Operationalizing a Congressional Mandate: Examples from the Cybersecurity Workforce Data Initiative

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NATIONAL CENTER FOR SCIENCE AND ENGINEERING STATISTICS
U.S. NATIONAL SCIENCE FOUNDATION

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Disclaimer

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This product has been reviewed for unauthorized disclosure of confidential information under NCSES-DRN24-055.

Background

Congressional mandates for federal data collection

The Science and Engineering Equal Opportunities Act of 1980

https://www.congress.gov/bill/96th-congress/senate-bill/568/text

BIENNIAL REPORT

SEC. 37. (a) By January 30, 1982, and biennially thereafter, the Director shall simultaneously transmit a report to the Congress, the Attorney General, the Director of the Office of Science and Technology Policy, the Chairman of the Equal Employment Opportunity Commission, the Director of the Office of Personnel Management, the Secretary of Labor, the Secretary of Education, and the Secretary of Health and Human Services. Report to Congress and certain Federal agencies. 42 USC 1885d.

(b) The report required by subsection (a) shall contain— Contents.

(1) an accounting and comparison, by sex, race, and ethnic group and by discipline, of the participation of women and men in scientific and technical positions, including—

(A) the number of individuals in permanent and temporary and in full-time and part-time scientific and technical positions by appropriate level or similar category;

(B) the average salary of individuals in such scientific and technical positions;

(C) the number and type of promotional opportunities realized by individuals in such scientific and technical positions;

(D) the number of individuals serving as principal investigators in federally conducted or federally supported research and development; and

(E) the unemployment rate of individuals seeking scientific and technical positions;

(2) an assessment, including quantitative and other data, of the proportion of women and minorities studying scientific and

Congressional mandates for federal data collection, continued

America COMPETES Reauthorization Act of 2010

https://www.congress.gov/111/plaws/publ358/PLAW-111publ358.pdf

SEC. 505. NATIONAL CENTER FOR SCIENCE AND ENGINEERING STATISTICS. 42 USC 1862p.

(a) ESTABLISHMENT.—There is established within the Foundation a National Center for Science and Engineering Statistics that shall serve as a central Federal clearinghouse for the collection, interpretation, analysis, and dissemination of objective data on science, engineering, technology, and research and development.

(b) DUTIES.—In carrying out subsection (a) of this section, the Director, acting through the Center shall—

(1) collect, acquire, analyze, report, and disseminate statistical data related to the science and engineering enterprise in the United States and other nations that is relevant and useful to practitioners, researchers, policymakers, and the public, including statistical data on— Reports. Public information.

(A) research and development trends;

(B) the science and engineering workforce;

(C) United States competitiveness in science, engineering, technology, and research and development; and

(D) the condition and progress of United States STEM education;

National Center for Science and Engineering Statistics

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

Part of the U.S. National Science Foundation (NSF)

One of 13 principal federal statistical agencies

Overseen by the U.S. Chief Statistician within the White House 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

CHIPS and Science Act of 2022 (§ 10317)

NSF/NCSES, in coordination with NIST [National Institute of Standards and Technology] and other federal statistical agencies, shall establish a Cybersecurity Workforce Data Initiative that

- Assesses the feasibility of providing nationally representative estimates and statistical information on the cybersecurity workforce
- Utilizes the NICE framework or other frameworks, as appropriate
- Utilizes existing data on employer requirements and unfilled positions
- Consults key stakeholders
- Evaluates existing federal survey data
- Evaluates administrative data
- Collects credential attainment and employment outcome data

Operationalizing the CHIPS and Science Act Mandate

Overview of operationalizing the mandate 1

Begin to collaborate with other federal agencies

December 2023

Overview of operationalizing the mandate 2

Begin to collaborate with other federal agencies

December 2023

January to April 2024

Define the population

Overview of operationalizing the mandate 3

Begin to collaborate with other federal agencies

December 2023

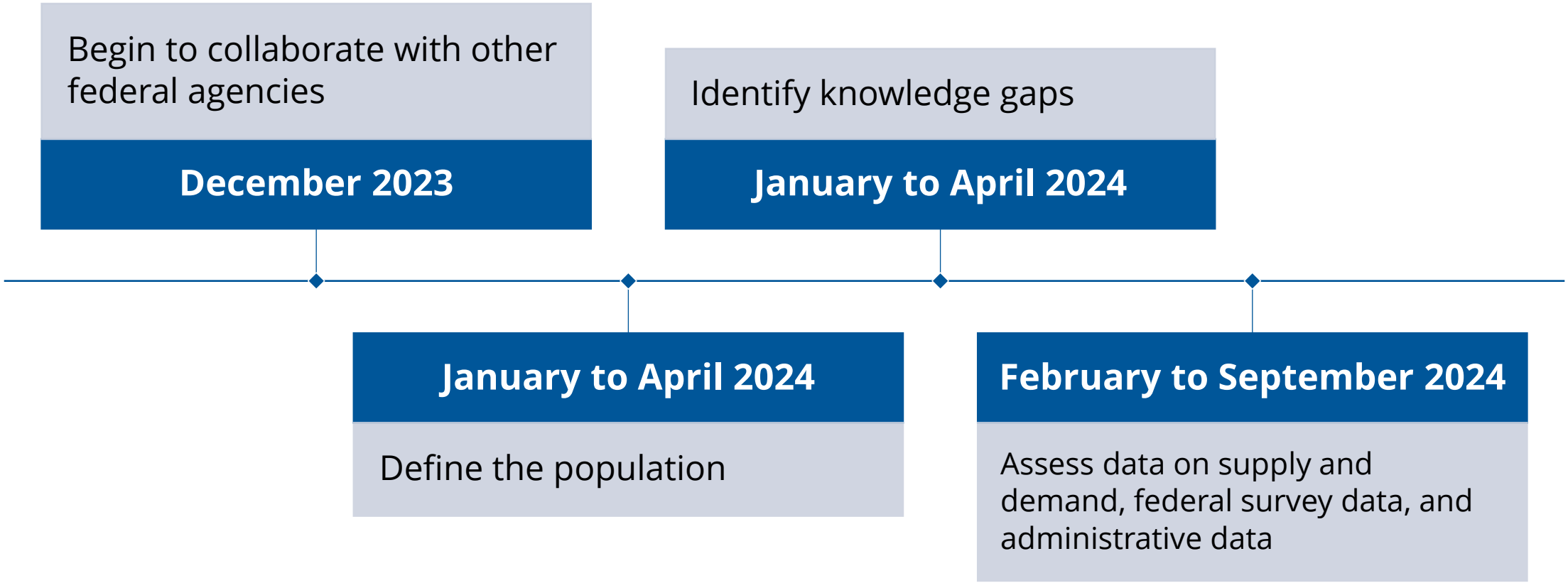
Identify knowledge gaps

January to April 2024

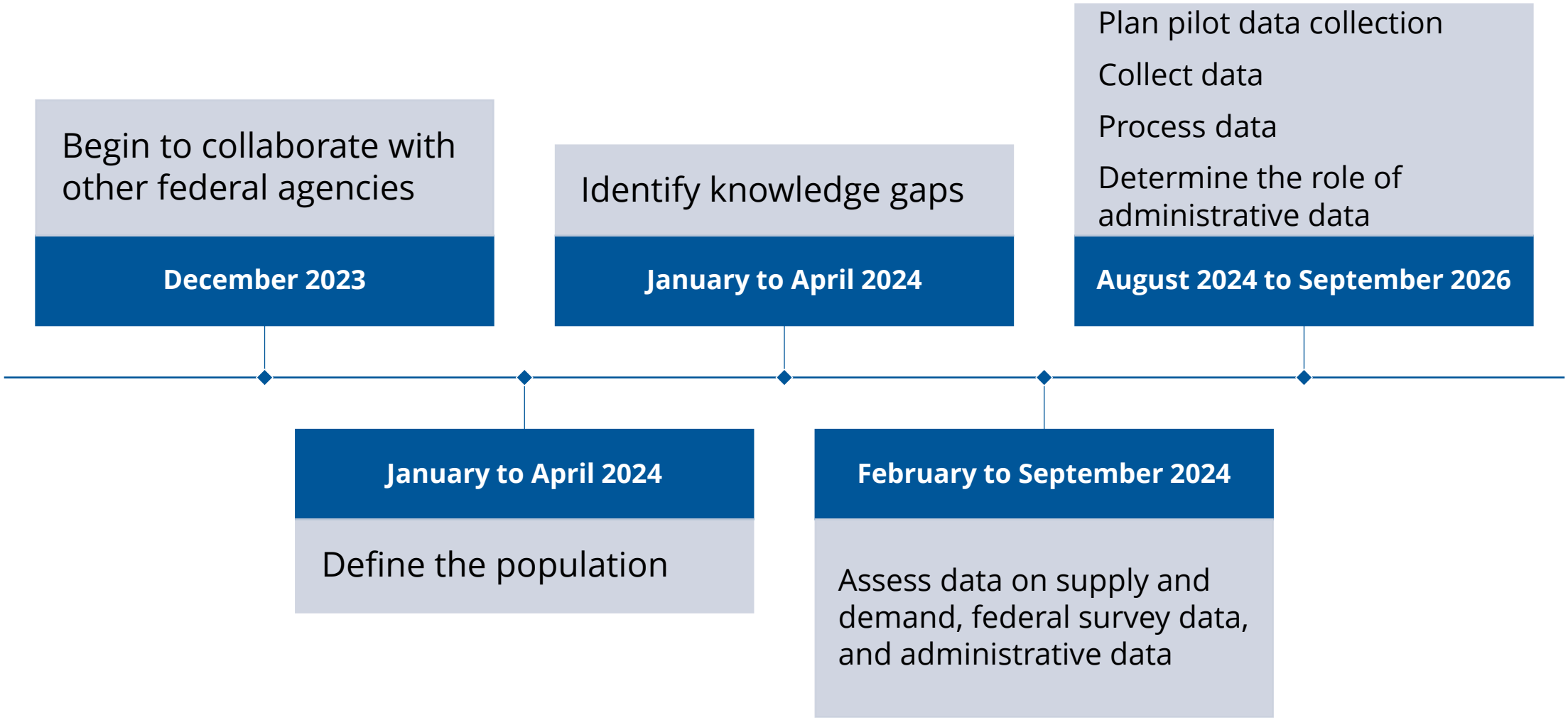
January to April 2024

Define the population

Overview of operationalizing the mandate 4



Overview of operationalizing the mandate 5



Collaborating with federal agencies 1

National Science Foundation
Format of collaboration • NCSES working group • Coordinates external updates
Goals of collaboration • Leverage expertise from peer group • Streamline status update reports about deliverables

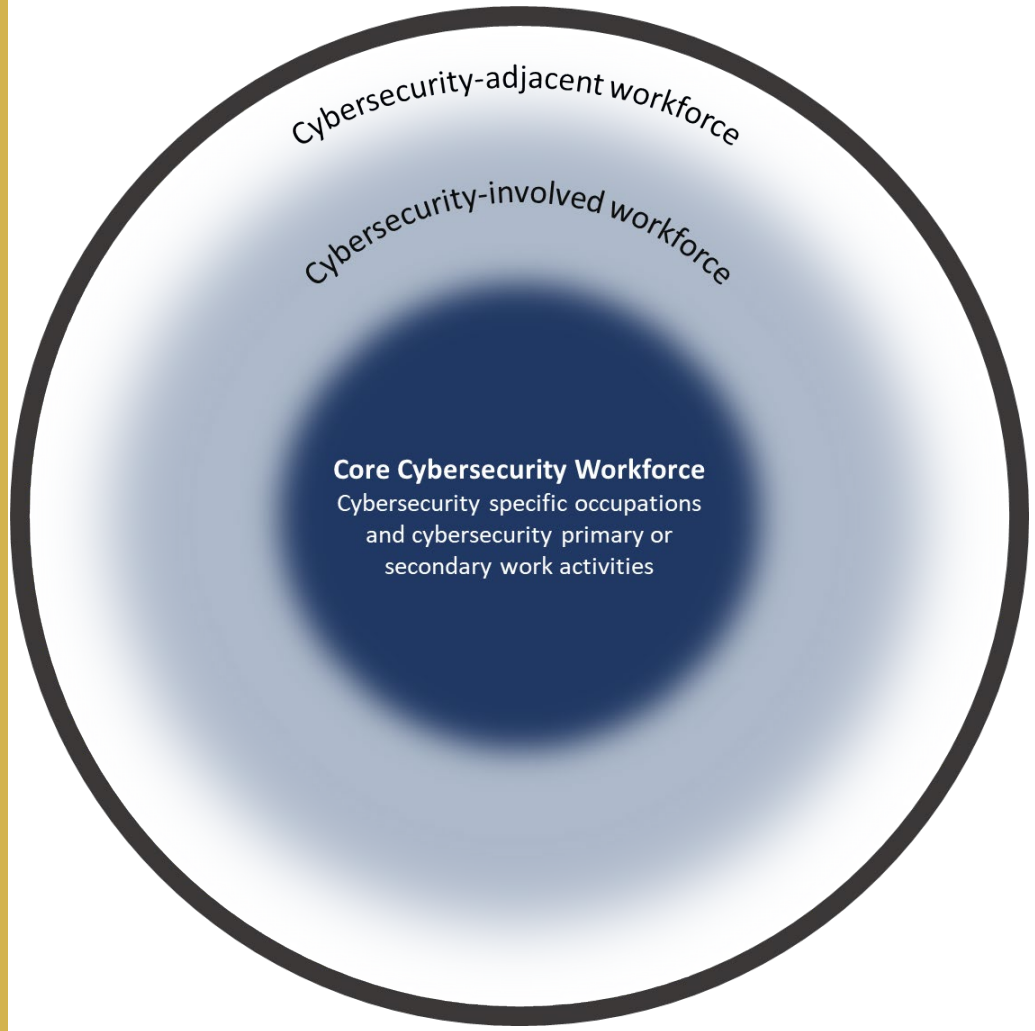
Collaborating with federal agencies 2

National Science Foundation	NICE Interagency Coordinating Council (ICC)
Format of collaboration • NCSES working group • Coordinates external updates	Format of collaboration • Updates to the NICE ICC working group
Goals of collaboration • Leverage expertise from peer group • Streamline status update reports about deliverables	Goals of collaboration • Receive input from other federal agencies • Relay information to NCSES

Collaborating with federal agencies 3

National Science Foundation	NICE Interagency Coordinating Council	Office of the National Cyber Director (ONCD) • Working Group on Cyber Workforce and Education • Federal Cyber Workforce Working Group
Format of collaboration • NCSES working group • Coordinates external updates	Format of collaboration • Updates to the NICE ICC working group	Format of collaboration • Updates to the ONCD working groups
Goals of collaboration • Leverage expertise from peer group • Streamline status update reports about deliverables	Goals of collaboration • Receive input from other federal agencies • Relay information to NCSES	Goals of collaboration • Receive input from other federal agencies • Relay information to NCSES

Defining the population



1. Scan of existing definitions
2. Interviews with subject matter experts
3. Working definition report
4. Workshop

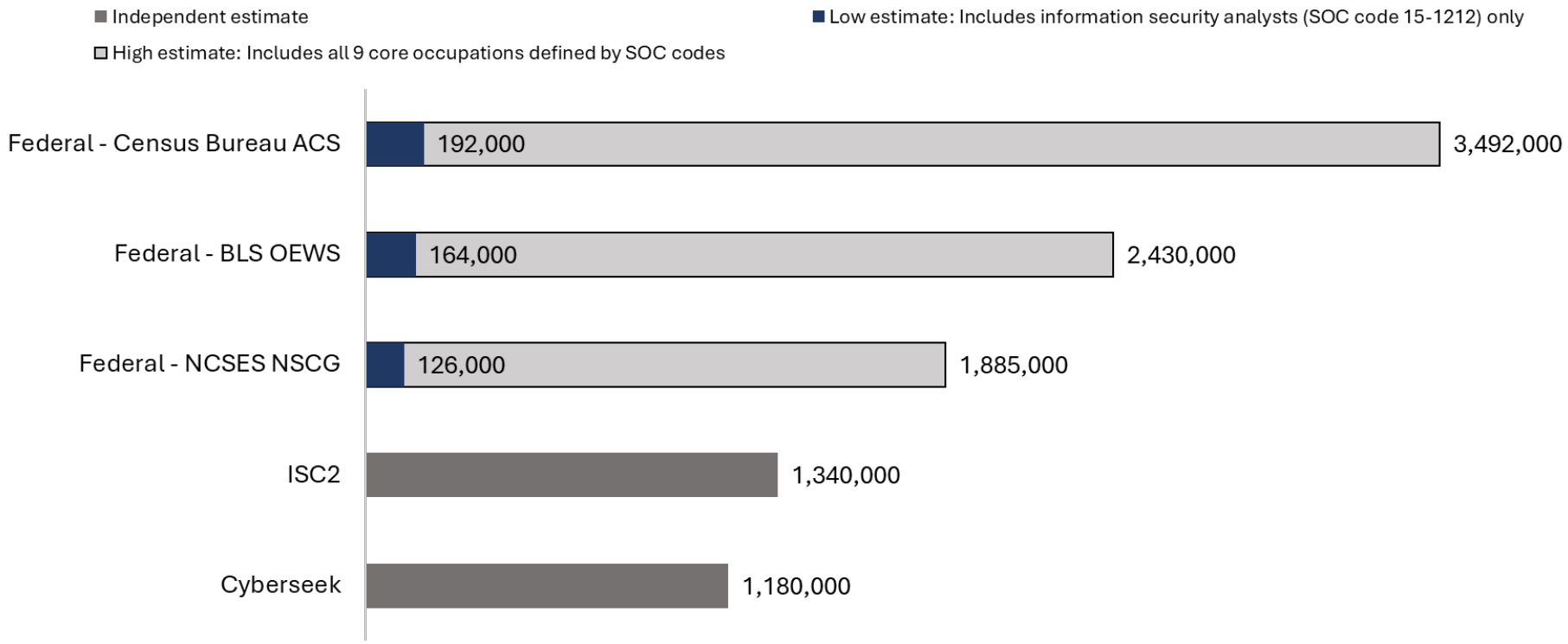
Hogan M, Bean de Hernandez A, McHugh P, Arbeit CA, Sullivan P; National Center for Science and Engineering Statistics (NCSES). 2024. *Cybersecurity Workforce Data Initiative: Cybersecurity Workforce Definitions Report*. Alexandria, VA: National Science Foundation. https://ncses.nsf.gov/760/assets/0/files/ncses-cwdi-working-definitions.pdf

Identify knowledge gaps

- What types of data are needed about the cybersecurity workforce?
- Conducted expert interviews
- Key types of information needed
  - Pathways into the cybersecurity workforce
  - Knowledge and skills that employers need the cybersecurity workforce to have
- Data sources that should be used
  - Data are needed from both employees and employers
  - Administrative data, survey data, or both

Assessing existing data

Estimates of Supply: Size of the Cybersecurity Workforce



Source(s): Publicly available data from Census Bureau ACS = American Community Survey; BLS OEWS = Bureau of Labor Statistics Occupational Employment and Wage Statistics; NSF NCSES NSCG = National Survey of College Graduates; ISC2 = International Information Systems Security Certification Consortium; Cyberseek

Hogan M, Lilienthal K, Bean de Hernandez A, McHugh P, Arbeit CA, Sullivan P; National Center for Science and Engineering Statistics (NCSES). 2024. *Cybersecurity Workforce Data Initiative: Cybersecurity Workforce Supply and Demand Report.* Alexandria, VA: National Science Foundation. https://ncses.nsf.gov/760/assets/0/files/ncses-cwdi-supply-demand-report.pdf

Example of assessment of a federal survey: National Survey of College Graduates

- High relevance
- Maps to Census occupation codes
- Collects granular demographic and education data
- However, codes for field of degree and occupation are not detailed enough

Hogan M, Lilienthal K, Arbeit CA, Bean de Hernandez A; National Center for Science and Engineering Statistics (NCSES). 2024. *Cybersecurity Workforce Data Initiative: Federal Data Evaluation Report*. Alexandria, VA: National Science Foundation. https://ncses.nsf.gov/760/assets/0/files/ncses-cwdi-federal-data-evaluation.pdf

Public presence and outreach

Email: ncses-cwdi@nsf.gov

Next steps and conclusions

Pilot data collection

- Workforce survey
  - Determine high-priority research questions
  - Develop and cognitively test questionnaire
  - Collect data
  - Process data

- Cognitive testing with businesses:
  - Testing cybersecurity questions with business in summer 2024

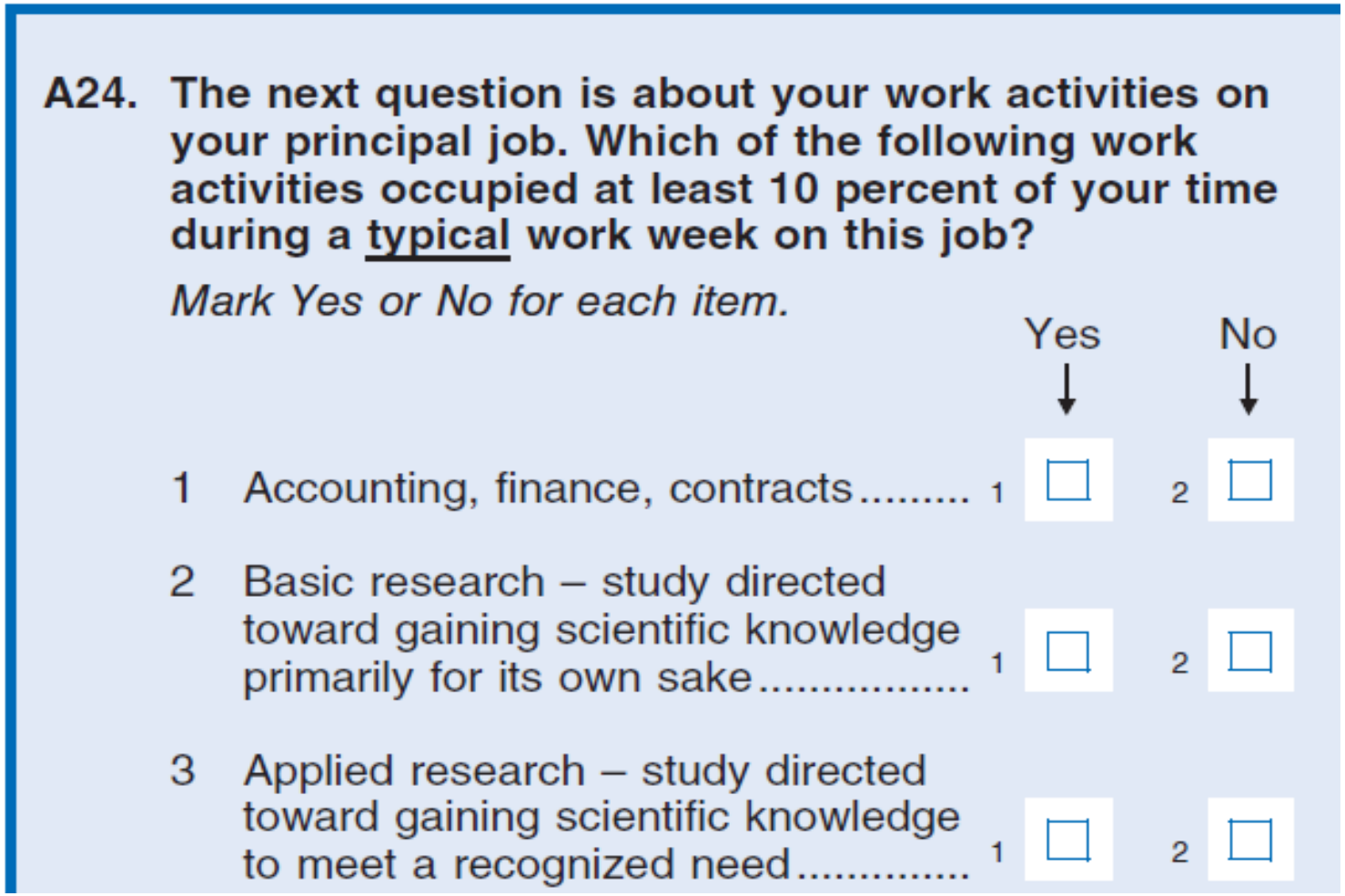
Use of auxiliary data

- Catalogue non-survey data about nondegree credentials
  - How can the data be accessed?
  - What is the quality of the data?

- Determine whether the non-survey data could in theory be linked to the survey data designed in the pilot study

- Analyze non-survey data to answer key questions about the cybersecurity workforce

Possible outcome of the feasibility study: Estimates of the cybersecurity workforce through an NCSES workforce survey



A24. The next question is about your work activities on your principal job. Which of the following work activities occupied at least 10 percent of your time during a typical work week on this job?

Mark Yes or No for each item.

		Yes	No
1	Accounting, finance, contracts.....	1 ☐	2 ☐
2	Basic research – study directed toward gaining scientific knowledge primarily for its own sake.....	1 ☐	2 ☐
3	Applied research – study directed toward gaining scientific knowledge to meet a recognized need.....	1 ☐	2 ☐

2023 National Survey of College Graduates

Conclusions

- The abstract sections of congressional mandates are opportunities for collaboration and research

- A mandate to assess the feasibility of providing nationally representative estimates should focus on
  - How can the data be relevant?
  - How can the data be of high quality?

For additional information:

Cybersecurity Workforce Data Initiative

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https://ncses.nsf.gov/about/cybersecurity-workforce-data-initiative