NICE
NATIONAL INITIATIVE FOR **CYBERSECURITY** EDUCATION

Solving the Cybersecurity Workforce and Skills Shortage

Rodney Petersen
Director, NICE

Mission

To energize, promote, and **coordinate a robust community working together** to advance an **integrated ecosystem** of cybersecurity education, training, and workforce development

Annual NICE Conference & Expo

SAVE THE DATE

NICE | Conference and Expo 2022

June 6 - 8, 2022

Westin Peachtree Plaza
Atlanta, Georgia

FIU | FLORIDA INTERNATIONAL UNIVERSITY

NEW AMERICA

This event is supported by NICE under a Cooperative Agreement (Award# 70NANB18H025).

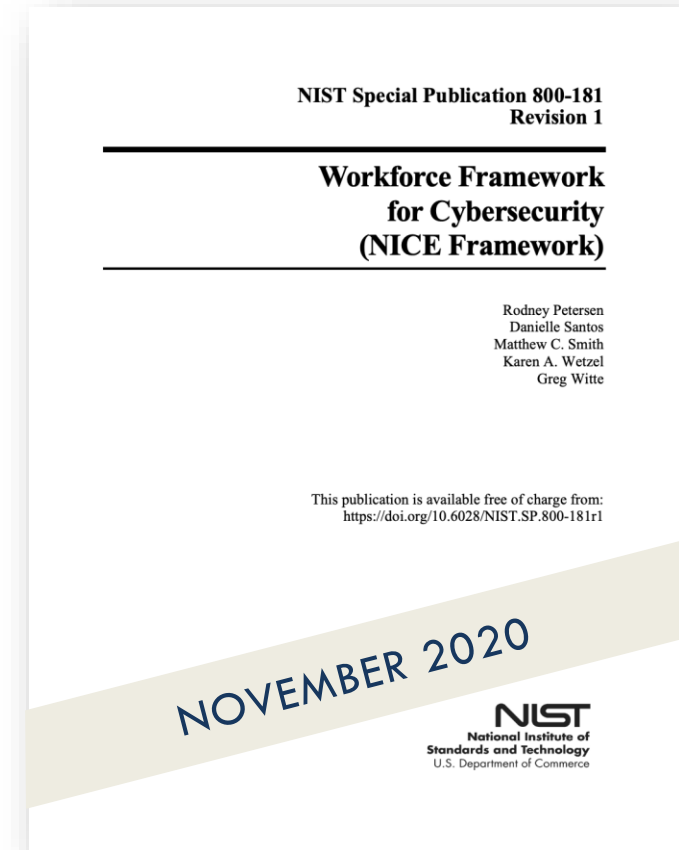NICEconference.org

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Goals

NICE Framework

Learning Process

Career Discovery

Talent Management

Research

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NICE Framework: 2020 Revision

- Title: Workforce Framework for Cybersecurity

- Introduction of Competencies

- Removed:

  – Specialty Areas (reflected in Competencies, Work Roles)

  – Ability Statements (incorporated in Skill statements)

- Appendices: Moved outside the publication

NIST Special Publication 800-181
Revision 1

**Workforce Framework
for Cybersecurity
(NICE Framework)**

Rodney Petersen
Danielle Santos
Matthew C. Smith
Karen A. Wetzel
Greg Witte

This publication is available free of charge from:
https://doi.org/10.6028/NIST.SP.800-181r1

NOVEMBER 2020

NIST
National Institute of
Standards and Technology
U.S. Department of Commerce

nist.gov/nice/framework

Competencies Update

- Draft NISTIR 8355, NICE Framework Competencies: Assessing Learners for Cybersecurity Work (Call for Comments: March 17 – May 3)
  - Defining Competencies
  - Developing Competency Statements
  - Example Uses
- Draft List of Competencies
  - Proposed Competency Names and Descriptions
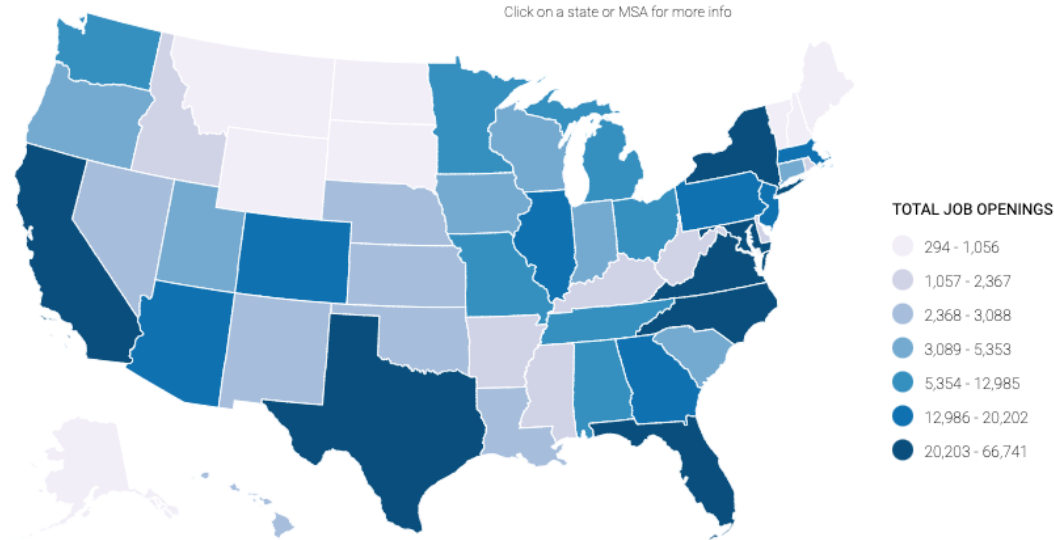 - TKS association will be next stage work

CYBERSECURITY SUPPLY/DEMAND HEAT MAP

All

Public Sector Data

Private Sector...

Total job openings

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.
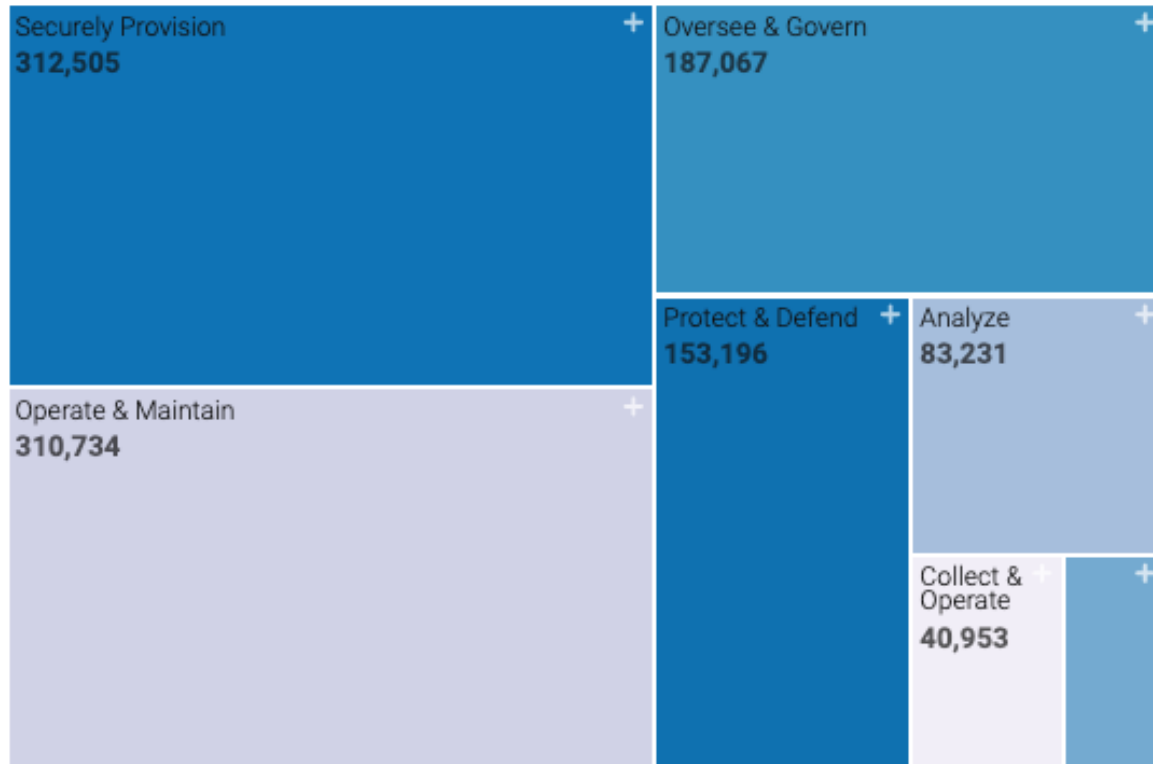
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Embed

States   Metro Areas   Search State

Click on a state or MSA for more info

TOTAL JOB OPENINGS

294 - 1,056
1,057 - 2,367
2,368 - 3,088
3,089 - 5,353
5,354 - 12,985
12,986 - 20,202
20,203 - 66,741

National level

TOTAL CYBERSECURITY JOB OPENINGS

521,617

TOTAL EMPLOYED CYBERSECURITY WORKFORCE

941,904

SUPPLY OF CYBERSECURITY WORKERS

Very Low

CYBERSECURITY WORKFORCE SUPPLY/DEMAND RATIO

National average
1.8

GEOGRAPHIC CONCENTRATION

Average

LOCATION QUOTIENT

National average
1.0

TOP CYBERSECURITY JOB TITLES

- Cyber Security Engineer
- Cyber Security Analyst
- Cyber Security Consultant
- Cyber Security Manager / Administrator
- Systems Engineer
- Software Developer / Engineer
- Network Engineer / Architect
- Vulnerability Analyst / Penetration Tester
- Cyber Security Specialist / Technician

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JOB OPENINGS BY NICE CYBERSECURITY WORKFORCE FRAMEWORK CATEGORY ⓘ

NICE

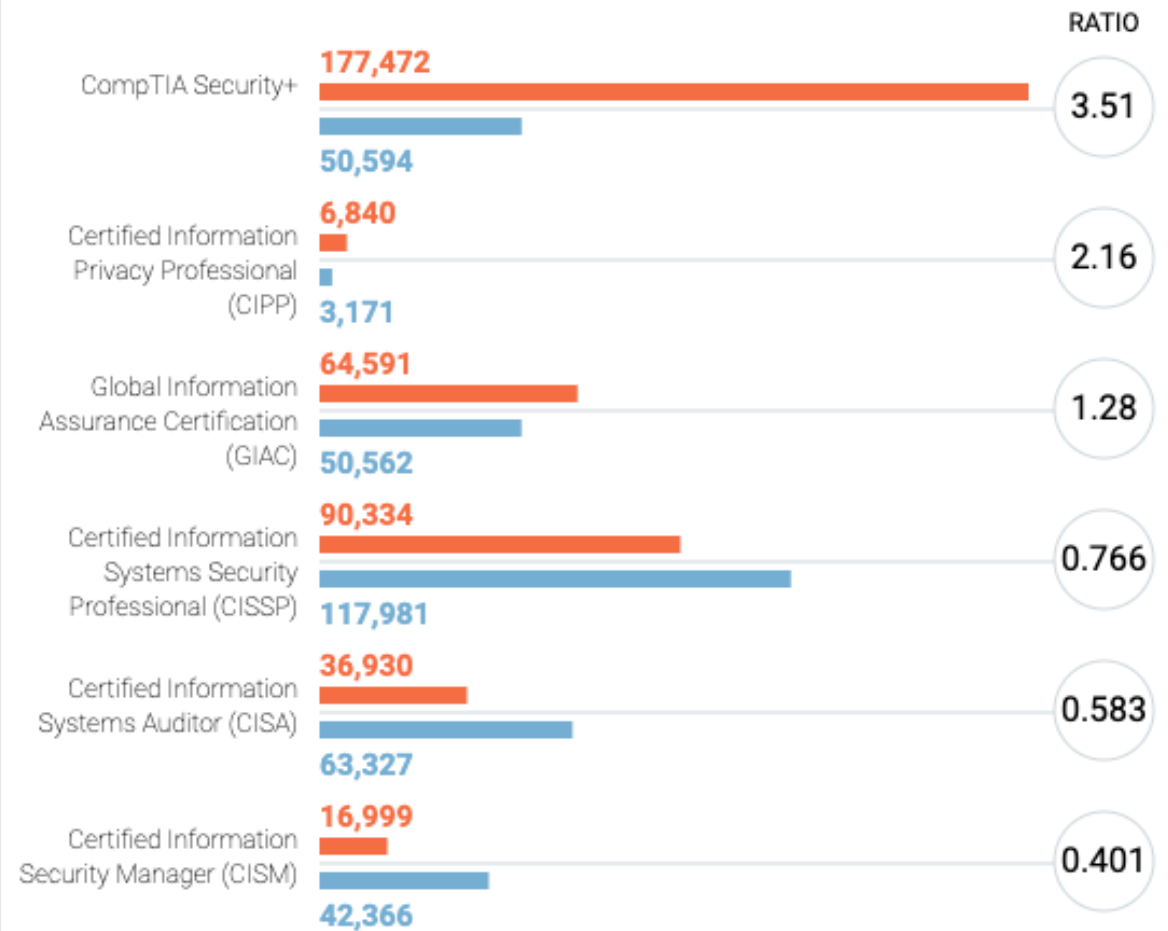| Securely Provision **312,505** | Oversee & Govern **187,067** | |
| Operate & Maintain **310,734** | Protect & Defend **153,196** | Analyze **83,231** |
| | | Collect & Operate **40,953** |

Notes: The NICE Workforce Categories are not mutually exclusive- one job could perform multiple roles within the framework. The data shown here are not intended to be aggregated.

CERTIFICATION HOLDERS / OPENINGS REQUESTING CERTIFICATION ⓘ

🟧 Certification holders 🟦 Openings requesting certification

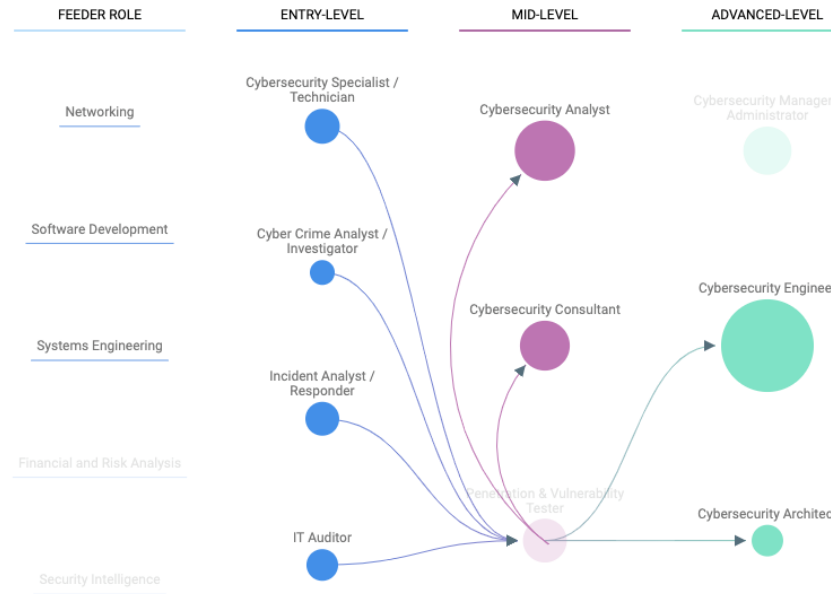| Certification	Holders	Openings requesting	RATIO
CompTIA Security+	177,472	50,594	3.51
Certified Information Privacy Professional (CIPP)	6,840	3,171	2.16
Global Information Assurance Certification (GIAC)	64,591	50,562	1.28
Certified Information Systems Security Professional (CISSP)	90,334	117,981	0.766
Certified Information Systems Auditor (CISA)	36,930	63,327	0.583
Certified Information Security Manager (CISM)	16,999	42,366	0.401

CYBERSECURITY CAREER PATHWAY

There are many opportunities for workers to start and advance their careers within cybersecurity. This interactive career pathway shows key jobs within cybersecurity, common transition opportunities between them, and detailed information about the salaries, credentials, and skillsets associated with each role.

< Share

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FEEDER ROLE	ENTRY-LEVEL	MID-LEVEL	ADVANCED-LEVEL

Networking

Software Development

Systems Engineering

Financial and Risk Analysis

Security Intelligence

Cybersecurity Specialist / Technician

Cyber Crime Analyst / Investigator

Incident Analyst / Responder

IT Auditor

Cybersecurity Analyst

Cybersecurity Consultant

Penetration & Vulnerability Tester

Cybersecurity Manager / Administrator

Cybersecurity Engineer

Cybersecurity Architect

Penetration & Vulnerability Tester

AVERAGE SALARY ⓘ

$104,000

Penetration & Vulnerability Tester

REQUESTED EDUCATION (%) ⓘ

Sub-BA   Bachelor's Degree   Graduate Degree

| 9 | 70 | 22 |

COMMON JOB TITLES ⓘ

- Penetration Tester
- Senior Penetration Tester
- Network Relations Consultant
- Application Security Analyst

TOP SKILLS REQUESTED ⓘ

1 Information Security
2 Penetration Testing
3 Linux
4 Python
5 Java
6 Vulnerability Assessment
7 Information Systems
8 Software Development
9 Project Management

TOTAL JOB OPENINGS ⓘ

13,930

Penetration & Vulnerability Tester

TOP CERTIFICATIONS REQUESTED ⓘ

- Certified Information Systems Security Professional (CISSP)
- SANS/GIAC Certification
- Certified Information Security Manager (CISM)
- Certified Information Systems Auditor (CISA)
- CompTIA Security+

COMMON NICE CYBERSECURITY WORKFORCE FRAMEWORK CATEGORIES ⓘ

Securely Provision   ⌄

Protect and Defend   ⌄

Analyze   ⌄

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Cybersecurity Career Awareness Week

Inspiring and promoting awareness and exploration of cybersecurity careers.

- Inspire, engage, and inform the public about the demand, opportunities, and multiple career options

- Raise awareness about pathways to prepare a highly skilled and diverse workforce

- Support successful programs and showcase effective resources, especially those that increase participation of underrepresented populations

Cybersecurity Career Awareness Week
OCTOBER 18-23, 2021

Discover Careers

Get Ideas for How to Engage

Make a Commitment

nist.gov/nice/ccaw

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NICE K12 Cybersecurity Education Conference

k12cybersecurityconference.org

Centers of Academic Excellence in Cybersecurity

For More Information

NIST.gov/NICE

NICE@nist.gov

Linkedin.com/company/NIST-NICE

@NISTcyber

The Challenges of Cyber Security Education as our Socio-Economic System Digitizes...

A North Dakota example of adaptation in Rural-Western States

Dr. Mark Hagerott
Chancellor, North Dakota University System
Deputy Director of US Naval Academy Cyber Center '13-15
New America Cyber Fellow '15
Commissioner (Western and Mid West Education Consortiums)
Mark.Hagerott@ndus.edu

NORTH DAKOTA
UNIVERSITY SYSTEM

Epic Times...Dual Digital Revolutions

➢ Two Macro Technological Revolutions near simultaneous:

▪ **Robotic** machines proliferating across the planet...factories, transportation, infrastructure...IoT

▪ **Cyber Space**...a global digital information nexus in the cloud, connecting people and data with the IoT...

Cyber Security is the ONLY SHOW STOPPER of the Digital Revolutions... Labor Shortage a top problem for Higher Education

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Challenge to Leaders: Adapt and Respond

➢ **Create** the Technology, in a competitive race with or against other nations.

➢ **Civilize** the Technology (eg., law, ethics, policy, privacy)

➢ **Control** and secure the Technology (**cyber security**)

Education of Humans is a SHORT TERM IMPERATIVE but also THE long term source of competitive advantage

Complicating Factors:

1. *Achieving Scale in large, low-density states*

2. *Academic Poaching in the "market place" by larger, well funded Universities*

Unless these problems are solved... Opportunities of this Digital Age will Decouple from Rural-West Regions

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Large Western States: an Imperative for Integration and Collaboration across state, across type of colleges

➤ Challenges of population density, ability to pay, and distance to physical campuses.

➤ Necessitated an integrated approach to education, research, and training.

➤ 11 state institutions: two research universities; five cc; four regional colleges.

➤ Partnering with Five Tribal Colleges

➤ Transferability of credits; shared classes

Next Level: In 2020, the creation of State-Wide Dakota Digital Academy to promote collaboration… to achieve Speed and Scale of Response… 11 campuses… MOU in draft with 5 Tribal Colleges

NORTH DAKOTA UNIVERSITY SYSTEM

K12 Cyber Education: Provide Freshmen Feeder

Every Student. Every School. Cyber Educated

➤ Comprehensive statewide approach to cybersecurity
➤ Aligns pillars of K-20 cyber ed, workforce development, and operational security
➤ Representation from more than 20 diverse organizations
➤ NICERC (Natl. Integrated Cyber Education Research Center) and Palo Alto partnering

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Unique in Upper Midwest…
Two Centers earn NSA/DHS (CAE) in one year…

NDSU NORTH DAKOTA STATE UNIVERSITY

BSC BISMARCK STATE COLLEGE

National Center of Academic Excellence in Cyber Defense (CAE-CD) in Research

National Center of Academic Excellence in Cyber Defense (CAE-CD) for 2-Year Education

External corporate partners were Key to this success… in the face of massive budget cuts due to collapsing oil prices, our programs were in jeopardy… **Palo Alto** partnered with North Dakota… directly contributed to the successful creation of our cyber programs…

NORTH DAKOTA UNIVERSITY SYSTEM

Questions/Comments

- Contact Information: Mark.Hagerott@ndus.edu

Attract, Develop, and Retain Cyber Top Talent

Cyber Threat Information

Defensive Measures

National Cyber Strategy

A highly skilled cybersecurity workforce is a strategic national security advantage

- Develop a superior workforce
- Build & sustain the talent pipeline
- Highlight & award talent

Department of Defense Cyber Strategy

- Provide most skilled cyber personnel w/focused resources & opportunities to develop key skills over the course of their careers
- Identify most capable and empower them to solve the toughest challenges
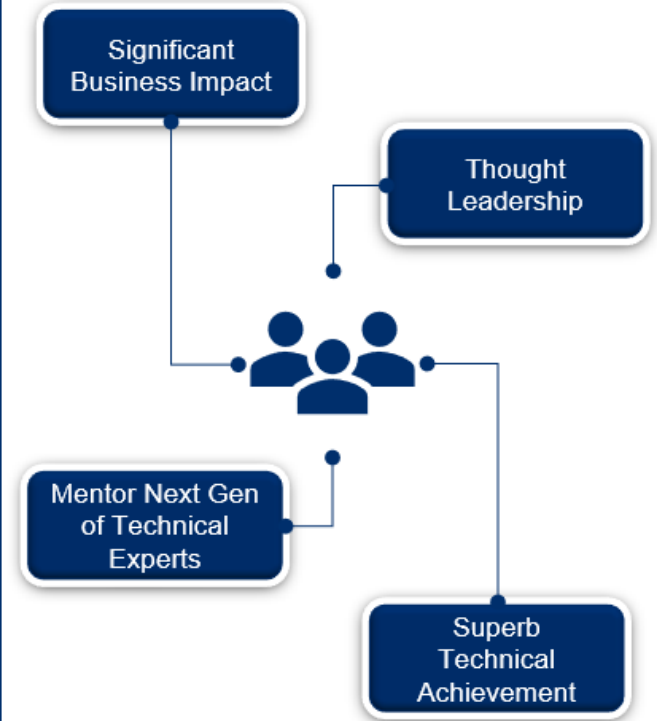
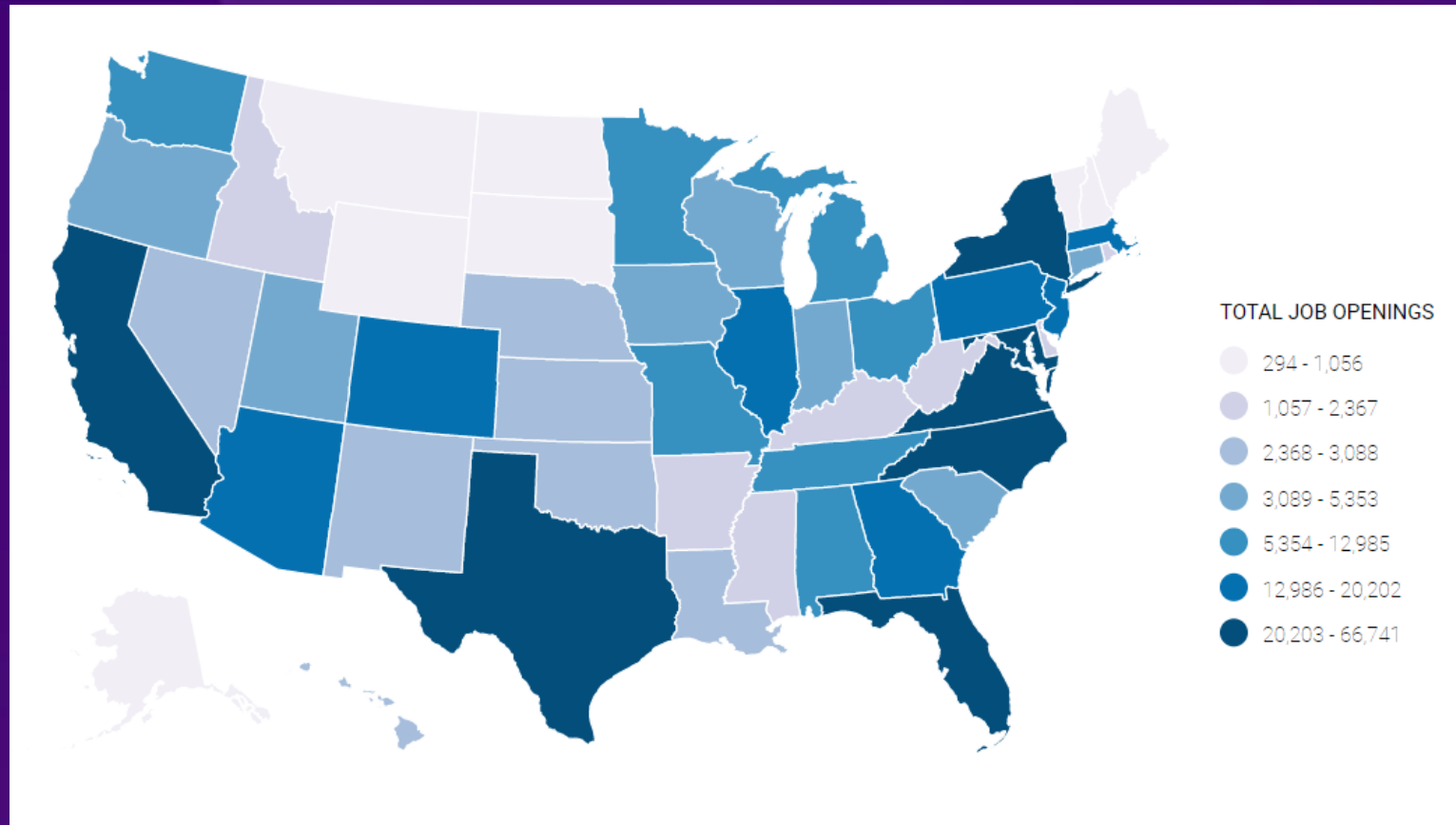Recognize & celebrate superb technical achievement and leadership

Inspire technical population to the highest levels of excellence

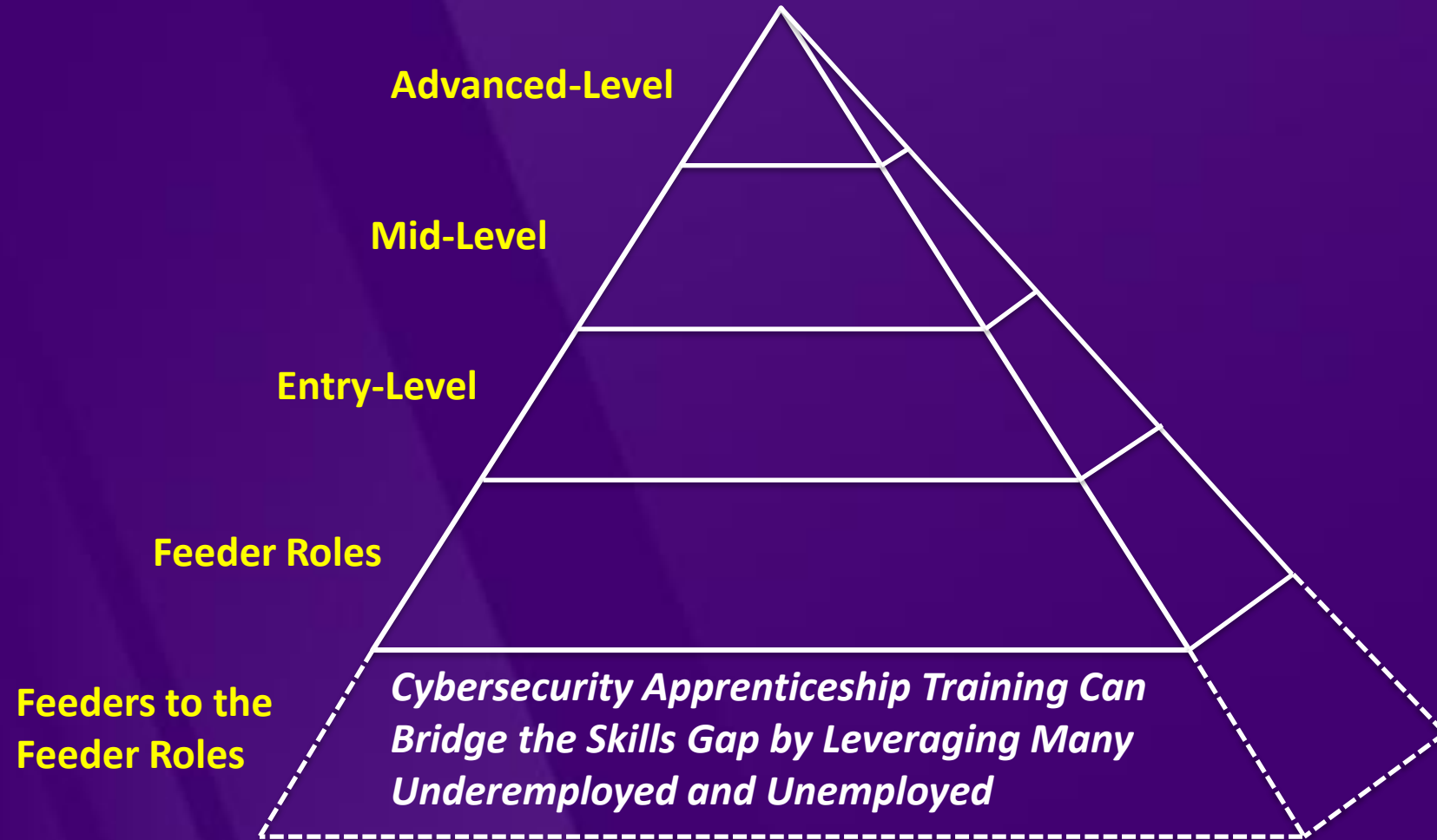Leverage corporation's world-class engineers, scientists, and technologies

- Significant Business Impact
- Thought Leadership
- Mentor Next Gen of Technical Experts
- Superb Technical Achievement

Jobs in Cybersecurity

https://www.cyberseek.org/heatmap.html

Closing the Skills Gap Cybersecurity Apprenticeship

- 16 week training
- 600 hours paid, on-the-job component
- Mentorship
- Career development road map
- Focus on diversifying the workforce

University of Wisconsin
Whitewater | College *of* Business and Economics

Dominique Walsh
walshd@uww.edu
(262) 472 – 1311
cybersecuritycenterforbusines
s.org

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Whitewater | College *of* Business and Economics