

Maryland's Cybersecurity Workforce -- Meeting the Challenge of Government and Industry



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Maryland Department of Commerce

Central Maryland ISSA

25 April 2018

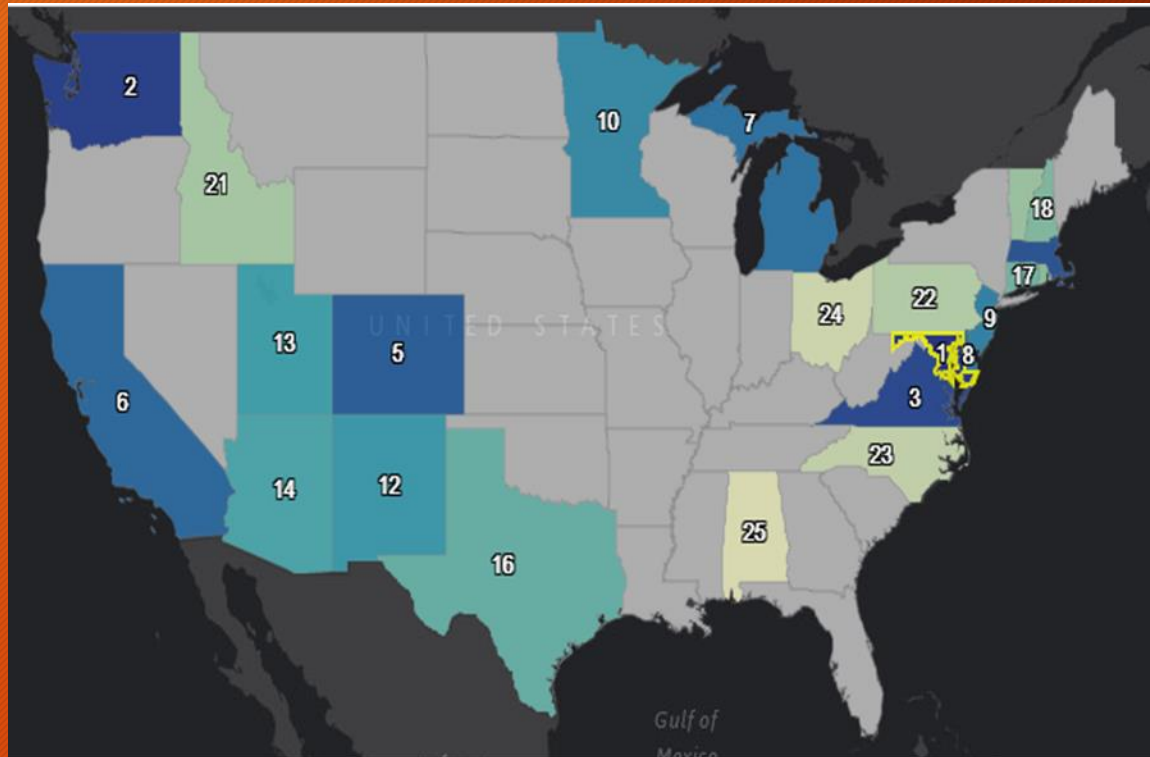
Maryland's Technical Workforce



- #2 “Most Educated State” - Wallet Hub

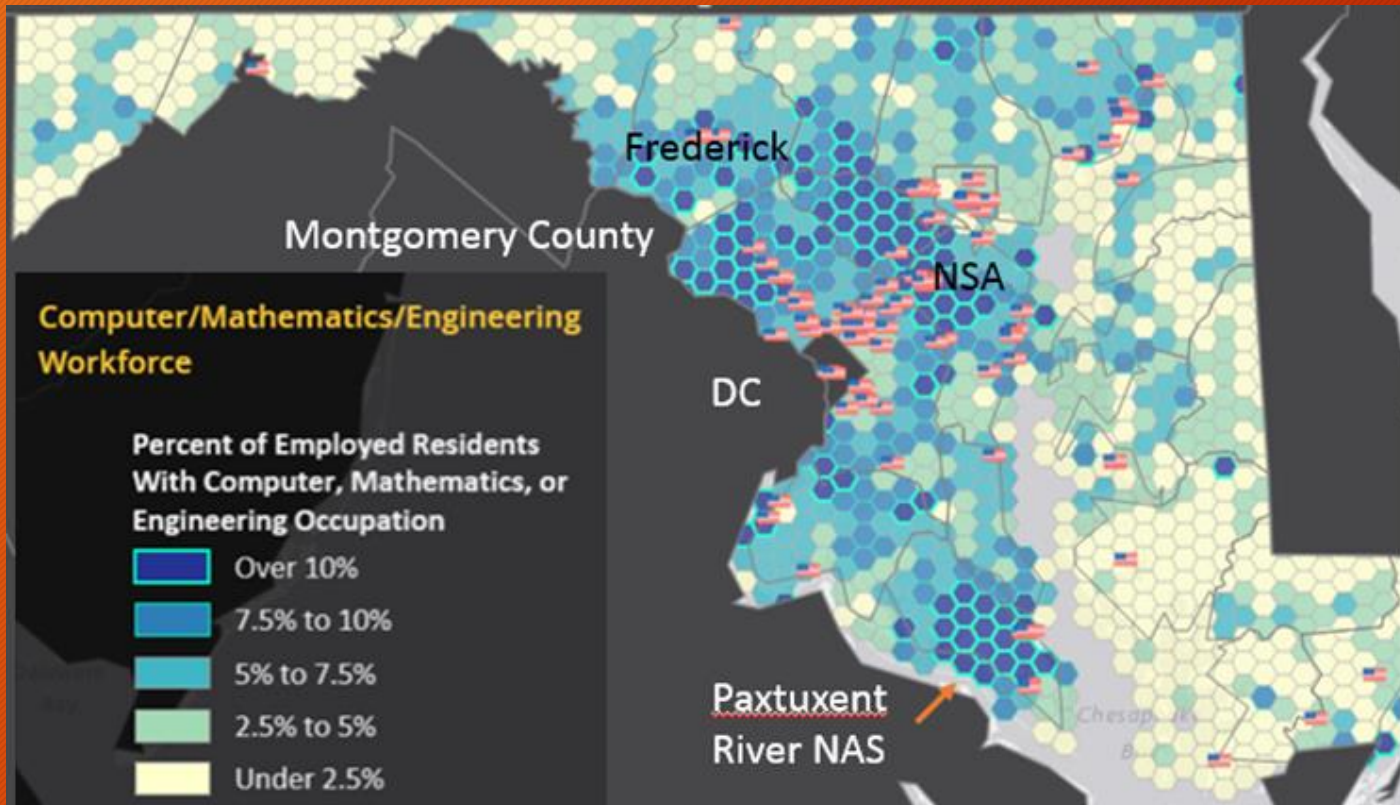
Overall Rank*	State	Total Score	'Educational Attainment' Rank	'Quality of Education' Rank
1	Massachusetts	81.92	1	1
2	Maryland	76.54	3	2
3	Connecticut	71.90	4	9
4	Vermont	71.14	6	3
5	Colorado	70.17	2	23

Maryland's Technical Workforce



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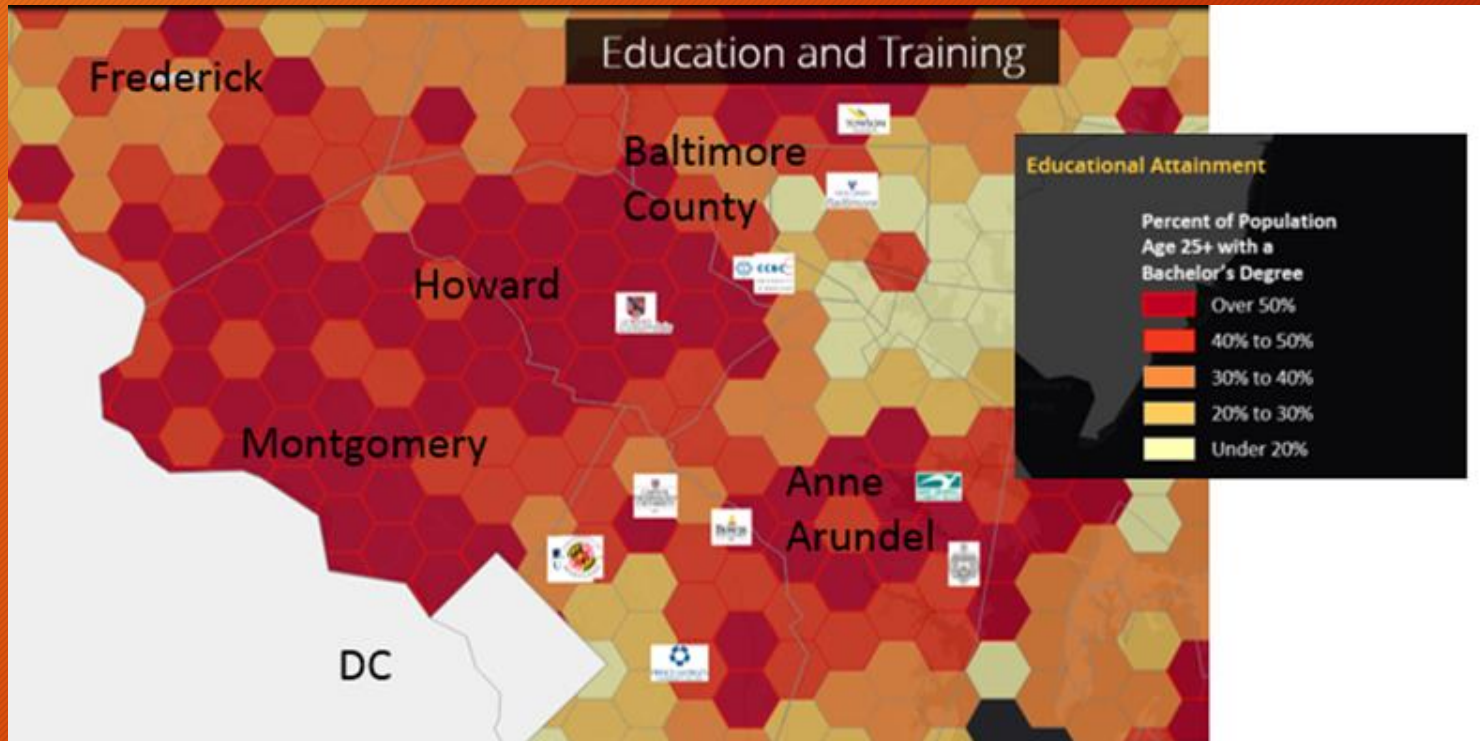


Maryland's Technical Workforce

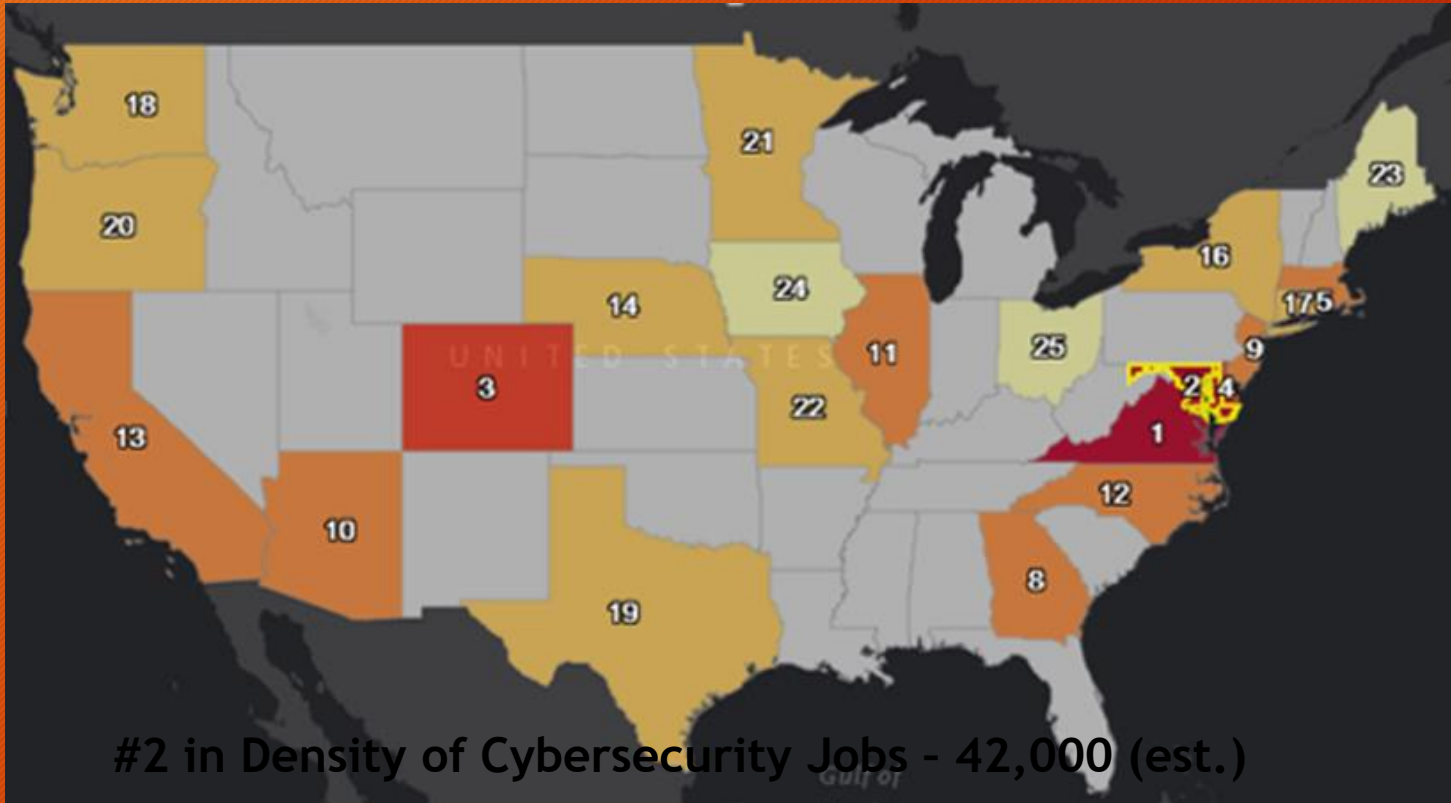


- #3 in % of population age 25 and above with bachelor degree or higher (38.8%)
- #2 in % with a graduate or professional degree (17.7%)

Maryland's Technical Workforce

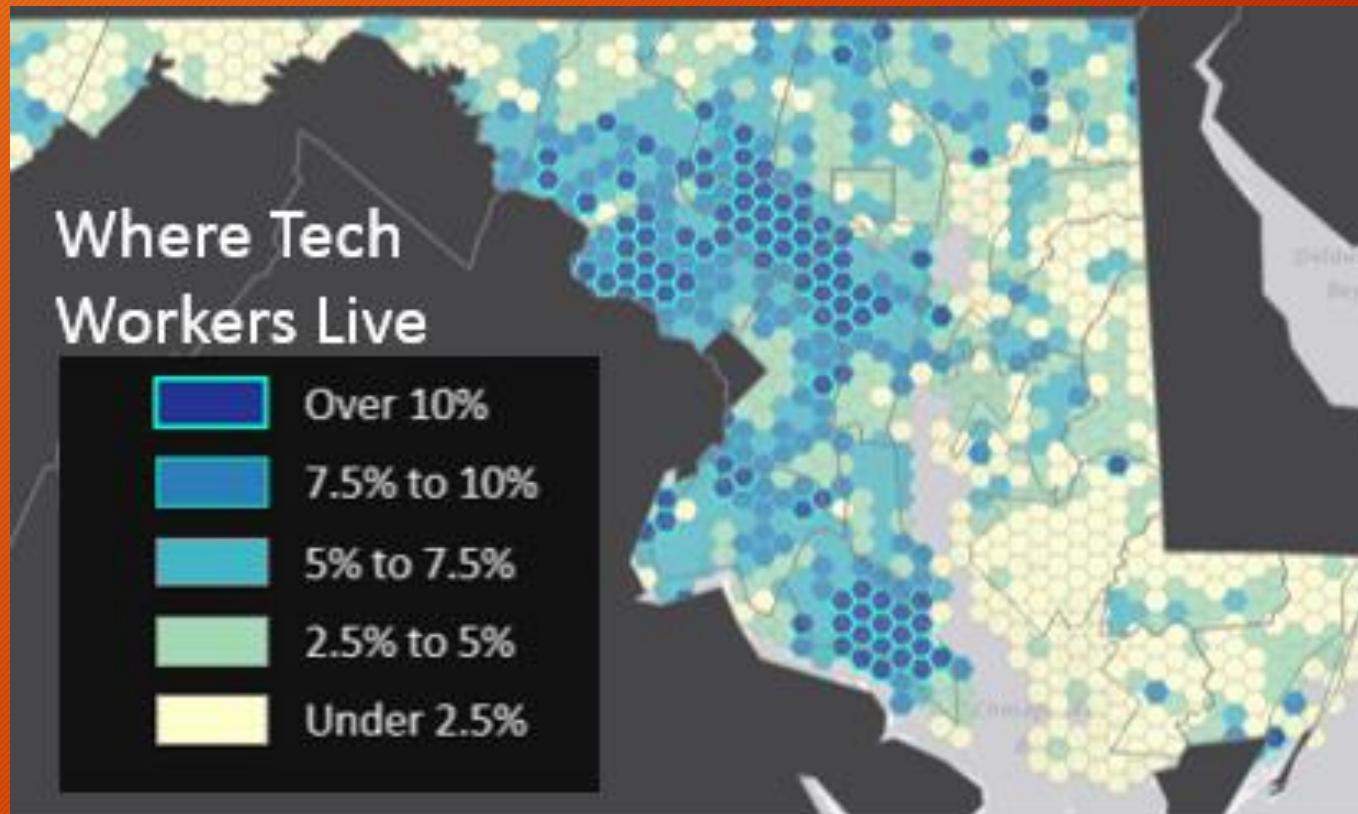


Maryland's Technical Workforce



#2 in Density of Cybersecurity Jobs - 42,000 (est.)

Maryland's Technical Workforce



The Education Pipeline: K-12



- Bedrock: high quality school system
- AP Computer Science Classes
 - Computer Science
 - Computer Science Principles

Top-Rated Public Schools



#1 in 2016 US News Rankings

The Education Pipeline: K-12



- Technology Education
 - Graduation Requirement
 - Career and Technology Education Programs: IT Focus

Concentrations offered in Montgomery County	Number Enrolled
Computer Science	131
Computer Systems Networking & Telecommunication	94
IT Networking Academy (Cisco)	167
IT Network Option	151
IT Programming	479
Information Resource Design Option	56

The Education Pipeline: K-12



- Governor's ACCESS initiative
- P-Tech

The Education Pipeline: K-12



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The Education Pipeline: K-12



- Governor's ACCESS initiative
- P-Tech
- CS Matters in Maryland

The Education Pipeline: College



USM Enrollment (Fall 2017)

Institution	Undergraduate	Graduate	Total
Bowie	4,711	958	5,669
Coppin	2,507	432	2,939
Frostburg	4,884	792	5,676
Salisbury	7,861	887	8,748
Towson	19,198	3,145	22,343
University of Baltimore	3,222	2,761	5,983
University of Maryland, Baltimore	905	5,577	6,482
University of Maryland, Baltimore County	11,142	2,498	13,640
University of Maryland, College Park	28,472	10,611	39,083
University of Maryland Eastern Shore	3,277	627	3,904
University of Maryland, University College	44,219	13,310	57,529
USM Total	130,398	41,598	171,996

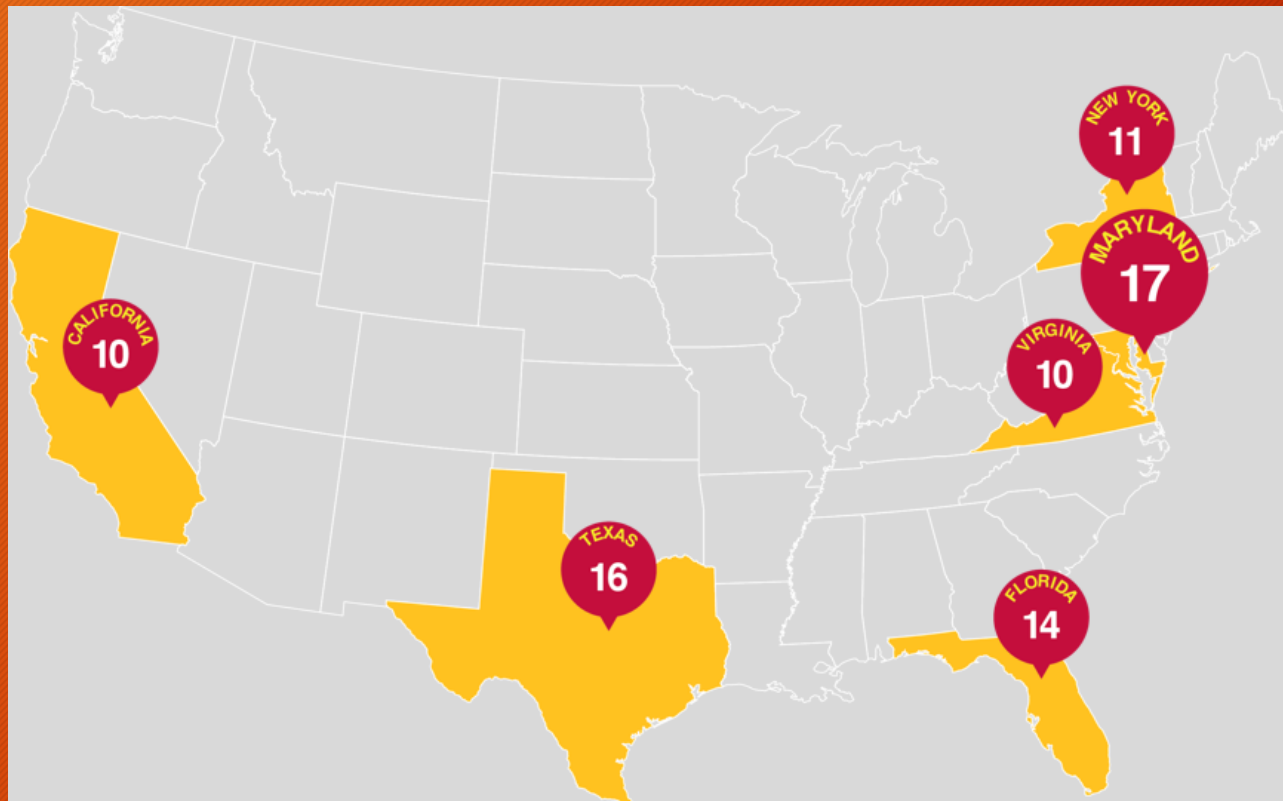
The Education Pipeline: STEM Degrees



USM Bachelor Degree Production in Key Workforce Areas (FY 2015 - FY 2017)

Institution	STEM	Health		Accounting	All Business & Management (General)	Computer	All Computer Science (General)	All Engineering (General)
		Professions	Cyber - Security			Programming or Electrical Engineering		
Bowie	290	248	144	-	366	-	128	-
Coppin	78	298	31	26	114	-	24	-
Frostburg	423	397	172	82	389	-	152	80
Salisbury	842	421	359	203	955	-	262	-
Towson	1,696	1,777	816	458	1,933	-	678	-
University of Baltimore	235	-	208	-	956	-	208	-
University of Maryland, Baltimore	-	1,148	-	-	-	-	-	-
University of Maryland, Baltimore County	3,560	344	1,425	-	30	-	1,209	601
University of Maryland, College Park	6,960	482	2,018	910	3,008	385	1,244	2,918
University of Maryland Eastern Shore	368	117	57	46	326	-	42	102
University of Maryland, University College	4,903	427	4,998	863	6,211	-	4,798	50
USM Total	19,355	5,659	10,228	2,588	14,288	385	8,745	3,751

The Education Pipeline: NSA/DHS Cybersecurity Centers of Academic Excellence



The Education Pipeline: Cybersecurity Associate Degrees



College/University	Program
Anne Arundel Community College	INFO. ASSURANCE & CYBERSECURITY
Anne Arundel Community College	CYBERCRIME
Chesapeake College	COMPUTER INFORMATION SECURITY
College of Southern Maryland	INFORMATION SYSTEMS SECURITY
Community College of Balt. County	INFORMATION SYSTEMS SECURITY
Frederick Community College	CYBERSECURITY
Garrett College	CYBERSECURITY
Hagerstown Community College	CYBERSECURITY
Harford Community College	INFO. ASSURANCE AND CYBERSECURITY
Howard Community College	CYBERSECURITY
Howard Community College	CYBER FORENSICS TECHNOLOGY
Montgomery College-All Campuses	CYBERSECURITY
Prince George's Community Coll.	CYBERSECURITY

Bachelor Degrees



College/University	Program
Bowie State University	Computer Science (CS); Computer Technology
Capitol Technology University	Management of Cyber & IT; Cyber & IT; Computer Engineering (CE); CS
Coppin State University	CS
Frostburg State University	CS; Computer Information Systems (CIS); Secure Computing and IA
Goucher College	CS
Hood College	CS
Johns Hopkins University	CS
Loyola of Baltimore	CS; Computer Engineering
McDaniel University	CS
Morgan State University	Electrical Engineering (Cyber Track)
Salisbury University	CS; Information Systems (Network/Security Analyst Focus)
Stephenson University	CIS
Towson University	CS (Security Track)
United States Naval Academy	Cyber Operations
University of Baltimore	CIS
UMBC	CE; CS; Information Systems
University of Maryland, College Park	CS (Cybersecurity Specialty); CE (Cybersecurity Specialty)
UMUC	Software Dev & Security; Computer Networks & Security; CS

Masters Degrees



College/University	Program
Bowie State University	CS; Information Systems Management with Concentration in IA
Capitol Technology Univ	Cyber and Information Security; CS; ISM
Frostburg State University	Applied CS
Hood College	CS; Cybersecurity
Johns Hopkins University	Security Informatics; Cybersecurity
Loyola of Baltimore	Data Science
Morgan State University	Cyber Engineering
Sans Technology Institute	Information Security Engineering
Towson University	Applied IT (IS and Assurance); CS (Security Track)
UMB	Cybersecurity Law
UMBC	CE; CS; Cybersecurity
College Park	Cybersecurity
UMUC	Cybersecurity; Cybersecurity Policy; Digital Forensics & Cyber Investigation

Doctorate Degrees



College/University	Program
Bowie State University	COMPUTER SCIENCE
Capitol Technology University	CYBER SECURITY
Johns Hopkins University	COMPUTER SCIENCE
University of Maryland, Baltimore County	COMPUTER ENGINEERING; COMPUTER SCIENCE
University of Maryland, College Park	COMPUTER SCIENCE

Recent Initiatives in Higher Ed



- September 2014, Brendan Iribe gifts **\$31 million** the *University of Maryland* to support *scholarships* and a *new computer science building*.
- 2016, *Morgan State* University establishes the *Endowed Chair in Internet of Things Security* with \$1 million from the Maryland Department of Commerce and opened the *Center for Reverse Engineering and Assured Microelectronics* in 2017
- August 2017, Maryland Department of Commerce awards **UMUC \$2.1 million** to *endow two new professorships* and fund research, education and entrepreneurship initiatives.
- October 2017, the A. James & Alice B. Clark Foundation awards **\$219 million** to the *University of Maryland* to enhance the university's strength in *engineering, neuroscience and cybersecurity*.

Recent Initiatives in Higher Ed



- December 2017, Capital One awards the *University of Maryland \$3 million* to develop a *workforce pipeline in data analytics, machine learning and cybersecurity*.
- January 2018, the *University of Maryland's Advanced Cybersecurity Experience for Students (ACES) program* receives *\$5 million grant* from the National Science Foundation.
- Senate Bill 204, introduced in this session of the legislature, calls for creating a *Cybersecurity Public Service Scholarship Program* modelled on the federal Cyber Corps program.

Internships



- Creating the bridge from classroom to workspace
- ACES Program; Northrop Grumman; Leidos; Lockheed and many others
- inMD Network

The Training and Certification Pipeline - Community Colleges



College/University	Program
Anne Arundel Community College	INFORMATION & CYBER SECURITY
Anne Arundel Community College	ADVANCED NETWORK SECURITY
Anne Arundel Community College	NETWORK SECURITY
Anne Arundel Community College	SERVER ADMINISTRATION & SECURITY
Anne Arundel Community College	ADVANCED CYBER FORENSICS
Anne Arundel Community College	CYBERCRIME
College of Southern Maryland	CYBERSECURITY
Community College of Balt. County	INFORMATION SYSTEMS SECURITY
Garrett College	CYBER SECURITY
Hagerstown Community College	CYBERSECURITY-NETWORK SECURITY
Hagerstown Community College	CYBERSECURITY-ADVANCED NETWORK SECURITY
Harford Community College	INFO. ASSURANCE AND CYBERSECURITY
Montgomery College	ADVANCED NETWORK SECURITY
Prince George's Community Coll.	CYBERSECURITY
Prince George's Community Coll.	CYBERSECURITY MANAGEMENT

The Training and Certification Pipeline - Post-Baccalaureate



College/University	Certificate Program
Towson University	INFORMATION SECURITY AND ASSURANCE
Univ. of MD University College	INFORMATION ASSURANCE
Univ. of MD University College	CYBERSECURITY TECHNOLOGY
Univ. of MD University College	FOUNDATIONS OF CYBERSECURITY
Univ. of MD University College	CYBERSECURITY POLICY
Univ. of MD University College	INFORMATION ASSURANCE
Univ. of MD University College	DIGITAL FORENSICS & CYBER INVESTIGATION
Capitol Technology University	COMPUTER AND NETWORK SECURITY
Capitol Technology University	INFORMATION ASSURANCE ADMIN.
Capitol Technology University	SECURITY MANAGEMENT
Capitol Technology University	NETWORK PROTECTION
Capitol Technology University	SECURE CLOUD COMPUTING
Hood College	CYBERSECURITY
Sans Technology Institute	CYBERSECURITY ENGINEERING CORE

The Training and Certification Pipeline - UMBC Training Centers



- Non-Profit established by UMBC to provide Professional and Tech Training for career starters and career changers
- 4 Cybersecurity Certificate Programs
 - Cyber Foundations
 - Cybersecurity
 - Cyber Operations
 - Cyber Analyst/Operator
- Other Offerings
 - Big Data Analytics, Cloud and DevOps
 - Red Hat Linux and SQL Databases
 - Agile Development and Sonography

The Training and Certification Pipeline - Commercial Offerings



- Cybrary
- Chiron Technology Services
- Comtech
- SANS Institute

The Training and Certification Pipeline - Commercial Offerings



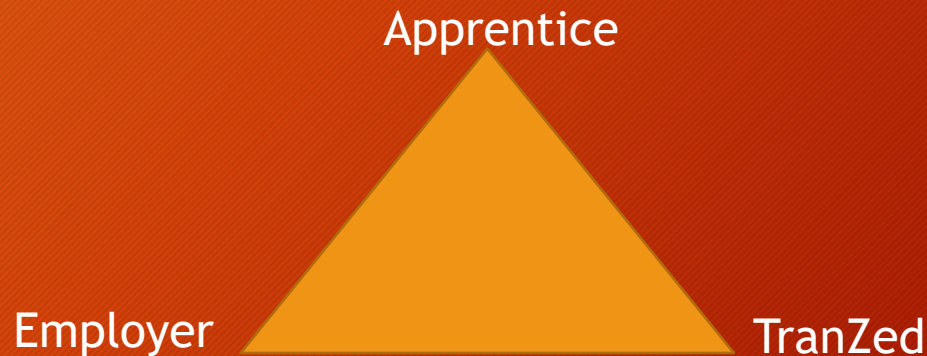
- Baltimore Cyber Range



Non-Traditional Pipeline -- Apprenticeships



- TranZed Apprenticeship Services
- DLLR certified apprenticeship program to create alternative career paths into tech fields.



Expanding the Pipeline - Women and Minorities



- Girls Go CyberStart Initiative
- Digit All City
- EARN Grants
- MilVets
- Military Corps Career Connect Program

Expanding the Pipeline - Women and Minorities



- EARN Grants
- MilVets
- SANS Maryland Cyber Workforce Academy

Another Can of Worms....



Technically qualified cybersecurity workforce

Who Are

CLEARABLE!

Maryland: Open for Business!

