

# Welcome!

## Schedule for the Session

10 min: Introduction and Welcome

20 min: Presentation

- Understanding the Knowledge Gaps in the Cybersecurity Workforce

25 min: Panel Discussion

- Amanda Theel from Argonne National Lab
- Simone Petrella from N2K
- Akash Kaura from LinkedIn

25 min: Q&A with Panel and NCSES

5 min: Group Poll activity

25 min: Small Group Discussions

5 min: Concluding Remarks



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# Logistics

- This presentation is being recorded
  - Recording and slides will be on CWDI website
- We will be collecting transcripts from the small group sessions
- We will be monitoring for and removing bots and AI notetakers
- You will have two opportunities to share your input
  - Q&A using the Zoom function
  - Small group sessions



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# Introduction to the Cybersecurity Workforce Data Initiative Workshop 2: Knowledge Gaps

John Finamore

Chief Statistician

National Center for Science and Engineering Statistics

U.S. National Science Foundation



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# National Center for Science and Engineering Statistics

Measuring America's progress in science, technology, and innovation



Part of the National Science Foundation (NSF)



One of 13 principal federal statistical agencies

*Overseen by the U.S. Chief Statistician within the Office of Management and Budget (OMB)*

## MANDATE

Serve as a central **Federal clearinghouse** for the collection, interpretation, analysis, and dissemination of **objective data** on the **U.S. science and engineering enterprise**

*Section 505 of the America COMPETES Reauthorization Act of 2010*



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# Why is it important to assess knowledge gaps in the cybersecurity workforce?

- The CHIPS and Science Act of 2022 section 10317 mandates that NCSES assess the feasibility of providing estimates and statistical information on the cybersecurity workforce
- Before assessing the feasibility of providing estimates, we need to understand:
  - What are the major challenges related to the cybersecurity workforce?
  - Based on those challenges, what data do we need to collect?



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# Goals of today's workshop

1. Hear current thinking about information that is needed on the cybersecurity workforce in the US
2. Discuss the sources of data that may be needed
3. Connect with other organizations working to advance the cybersecurity workforce
4. Provide feedback to the CWDI to inform our determination of what information is needed about the cybersecurity workforce, and preferred sources of that information



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# Cybersecurity Workforce Data Initiative Workshop 2

Understanding the knowledge gaps: What  
do we need to learn about the cybersecurity  
workforce?

May 23, 2024

Erin Velez

Director of Education Research, RTI International



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# About Us

RTI is an independent nonprofit research institute dedicated to improving the human condition.

## RTI Research Team

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# Agenda

Background & project timeline

Definition of a cybersecurity worker

Challenges facing the cybersecurity workforce

Needed data on the cybersecurity workforce

Who data should be collected from and how?

Key takeaways and next steps



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# Background on the Cybersecurity Workforce Data Initiative (CWDI)

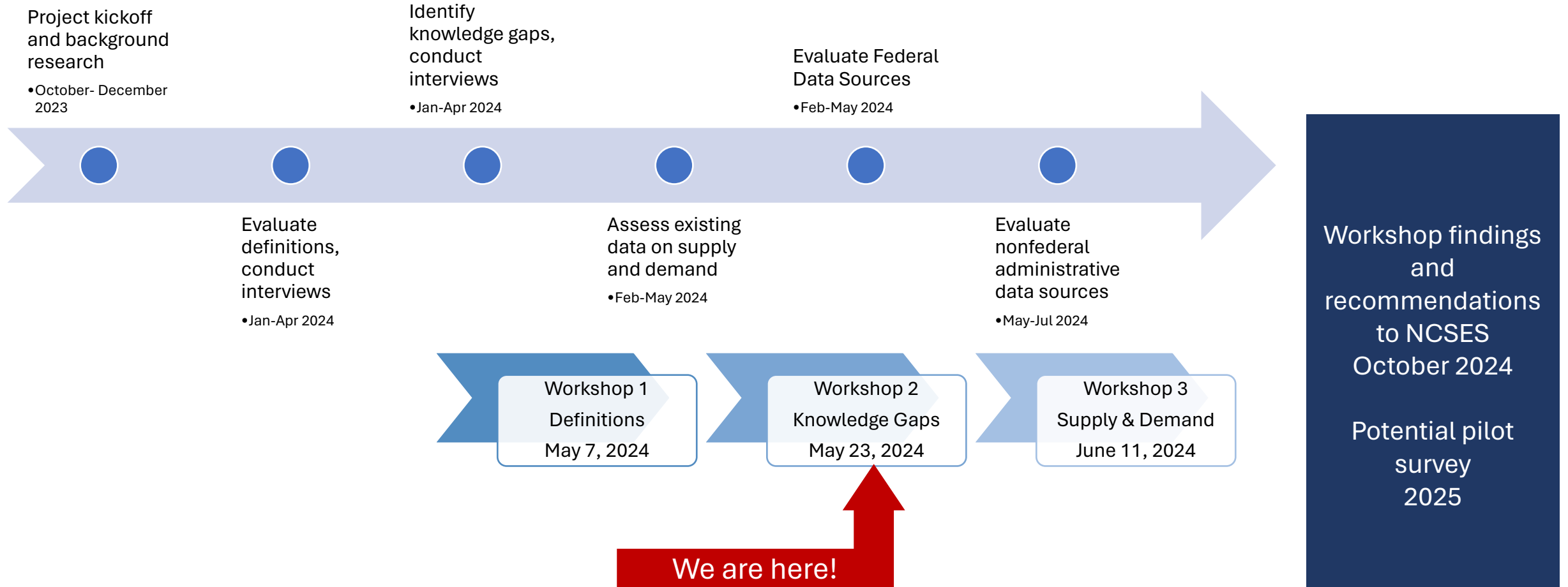
- Mandated by the CHIPS and Science Act of 2022
  - Led by the National Center for Science and Engineering Statistics (NCSES)
- The goal of the CWDI is to assess the feasibility of producing nationally representative estimates and statistics on the cybersecurity workforce in the United States



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# Project Timeline



# Knowledge Gaps Objective

*Our objective is to understand what types of **beneficial statistical information** describing the U.S. cybersecurity workforce are **currently missing**.*



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# Methods

To compile this information, our team

- Conducted 15 **interviews** with federal, private, nonprofit, and academic experts and interested parties in the cybersecurity field
- Interviews discussed:
  - The **definition** of a cybersecurity job
  - The most **significant workforce challenges** in cybersecurity today
  - What is **missing from the current data** available
- **Synthesized common themes** into a summary report



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# CWDI working definition

The cybersecurity workforce includes a “**core**” set of **cybersecurity occupations focused on cybersecurity**. Workers in other occupations where their **primary**, or **secondary work activities** include cybersecurity are also part of the core cybersecurity workforce.

The cybersecurity “involved” and “adjacent” workforce include those occupations where cybersecurity is a work activity, but not primary or secondary.



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# CWDI working definition, details

Cybersecurity Core	Cybersecurity Involved	Cybersecurity Adjacent
<p>Cybersecurity is the <b>primary work activity</b> and is <b>explicitly at the core</b> of the occupation.</p> <ul style="list-style-type: none"> <li>• Cybersecurity analysts, engineers</li> <li>• Penetration testers</li> </ul> <p>Cybersecurity is a <b>primary or secondary work activity</b> of the occupation.</p> <ul style="list-style-type: none"> <li>• Cybersecurity lawyers</li> <li>• Database architects</li> <li>• Systems engineers</li> <li>• Software developers</li> </ul>	<p>Cybersecurity is an <b>explicit or other work activity</b>, but where an employee may not rank it as a primary or secondary part of their regular work roles.</p> <ul style="list-style-type: none"> <li>• Other computer and tech</li> <li>• Engineering</li> <li>• Financial and business</li> <li>• Legal and management</li> <li>• Military, protective services</li> <li>• Office support</li> </ul>	<p>Roles where cybersecurity is not an explicit work activity but where there are <b>cybersecurity implications</b> or a small number of required tasks, knowledge, and/or skills from the NICE Framework central to the occupation.</p>



# Challenges Facing the Cybersecurity Workforce

- Employers tend to want employees with extensive work experience
  - Costs to train new workers
  - Want to be prepared immediately
  - Struggle to find enough experienced workers
- Workers often have difficulty finding jobs
  - Many are relatively new to the field



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# Challenges Facing the Cybersecurity Workforce, cont.

- Mismatch between skills taught in postsecondary & nondegree credentials and skills employers need
  - Lack of common standards and definitions in field
  - Field is evolving quickly
  - Huge variety of distinct skills
  - Hundreds of credentials with little documentation of skills learned
  - Difficult to translate academic knowledge into practice



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# Challenges Facing the Cybersecurity Workforce, cont.

- Skills taught in postsecondary & nondegree credentials not being broad enough
  - Many specialize in particular aspects of cybersecurity without having broad background
  - Gap in “interpersonal” skills



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# Challenges Facing the Cybersecurity Workforce, cont.

- Need for cybersecurity education at the K-12 level
- Disparities between small and large organizations
  - Larger organizations can afford and attract strong talent
  - Smaller organizations may be understaffed, leading to burnout and retention issues
  - Small and medium organizations often use contractors



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# Needed Data on the Cybersecurity Workforce

- Pathways into and through the workforce
- Preparation of employees and how well they “fit” their job
- Extent to which knowledge from credentials is relevant to work
- Employer satisfaction with employees of different preparation backgrounds
- Typical workforce data: wages, daily tasks, demographics, hours worked, educational background, years of work experience



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# Needed Data on the Cybersecurity Workforce, cont.

- What employers are looking for when they hire
- Cybersecurity functions at organizations
- Attrition and retention of workers
- Accurate and unduplicated headcount of cybersecurity jobs



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# Who Should Data be Collected From?

- Important to collect data from both employees and employers
- Include diverse types of employers and employees
  - Include cybersecurity adjacent occupations
  - Different industries such as finance, energy, health
  - Different organization sizes
  - Include companies that supply contractors



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# Sources of Data

- Individual survey data
  - **Pros:** important information can only be collected through a survey (skills and mismatch); less data cleaning and processing needed
  - **Cons:** point-in-time collection; data is less granular
- Administrative data
  - **Options:** IRS, state UI records, Lightcast, LinkedIn, Cyberseek, OPM (federal workforce)
  - **Pros:** large sample size
  - **Cons:** data permission delays, many data sources are proprietary, can be low quality with large missingness, lag in reporting, does not include demographics, and data are not consistent across sources
- Combination of survey and administrative data



# Key Takeaways

When defining the cybersecurity workforce, important to consider “core,” “involved,” and “adjacent” workers

Largest challenge in cybersecurity workforce is mismatch between the skills and experience employers are looking for and skills and experience employees have

Consider data from both employers and employees, consider both survey and administrative data



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# Next Steps

Upcoming workshop: **June 11 - Supply and demand**

Workshop recommendations to NCSES in October 2024 to inform a potential **pilot study in FY 2025**

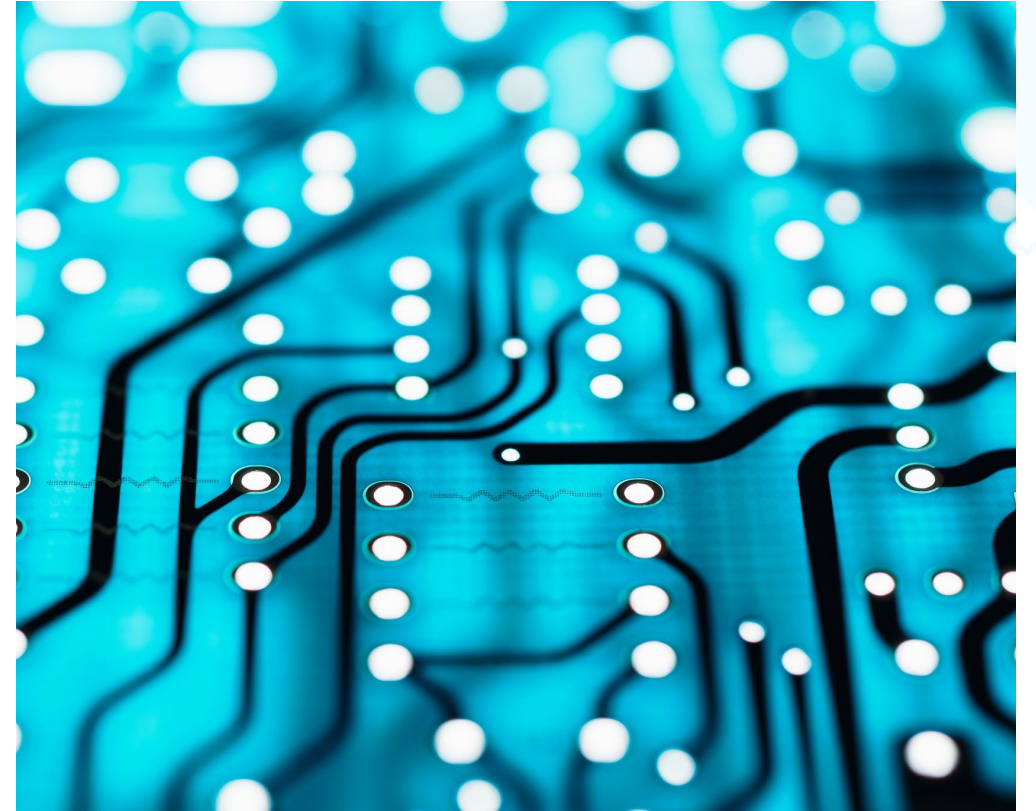


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# More Information

- Learn more about the CWDI here:  
<https://nces.nsf.gov/about/cybersecurity-workforce-data-initiative>
- Agenda for upcoming workshop and recording of prior workshop (when available):  
<https://nces.nsf.gov/about/cybersecurity-workforce-data-initiative/workshops>
- Reach us at [NCSES-CWDI@nsf.gov](mailto:NCSES-CWDI@nsf.gov) and [CWDI@rti.org](mailto:CWDI@rti.org)



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# Panel Discussion



Amanda Theel  
Argonne National Lab



Simone Petrella  
N2K



Akash Kaura  
LinkedIn



Jeffrey Alexander  
RTI  
Moderator



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# Poll Questions



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# Zoom “Waterfall”

- **What are the primary sources of administrative, proprietary, or other data available to learn about the cybersecurity workforce?**



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# Poll Questions



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# Small Group Discussions



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# Please stay for the breakout discussions, if able

- We are very interested in hearing from you
- This is your opportunity to shape a potential future cybersecurity workforce data collection
- Please click “Ok” in the breakout room pop up to enter your assigned break out room
- Discussion topics will include:
  - Types of cybersecurity professionals we want to collect data on
  - Needed information on the cybersecurity workforce



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# Next Steps

- Upcoming workshops - **June 11: Supply and Demand**
- Send workshop feedback for consideration to NCSES by **June 28, 2024**
- To send feedback or ask questions: [NCSES-CWDI@nsf.gov](mailto:NCSES-CWDI@nsf.gov) or [cwdi@rti.org](mailto:cwdi@rti.org)

Thank you!



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