include **ethical** hacking

  - Provide real-world experience:

    - internships, competitions, immersive lab environments

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The Future of Cybersecurity

- Cybersecurity – an emerging discipline
  - Enhance multidisciplinary approach
  - Infuse research and real-world skills
  - Diversity is key for innovation
  - Develop [global] curricular standards

Resources

- CSO Online: http://www.csoonline.com/article/2953258/it-careers/cybersecurity-job-market-figures-2015-to-2019-indicate-severe-workforce-shortage.html

- Bureau of Labor Statistics: http://blog.sfgate.com/inthepeninsula/2015/03/31/cybersecurity-jobs-growth/

- Job Market Intelligence: Cybersecurity Jobs, 2015, Burning Glass: http://burning-glass.com/wp-content/uploads/Cybersecurity_Jobs_Report_2015.pdf

- NIST NICE Workforce Development Framework: http://nist.gov/nice/framework

- National Initiative for Cybersecurity Careers and Studies: https://niccs.us-cert.gov

- National Centers of Academic Excellence: https://niccs.us-cert.gov/education/national-centers-academic-excellence-cae

- ACM – Toward Curricular Guidelines for Cybersecurity: https://www.acm.org/education/TowardCurricularGuidelinesCybersec.pdf

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Center for Cybersecurity

Thank you
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