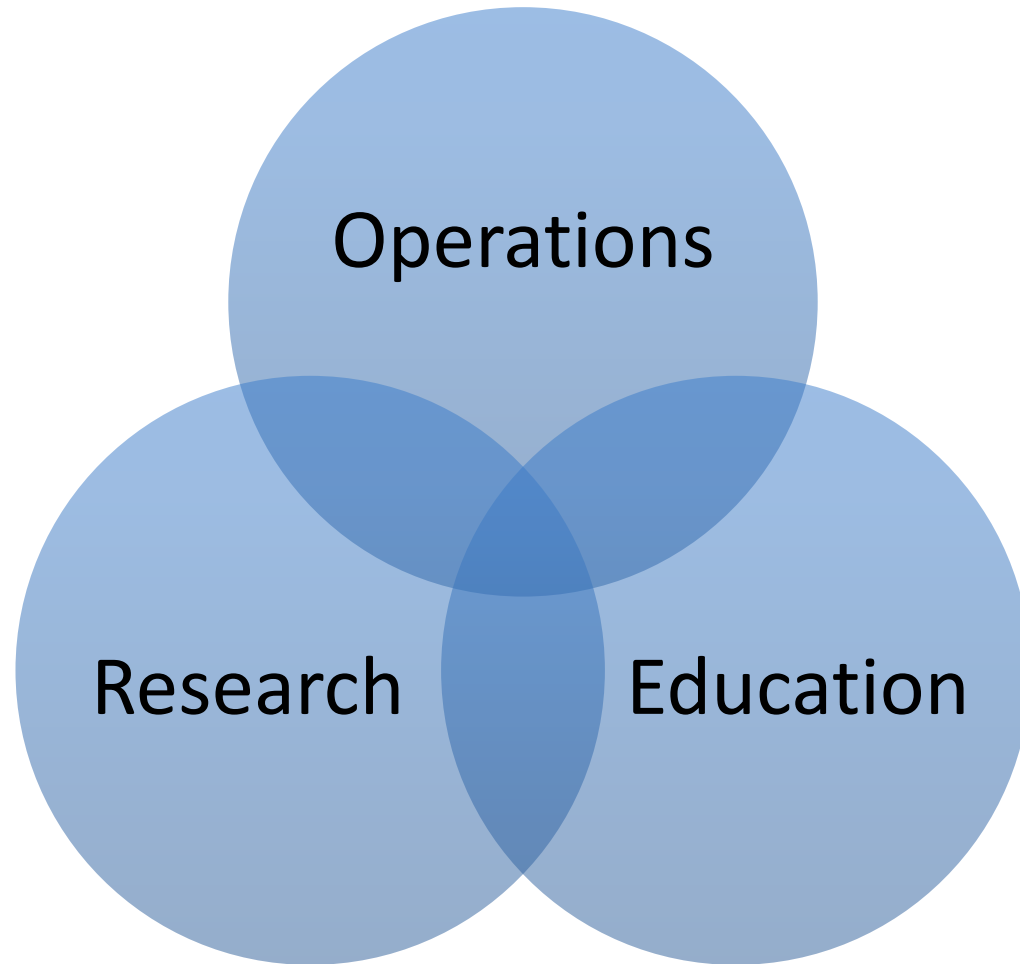


NICE

NATIONAL INITIATIVE FOR **CYBERSECURITY** EDUCATION



Higher Education Role in Securing Cyberspace



Vision

A digital economy enabled by a knowledgeable and skilled cybersecurity workforce.



Mission of NICE

To energize and promote a robust network and an ecosystem of cybersecurity education, training, and workforce development.



Examples of Affiliated Programs

- DHS/NSA Centers of Academic Excellence in Cybersecurity – 2Y, Cyber Defense Ed, Research
- NSA Centers of Academic Excellence in Cyber Operations
- NSF Advanced Technological Education Centers
- CyberCorps: Scholarship for Service Program
- And more . . .

Accelerate Learning and Skills Development



Inspire a sense of urgency in both the public and private sectors to address the shortage of skilled cybersecurity workers

Nurture A Diverse Learning Community

Strengthen education and training across the ecosystem to emphasize learning, measure outcomes, and diversify the cybersecurity workforce



Guide Career Development & Workforce Planning



Support employers to address market demands and enhance recruitment, hiring, development, and retention of cybersecurity talent

NICE Strategic Goal #3: Guide Career Development and Workforce Planning

Support employers to address market demands and enhance recruitment, hiring, development, and retention of cybersecurity talent

Objectives:

3.1 Identify and analyze data sources that support projecting present and future demand and supply of qualified cybersecurity workers

3.2 Publish and raise awareness of the NICE Cybersecurity Workforce Framework and encourage adoption

3.3 Facilitate state and regional consortia to identify cybersecurity pathways addressing local workforce needs

3.4 Promote tools that assist human resource professionals and hiring managers with recruitment, hiring, development, and retention of cybersecurity professionals

3.5 Collaborate internationally to share best practices in cybersecurity career development and workforce planning

Draft NIST Special Publication 800-181

NICE Cybersecurity Workforce Framework (NCWF)

National Initiative for Cybersecurity Education (NICE)

Bill Newhouse
Stephanie Keith
Benjamin Scribner
Greg Witte

The NCWF is now available for public comment
Deadline to submit comments: January 6, 2017

<http://csrc.nist.gov/publications/PubsDrafts.html#SP-800-181>



NICE Cybersecurity Workforce Framework – Draft NIST SP 800-181

Reference Resource for Cybersecurity Workforce Development

Cybersecurity Work Categories



- Specialty Areas (33) – Distinct areas of cybersecurity work;
 - Work Roles (52) – The most detailed groupings of IT, cybersecurity or cyber-related work, which include specific knowledge, skills, and abilities required to perform a set of tasks.
 - Tasks – Specific work activities that could be assigned to a professional working in one of the NCWF’s Work Roles; and,
 - Knowledge, Skills, and Abilities (KSAs) – Attributes required to perform Tasks, generally demonstrated through relevant experience or performance-based education and training.
- Audience:
 - Employers
 - Current and Future Cybersecurity Workers
 - Training and Certification Providers
 - Education Providers
 - Technology Providers

NCWF Components

As a mechanism to organize information technology (IT), cybersecurity, and cyber-related work, the NCWF helps organizations organize roles and responsibilities through the following components:

Categories – A high-level grouping of common cybersecurity functions;

Specialty Areas – Distinct areas of cybersecurity work;

Work Roles – The most detailed groupings of IT, cybersecurity or cyber-related work, which include specific knowledge, skills, and abilities required to perform a set of tasks.

Tasks – Specific work activities that could be assigned to a professional working in one of the NCWF's Work Roles; and,

Knowledge, Skills, and Abilities (KSAs) – Attributes required to perform Tasks, generally demonstrated through relevant experience or performance-based education and training.

Securely Provision

Category	Specialty Area	Work Role
Securely Provision	Risk Management	Authorizing Official/Designating Representative
		Security Control Assessor
	Software Development	Software Developer
		Secure Software Assessor
	Systems Architecture	Enterprise Architect
		Security Architect
	Technology R&D	Research & Development Specialist
	Systems Requirements Planning	Systems Requirements Planner
	Test and Evaluation	Testing and Evaluation Specialist
	Systems Development	Information Systems Security Developer
		Systems Developer

Operate and Maintain

Category	Specialty Area	Work Role
Operate and Maintain	Data Administration	Database Administrator
		Data Analyst
	Knowledge Management	Knowledge Manager
	Customer Service and Technical Support	Technical Support Specialist
	Network Services	Network Operations Specialist
	Systems Administration	System Administrator
	Systems Analysis	Systems Security Analyst

Oversee and Govern

Category	Specialty Area	Work Role
Oversee and Govern	Legal Advice and Advocacy	Cyber Legal Advisor
		Privacy Compliance Manager
	Training, Education, and Awareness	Cyber Instructional Curriculum Developer
		Cyber Instructor
	Cybersecurity Management	Information Systems Security Manager
		COMSEC Manager
	Strategic Planning and Policy	Cyber Workforce Developer and Manager
		Cyber Policy and Strategy Planner
	Executive Cyber Leadership	Executive Cyber Leadership
	Acquisition and Program/Project Management	Program Manager
		IT Project Manager
		Product Support Manager
		IT Investment/Portfolio Manager
		IT Program Auditor

Protect and Defend

Category	Specialty Area	Work Role
Protect and Defend	Cyber Defense Analysis	Cyber Defense Analyst
	Cyber Defense Infrastructure Support	Cyber Defense Infrastructure Support Specialist
	Incident Response	Cyber Defense Incident Responder
	Vulnerability Assessment and Management	Vulnerability Assessment Analyst



NICE Challenge PROJECT

Enabling the Cybersecurity Workforce of Tomorrow

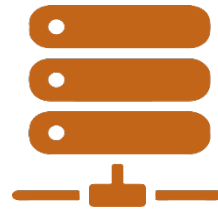
The NICE Challenge Project was created to develop virtual challenges and environments to evaluate students and professionals alike on their ability to perform NICE Cybersecurity Workforce Framework tasks and exhibit their knowledge, skills, and abilities. Whether it's supporting the teaching of competencies to students or evaluating the competencies of professionals, we've got you covered.

NICE Challenge Building Blocks



Platform

- We run & host the hardware, no upfront investment required
- Powerful & highly accessible web interface, no installs required
- Enables specialized content development, deployment, & analysis



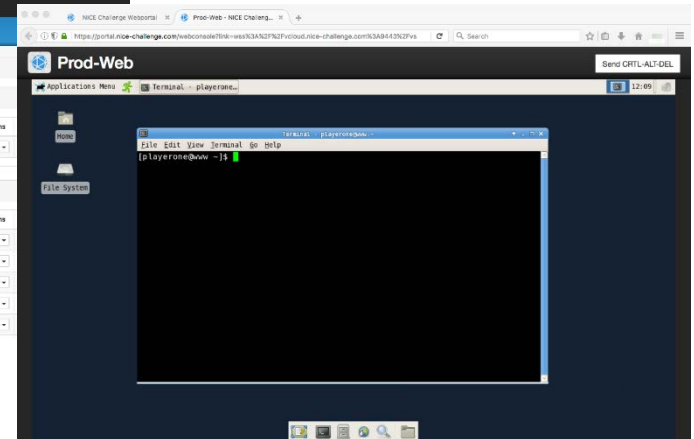
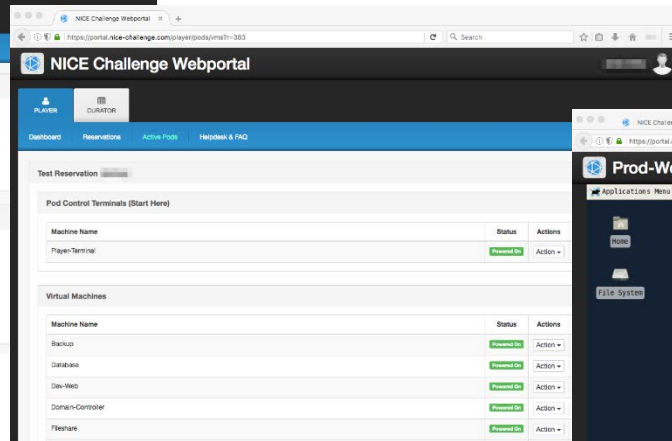
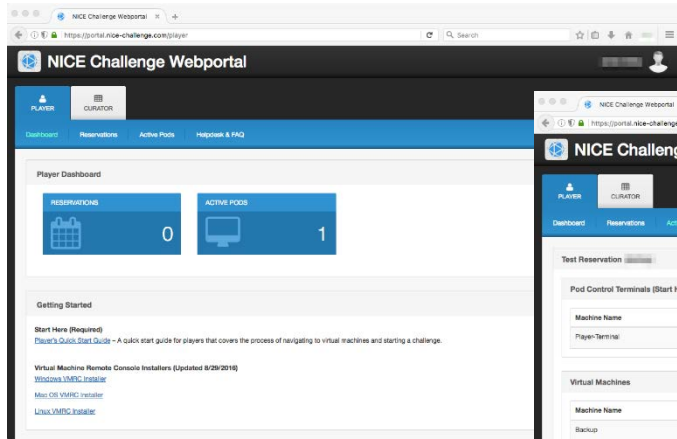
Environments

- Full scale context rich environments inspired by NICE Cybersecurity Workforce Framework Categories
- Fictional organizations & employees
- Virtualized networks, servers, & employee desktops



Challenges

- Competency based assessments focused on real world problems & context
- Maps to NICE Cybersecurity Workforce Framework Tasks/KSAs & CAE KUs
- Designed to capture useful data for actionable metrics & analytics



Web-based UI Example

NICE Strategic Goal #3: Guide Career Development and Workforce Planning

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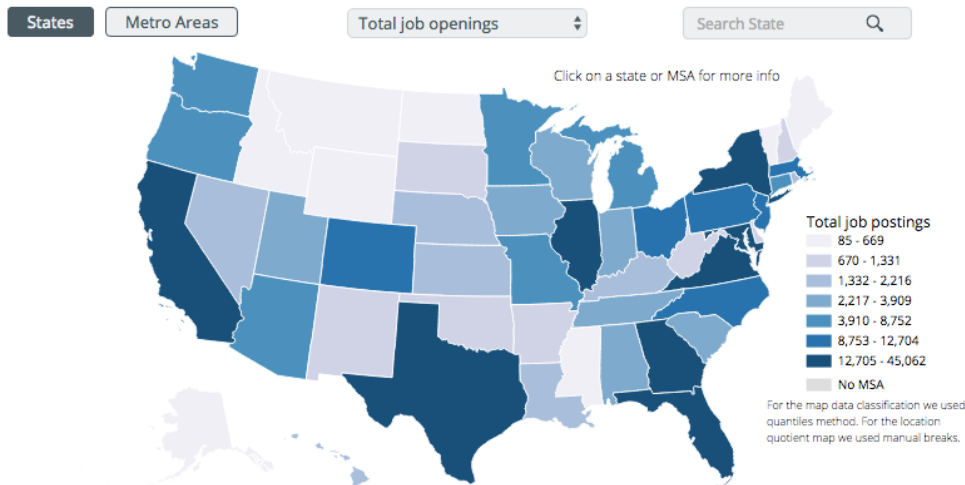


[About](#) [Interactive map](#) [Career pathway](#) [Who this tool is for](#) [Project partners](#)

Cybersecurity Supply/Demand Heat Map

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



National level

TOTAL CYBERSECURITY JOB OPENINGS

348,975

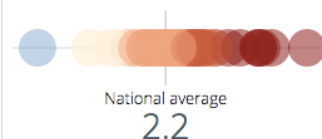
TOTAL EMPLOYED CYBERSECURITY WORKFORCE

778,402

SUPPLY OF CYBERSECURITY WORKERS

Very Low

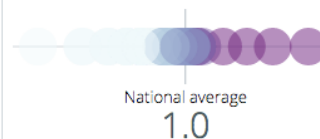
CYBERSECURITY WORKFORCE SUPPLY/DEMAND RATIO



GEOGRAPHIC CONCENTRATION

Average

LOCATION QUOTIENT



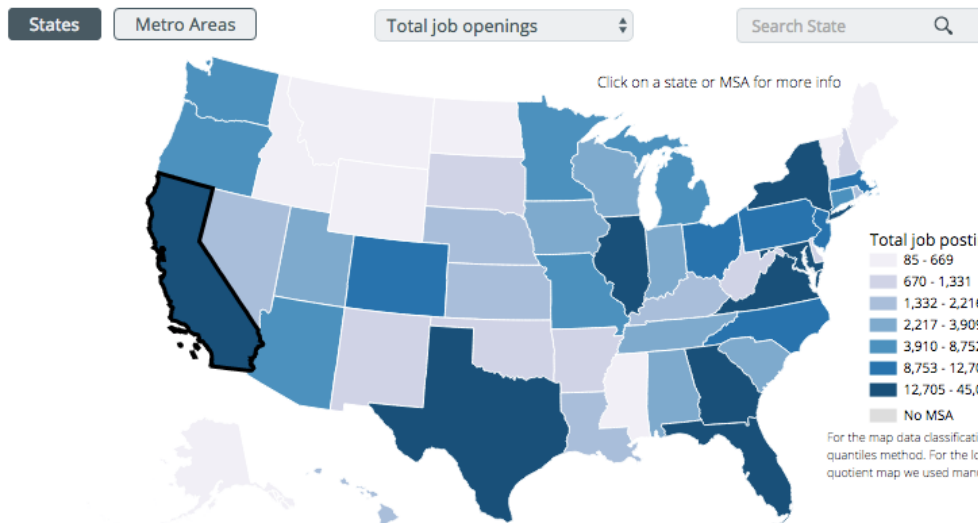
TOP CYBERSECURITY JOB TITLES

- Cyber Security Analyst / Specialist
- Cyber Security Engineer
- Auditor
- Network Engineer / Architect
- Software Developer / Engineer
- Systems Engineer
- Systems Administrator
- Information Assurance Engineer / Analyst
- Risk Manager / Analyst

Cybersecurity Supply/Demand Heat Map

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Share



California

TOTAL CYBERSECURITY JOB OPENINGS

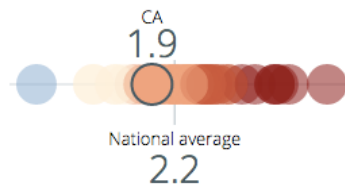
45,062

TOTAL EMPLOYED CYBERSECURITY WORKFORCE

84,415

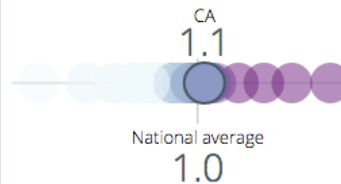
SUPPLY OF CYBERSECURITY WORKERS

Very Low
CYBERSECURITY WORKFORCE
SUPPLY/DEMAND RATIO



GEOGRAPHIC CONCENTRATION

Average
LOCATION QUOTIENT



TOP CYBERSECURITY JOB TITLES

- Cyber Security Engineer
- Network Engineer / Architect
- Auditor
- Software Developer / Engineer
- Systems Engineer
- Systems Administrator
- IT Director
- Systems Analyst
- Computer Support Specialist

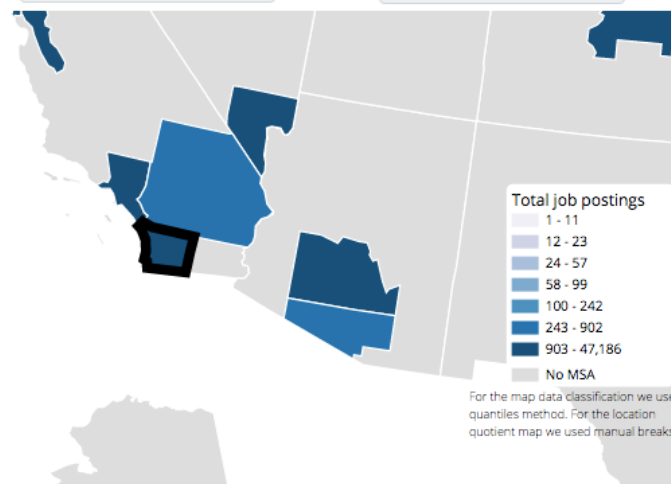
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[Share](#)
[States](#)
[Metro Areas](#)

Filter Metro Area by population

[Small](#)
[Medium](#)
[Large](#)
[All](#)
[- Zoom out](#)
[Total job openings](#)



San Diego-Carlsbad, CA

TOTAL CYBERSECURITY JOB OPENINGS ⓘ

5,368

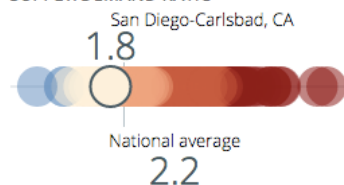
TOTAL EMPLOYED CYBERSECURITY WORKFORCE

9,508

SUPPLY OF CYBERSECURITY WORKERS ⓘ

Very Low

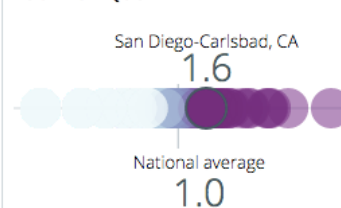
CYBERSECURITY WORKFORCE SUPPLY/DEMAND RATIO



GEOGRAPHIC CONCENTRATION ⓘ

Very High

LOCATION QUOTIENT



TOP CYBERSECURITY JOB TITLES ⓘ

- Cyber Security Analyst / Specialist
- Cyber Security Engineer
- Network Engineer / Architect
- Systems Engineer
- Auditor
- Systems Administrator
- Software Developer / Engineer
- Information Assurance Engineer / Analyst
- Systems Analyst

Cybersecurity Supply/Demand Heat Map

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](#)

States Metro Areas

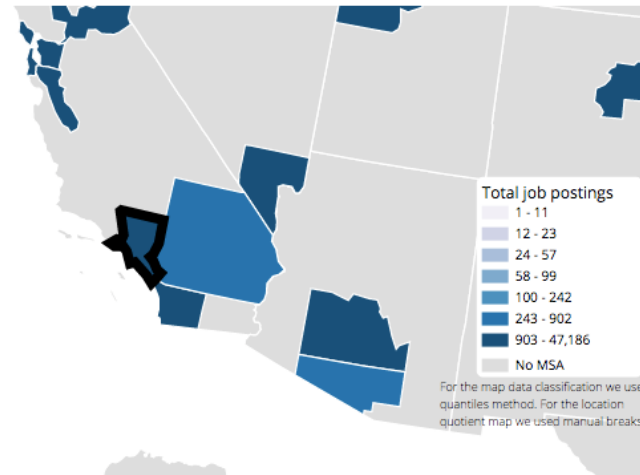
Filter Metro Area by population

Small Medium Large All

– Zoom out

Total job openings

Search Metro Area



Los Angeles-Long Beach-Anaheim, CA

TOTAL CYBERSECURITY JOB OPENINGS ⓘ

13,675

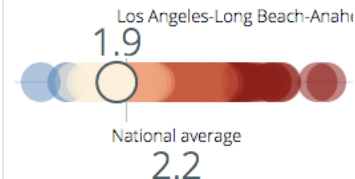
TOTAL EMPLOYED CYBERSECURITY WORKFORCE

25,805

SUPPLY OF CYBERSECURITY WORKERS ⓘ

Very Low

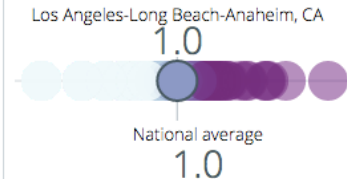
CYBERSECURITY WORKFORCE SUPPLY/DEMAND RATIO



GEOGRAPHIC CONCENTRATION ⓘ

Average

LOCATION QUOTIENT



TOP CYBERSECURITY JOB TITLES ⓘ

- Cyber Security Analyst / Specialist
- Cyber Security Engineer
- Network Engineer / Architect
- Auditor
- Systems Engineer
- Systems Administrator
- Software Developer / Engineer
- IT Director
- Network Administrator



[About](#) [Interactive map](#) [Career pathway](#) [Who this tool is for](#) [Project partners](#)

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.

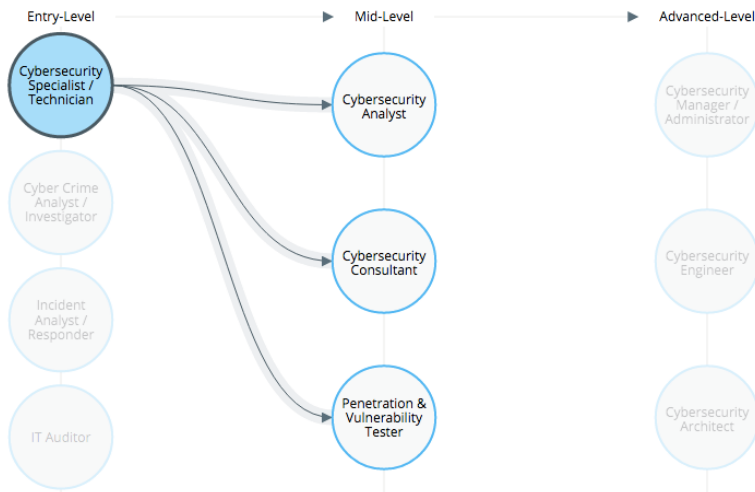
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[Feedback](#)

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Cybersecurity Specialist / Technician

AVERAGE SALARY ⓘ

\$81,603

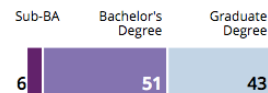
Cybersecurity Specialist / Technician



COMMON JOB TITLES ⓘ

- Information Security Specialist
- IT Security Specialist
- Cyber Security Specialist
- IT Specialist - Information Security
- Network Security Specialist

REQUESTED EDUCATION (%) ⓘ



TOP SKILLS REQUESTED ⓘ

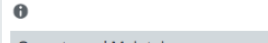
- 1 Information Security
- 2 Information Systems
- 3 Network Security
- 4 Information Assurance
- 5 LINUX
- 6 UNIX
- 7 Troubleshooting

TOTAL JOB OPENINGS ⓘ

6,741

Cybersecurity Specialist / Technician

COMMON NICE CYBERSECURITY WORKFORCE FRAMEWORK CATEGORIES ⓘ



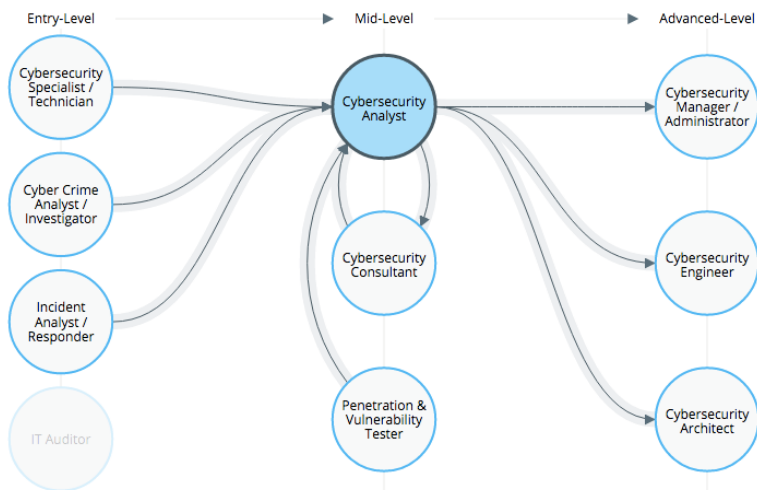
TOP CERTIFICATIONS REQUESTED ⓘ

- CISSP
- CISA
- CISM

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.

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Cybersecurity Analyst

AVERAGE SALARY ⓘ

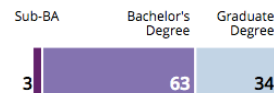
\$89,232



COMMON JOB TITLES ⓘ

- Information Security Analyst
- Security Analyst
- IT Security Analyst
- Cyber Security Analyst
- Senior Security Analyst

REQUESTED EDUCATION (%) ⓘ



TOP SKILLS REQUESTED ⓘ

- 1 Information Security
- 2 Information Systems
- 3 Cryptography
- 4 LINUX
- 5 Network Security
- 6 Troubleshooting
- 7 Security Operations

TOTAL JOB OPENINGS ⓘ

29,160

Cybersecurity

COMMON NICE CYBERSECURITY WORKFORCE FRAMEWORK CATEGORIES ⓘ

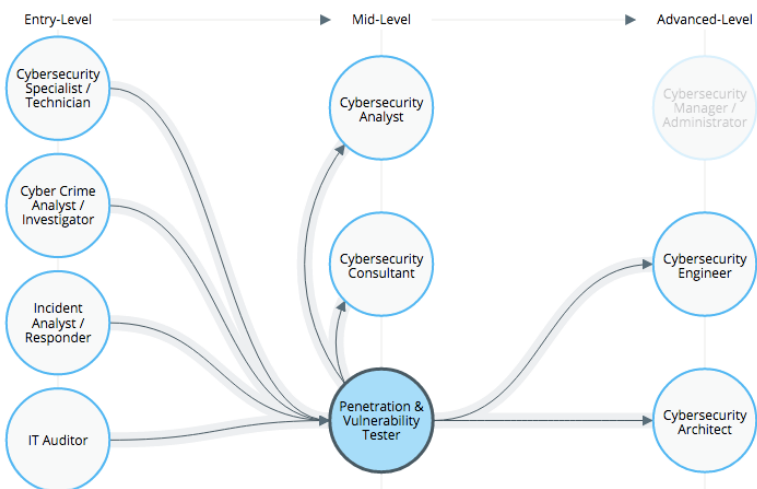


TOP CERTIFICATIONS REQUESTED ⓘ

- CISSP
- CISA
- CISM

Cybersecurity Career Pathway

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[Share](#)


Penetration & Vulnerability Tester

AVERAGE SALARY ⓘ

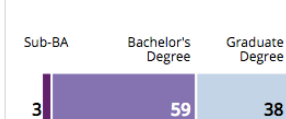
\$90,590



COMMON JOB TITLES ⓘ

- Penetration Tester
- Security Analyst
- Senior Penetration Tester
- Security Penetration Tester
- Vulnerability Analyst

REQUESTED EDUCATION (%) ⓘ



TOP SKILLS REQUESTED ⓘ

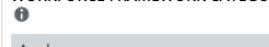
- 1 Information Security
- 2 JAVA
- 3 LINUX
- 4 Information Systems
- 5 Python
- 6 Software Development
- 7 SQL

TOTAL JOB OPENINGS ⓘ

12,702

Penetration & Vulnerability

COMMON NICE CYBERSECURITY WORKFORCE FRAMEWORK CATEGORIES ⓘ

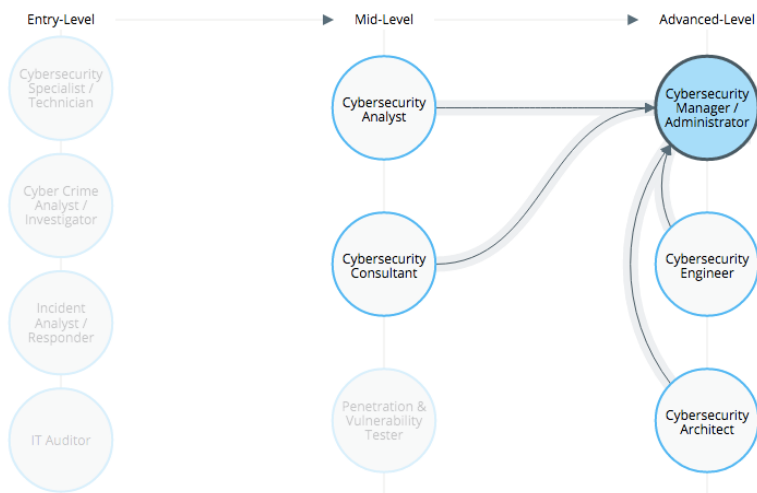


TOP CERTIFICATIONS REQUESTED ⓘ

- CISSP
- CISA
- CISM

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](#)


Cybersecurity Manager / Administrator

AVERAGE SALARY ⓘ

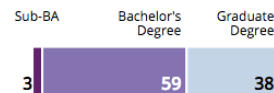
\$113,407



COMMON JOB TITLES ⓘ

- Security Administrator
- Information Security Manager
- Information Security Officer
- Network Security Administrator
- IT Security Manager

REQUESTED EDUCATION (%) ⓘ



TOP SKILLS REQUESTED ⓘ

- 1 Information Security
- 2 Information Systems
- 3 Project Management
- 4 LINUX
- 5 Network Security
- 6 Troubleshooting
- 7 Information Assurance

TOTAL JOB OPENINGS ⓘ

15,120

Cybersecurity Manager / Administrator

COMMON NICE CYBERSECURITY WORKFORCE FRAMEWORK CATEGORIES ⓘ



TOP CERTIFICATIONS REQUESTED ⓘ

- CISSP
- CISM
- CISA

NICE Strategic Goal #3: Guide Career Development and Workforce Planning

Support employers to address market demands and enhance recruitment, hiring, development, and retention of cybersecurity talent

Objectives:

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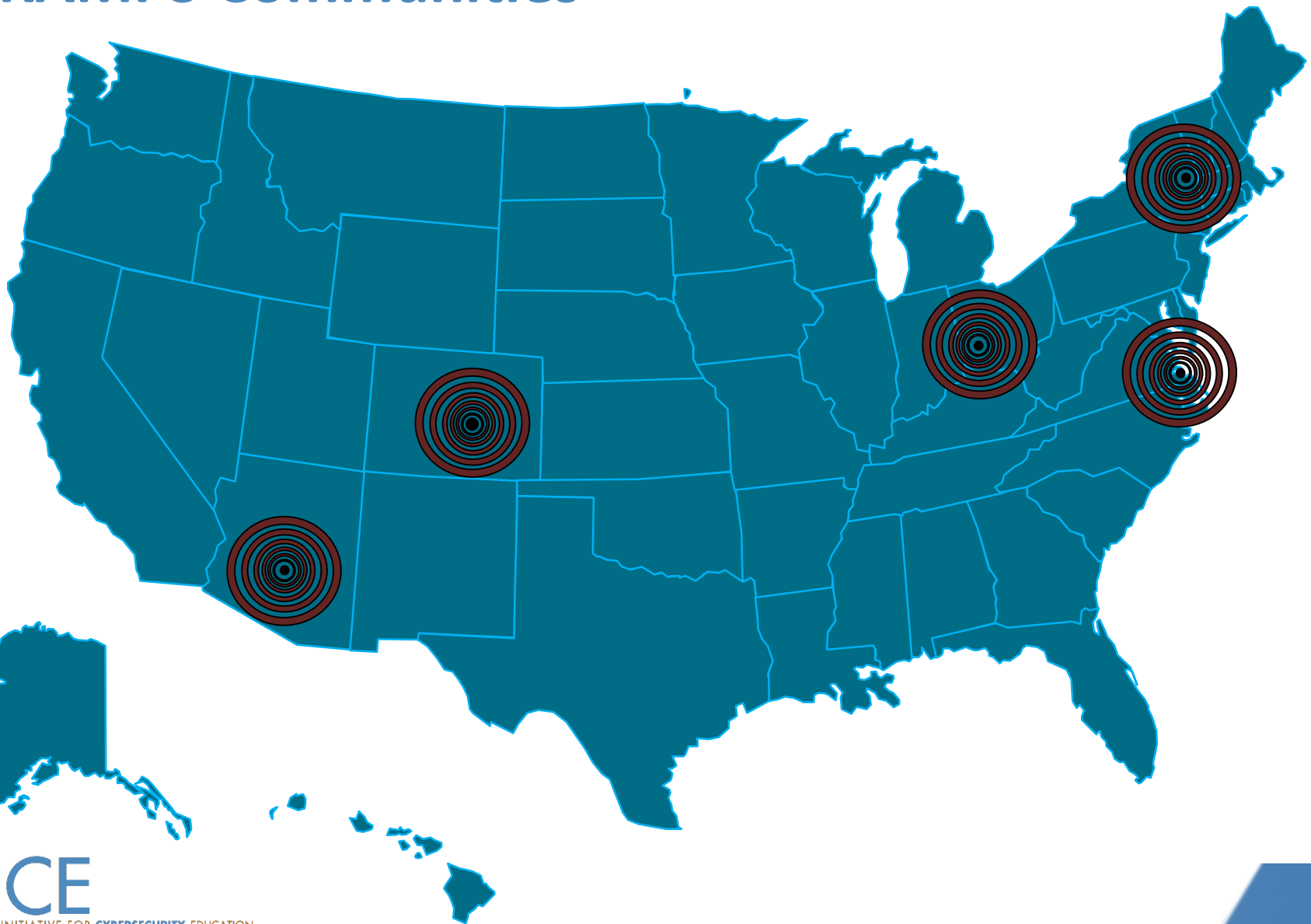
3.4 Promote tools that assist human resource professionals and hiring managers with recruitment, hiring, development, and retention of cybersecurity professionals

3.5 Collaborate internationally to share best practices in cybersecurity career development and workforce planning

Regional Alliances & Multistakeholder Partnerships

- RAMPS for Cybersecurity Education & Workforce
- Job-Driven Training Principles
 - ✓ Engaging Employers
 - ✓ Earn and Learn
 - ✓ Smart Choices
 - ✓ Measuring Matters
 - ✓ Stepping Stones
 - ✓ Opening Doors
 - ✓ Regional Partnerships

RAMPS Communities



RAMPS Communities

Southwest Region: Arizona Statewide Cyber Workforce Consortium

Western Region: Cyber Prep Program

Central Region: Cincinnati-Dayton Cyber Corridor (Cin-Day Cyber)

Mid-Atlantic Region: Hampton Roads Cybersecurity Education, Workforce, and Economic Development Alliance (HRCyber)

Northeast Region: The Partnership to Advance Cybersecurity Education and Training (PACET)

Recommendations from Cybersecurity Commission



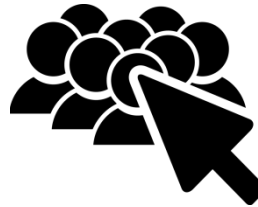
Federal Cybersecurity Human Capital Strategy

Make civilian Federal service the destination of choice for Cybersecurity professionals throughout multi-sector careers



Data Analytics

Increase cybersecurity workforce data accuracy and planning capability to effectively conduct workforce planning.



Recruit & Hire

Engage in government-wide and agency-specific efforts to conduct outreach and recruitment for cybersecurity talent.



Talent Pipeline

Work with educational institutions on a cyber curriculum from K-12 through university to significantly increase capacity for government and beyond.



Talent Development & Retention

Promote retention through uniform, high-quality trainings, certifications, badging, and developmental opportunities across the Federal cybersecurity workforce.

NICE Engagement Process

- NICE Working Group
 - Subgroups: K-12, Collegiate, Competitions, Training and Certifications, and Workforce Management
- NICE Interagency Coordinating Council
- NICE Webinars (Monthly)
- NICE eNewsletter (Quarterly)
- NICE Email Updates (Periodic)
- NICE Events
 - Annual Conference & Expo: November 7-8, 2017, Dayton, OH
 - National K-12 Cybersecurity Education Conference: 2017 TBD
- NICE Website: nist.gov/nice