

NIST Surpassed Hiring Goals for CHIPS But Did Not Develop a Comprehensive Workforce Plan

FINAL REPORT NO. OIG-24-023-I
MAY 20, 2024



U.S. Department of Commerce
Office of Inspector General
Office of Audit and Evaluation



May 20, 2024

MEMORANDUM FOR: Laurie Locascio
Under Secretary of Commerce for Standards and Technology and
Acting Director of the CHIPS Research and Development Office
National Institute of Standards and Technology

Michael Schmidt
Director of the CHIPS Program Office
National Institute of Standards and Technology

Essex Brown
Director of the Office of Human Resources Management
National Institute of Standards and Technology

FROM: Richard Bachman
Assistant Inspector General for Audit and Evaluation

SUBJECT: *NIST Surpassed Hiring Goals for CHIPS But Did Not Develop a
Comprehensive Workforce Plan*
Final Report No. OIG-24-023-I

Attached is our final report on the evaluation of CHIPS workforce management. Our objective was to assess the National Institute of Standards and Technology's (NIST's) progress in meeting workforce hiring milestones for the CHIPS Program Office (CPO) and the CHIPS Research and Development Office (CRDO).

Overall, we found that NIST surpassed hiring goals for CHIPS but did not develop a comprehensive workforce plan. Specifically, we found the following:

- I. NIST surpassed hiring goals for CPO and CRDO.
- II. NIST did not develop a comprehensive workforce plan to meet its human capital needs.

In its response to our draft report, NIST concurred with our two recommendations and stated that it will prepare a formal action plan upon issuance of the final report. NIST also provided bureau-specific technical and editorial comments. We considered these comments and made changes in the final report where appropriate. NIST's response is included in appendix B of this report.

Pursuant to Department Administrative Order 213-5, please submit to us an action plan that addresses the recommendations in this report within 60 calendar days. This final report will be

posted on the Office of Inspector General's website pursuant to the Inspector General Act of 1978, as amended (5 U.S.C. §§ 404 & 420).

We appreciate the cooperation and courtesies extended to us by your staff during our evaluation. If you have any questions or concerns about this report, please contact me at (202) 793-3344 or Cusetta Parran, Semiconductor Division Director, at (202) 763-6912.

Attachment

cc: Del Brockett, Associate Director for Management Resources, NIST



Report in Brief

MAY 20, 2024

Background

Over the past several decades, the United States has lost ground as a leader in semiconductor chip manufacturing and research. Congress passed the CHIPS Act of 2022 to help rebuild the domestic semiconductor industry and strengthen semiconductor research and development.

The CHIPS Act provides \$50 billion to the Department of Commerce to support research and development, innovation, and manufacturing related to semiconductors. In addition, the CHIPS Act authorizes the Secretary of Commerce to issue up to \$75 billion in direct loans and loan guarantees. The National Institute of Standards and Technology (NIST) is overseeing the Department's CHIPS program.

NIST established two offices to implement the CHIPS program: the CHIPS Program Office (CPO), responsible for implementing the semiconductor incentives program, and the CHIPS Research and Development Office (CRDO), responsible for programs undertaking research and development activities. The initial CHIPS leadership team was announced in September 2022 and undertook hiring for the two offices.

Why We Did This Evaluation

The objective of our evaluation was to assess NIST's progress in meeting workforce hiring milestones for CPO and CRDO.

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY

NIST Surpassed Hiring Goals for CHIPS But Did Not Develop a Comprehensive Workforce Plan

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WHAT WE FOUND

Given the complex nature of the semiconductor industry, recruiting individuals with the necessary technical expertise, particularly those with experience in large federal programs and the financial sector, poses a significant hurdle. Therefore, developing and implementing a comprehensive workforce plan is critical to these efforts.

We found that NIST surpassed its hiring goals for CPO and CRDO but did not develop a comprehensive workforce plan to meet its human capital needs.

Without a comprehensive workforce plan, CPO and CRDO lack assurance that they have adequately aligned their resources to fulfill their mission or identified current and future staffing opportunities and constraints. Workforce planning ensures that agencies have the right people with the right skills to accomplish the mission and enables agencies to meet current and future organizational goals and objectives. It is also the foundation for managing human capital, enabling agencies to strategically meet current and future workforce needs and preventing unnecessary disruptions in maintaining a steady-state and agile workforce.

CHIPS officials cited urgency in executing CHIPS Act requirements as the reason for not completing a comprehensive workforce plan for CPO and CRDO.

WHAT WE RECOMMEND

1. We recommend that the Director of the CHIPS Program Office and the Acting Director of the CHIPS Research and Development Office collaborate with the Director of the NIST Office of Human Resources Management to develop a comprehensive workforce plan that includes a skills assessment, vacancy analysis, and risk assessment.
2. We recommend that the Director of the NIST Office of Human Resources Management implement lessons learned from CPO and CRDO for future NIST hiring efforts.

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Cover: Herbert C. Hoover Building main entrance at 14th Street Northwest in Washington, DC. Completed in 1932, the building is named after the former Secretary of Commerce and 31st President of the United States.

Background

Semiconductor chips are a central component of electronic devices and systems (from consumer products to defense systems) and therefore vital to economic growth and national security. Over the past several decades, the United States has lost ground as a leader in semiconductor manufacturing and research. In 1990, the United States had 36 percent of the world's chip production capacity. By 2020, this amount had fallen to only 10 percent, and none of the most advanced chip manufacturing is located in the United States.¹

To rebuild the domestic semiconductor industry and strengthen semiconductor research and development, Congress passed the Creating Helpful Incentives to Produce Semiconductors and Science Act (CHIPS and Science Act).² The CHIPS Act of 2022 (division A of the CHIPS and Science Act) authorizes direct funding (including grants, cooperative agreements, and other transactions) to support research and development, innovation, and manufacturing related to semiconductors.³ This includes investments in facilities, workforce development, and collaboration between government agencies and private entities.

The CHIPS Act provides \$50 billion to the Department of Commerce. Of this amount, \$39 billion is available to provide incentives for investment in facilities and equipment in the United States. The remaining \$11 billion is for establishing a robust domestic research and development ecosystem and overseeing a suite of programs intended to strengthen and revitalize the U.S. position in semiconductor research, development, and manufacturing. In addition, the CHIPS Act authorizes the Secretary of Commerce to issue up to \$75 billion in direct loans and loan guarantees. The Department is implementing these requirements through the National Institute of Standards and Technology (NIST), which advances measurement science, standards, and technology to promote U.S. innovation, foster industrial competitiveness, and improve economic security and quality of life.

NIST established two offices to implement the CHIPS program: the CHIPS Program Office (CPO) and the CHIPS Research and Development Office (CRDO). CPO is responsible for the implementation of the semiconductor incentives program. CRDO is responsible for four integrated programs that aim to generate innovations that make American semiconductor manufacturers globally competitive. These four programs are the National Semiconductor Technology Center, the National Advanced Packaging Manufacturing Program, up to three new Manufacturing USA institutes, and the CHIPS Research and Development Metrology program.

After the CHIPS Act was enacted in August 2022, the initial CHIPS leadership team was announced in September 2022. Initial leadership included the director for CPO, as well as the interim director for CRDO and the interim senior advisor for CPO. Additional CPO leadership

¹ Congressional Research Service (CRS), April 25, 2023. *Frequently Asked Questions: CHIPS Act of 2022 Provisions and Implementation*, 3. Washington, DC: CRS. Available at <https://crsreports.congress.gov/product/pdf/R/R47523> (accessed August 10, 2023).

² Pub. L. No. 117-167, 136 Stat. 1366 (2022).

³ The CHIPS Act of 2022 amended Title XCIX of the William M. (Mac) Thornberry National Defense Authorization Act for Fiscal Year 2021; we refer to these provisions collectively as the CHIPS Act.

was announced in February 2023, including the chief operating officer, chief investment officer, and chief risk officer.

The CRDO leadership team was announced in June 2023, presenting the director, deputy director, executive officer, associate director for integration and policy, and director of the metrology program. The hiring process for CRDO has been more prolonged than that for CPO due to the long-term nature of the programs it is mandated to establish, according to CHIPS officials.

Given the complex nature of the semiconductor industry, recruiting individuals with the necessary technical expertise, particularly those with experience in large federal programs and the financial sector, poses a significant hurdle. Therefore, developing and implementing a comprehensive workforce plan is critical to these efforts.

Objective, Findings, and Recommendations

Our evaluation objective was to assess NIST's progress in meeting workforce hiring milestones for CPO and CRDO. We reviewed workforce planning performed by CPO and CRDO since August 2022 by reviewing relevant laws, regulations, standards, policies, and guidance. We also interviewed key personnel and reviewed CHIPS staffing data. See appendix A for a more detailed description of our scope and methodology.

We found that NIST surpassed its hiring goals for CPO and CRDO but did not develop a comprehensive workforce plan that included a skills assessment, vacancy analysis, and risk assessment. Without a comprehensive workforce plan, CPO and CRDO lack assurance that they have adequately aligned their resources to fulfill their mission or identified current and future staffing opportunities and constraints. Workforce planning ensures that agencies have the right people with the right skills to accomplish the mission and enables agencies to meet current and future organizational goals and objectives. It is also the foundation for managing human capital, enabling agencies to strategically meet current and future workforce needs and preventing unnecessary disruptions in maintaining a steady-state and agile workforce.

I. NIST Surpassed Hiring Goals for CPO and CRDO

We found that NIST surpassed its hiring goals for CPO and CRDO, achieving 149 hires by September 11, 2023, against a goal of 135 positions by September 30, 2023. CHIPS officials said that after the CHIPS Act's enactment, their primary focus was to swiftly form the CPO leadership team due to the urgent nature of the semiconductor incentives program. Once CPO leaders were in place, they were responsible for determining the types and quantities of positions required. CRDO took a similar approach to hiring once its leadership team was in place.

Both CPO and CRDO collaborated with the NIST Office of Human Resources Management (OHRM) to navigate the hiring process. Recognizing the anticipated surge in CHIPS-related hiring, OHRM increased its payroll, strategic recruiting, compensation, and benefits staffing to handle CHIPS hiring. OHRM assigned four HR specialists to exclusively support CHIPS hiring, along with three others in reserve as needed. Additionally, OHRM assigned three HR assistants to process and onboard CHIPS staff.

According to CHIPS officials, they had regular meetings with OHRM about hiring, and various hiring authorities were leveraged to expedite the hiring process. Some of these hiring authorities included:

- CHIPS 25, which established broad HR authority for the appointment of 25 scientific, engineering, and professional personnel in direct support of the CHIPS Act.
- CHIPS Direct Hiring Authority (DHA) and CHIPS Schedule A, which enable NIST to appoint qualified U.S. citizens to temporary, term, and permanent appointments in the competitive or excepted service for certain positions.

- Alternative Personnel Management System DHA, which enables NIST to competitively recruit and hire for critical scientific positions.

OHRM's support extended to the development of position descriptions and classifications, and collaborative efforts streamlined the screening process for new hires with assistance from the Department's Office of the General Counsel and Office of Security. CHIPS officials tracked and managed hiring priorities using a spreadsheet.

With these efforts, NIST surpassed its goal of hiring 135 positions by the end of fiscal year (FY) 2023. Specifically, by September 11, 2023, NIST had hired 149 people, and the number increased to 187 by mid-January 2024. Table I shows staffing levels and vacancies for CPO and CRDO, as of January 15, 2024.⁴

Table I. Staffing Levels for CPO and CRDO, as of January 15, 2024

Office	Current Hires	Vacancies	Projected Staffing
CPO	139	43	182
CRDO	48	54	102
Total	187	97	284

Source: CHIPS staffing data

II. NIST Did Not Develop a Comprehensive Workforce Plan to Meet its Human Capital Needs

We found that while NIST surpassed its hiring milestones for CPO and CRDO, it did not develop a comprehensive workforce plan. Workforce planning, as outlined by the Office of Personnel Management (OPM),⁵ serves as the foundation for effective human capital management. It ensures that agencies have the appropriate personnel with the necessary skills to accomplish the mission and enables agencies to meet current and future organizational goals and objectives. OPM's workforce planning guide provides a five-step workforce planning model (shown in figure 1) that should be used continually as a roadmap for success.

⁴ In addition to the current hires, as of January 15, 2024, CPO had seven details and CRDO had six details.

⁵ *OPM Workforce Planning Guide*, November 2022.

Figure 1. OPM Workforce Planning Model

Source: *OPM Workforce Planning Guide*, p. 7

Using the model for workforce planning enables agencies to strategically meet current and future workforce needs and prevent unnecessary disruptions in maintaining a steady-state and agile workforce. It also aligns human capital needs with the agency's strategic plan, annual budget and performance plans, human capital strategy, and operating plans.

Integral components of a comprehensive workforce plan include a skills assessment, to identify an agency's current and future skills gaps, and a vacancy analysis. A skills gap is the difference between the current workforce skills and those required to fulfill the agency's mission. Additionally, according to the OPM workforce planning guide, it is vital that agencies assess the potential impact on their organization if positions are left vacant, understaffed, or under-skilled. According to CHIPS officials, projected vacancy needs come from input throughout the organization, and their total staffing projections continue to evolve over time. They also said their vacancy numbers are developed from their leadership team based upon their input and experience.

Despite the importance of these elements, CHIPS officials cited urgency in executing CHIPS Act requirements as the reason for not completing a comprehensive workforce plan for CPO and CRDO, including a skills assessment and vacancy analysis. CHIPS officials said there was not enough time to develop an office-wide comprehensive workforce plan. Rather, the priority was to identify the leadership teams for CPO and

CRDO, and then they tasked the new leadership teams with identifying the type and number of positions needed in each office.

Another integral component of a comprehensive workforce plan is risk analysis. Risk analysis requires an agency to analyze the risks facing the workforce today and in the future, including a review of the gap between current workforce personnel supply and the projected demand for that gap. Although CHIPS management identified recruiting and hiring as significant high-level operational risks, they did not conduct a comprehensive assessment of these risks for CPO and CRDO.

CHIPS officials said that they did not conduct a comprehensive workforce risk assessment because they already knew there were risks associated with recruiting and hiring for a new program. Instead, their focus was on hiring and onboarding selected applicants as quickly as possible. However, by forgoing a workforce risk assessment, CHIPS officials have increased the risk of not having a comprehensive understanding of staffing level gaps, current competency gaps, and future competency gaps.

In a prior audit report, the Government Accountability Office (GAO) concluded that NIST, which oversees both CPO and CRDO, lacked a strategic workforce planning process,⁶ which is particularly important for agencies with science and technology missions. Specifically, in a 2023 report GAO found that NIST did not assess skills gaps or develop workforce plans that linked recruiting, succession, or human capital plans to workforce plans. GAO concluded that an agency-wide workforce planning process aligned with NIST's strategic goals would help managers ensure the agency's workforce has needed skills and avoid program disruptions that can occur when skills gaps exist. GAO recommended that NIST develop and implement an agency-wide strategic workforce process. The Department agreed with the recommendation and plans to initiate the process to establish a strategic workforce planning program in FY 2024 and implement it in FY 2025.

Along with the NIST report, GAO has also identified strategic human capital management as a government-wide high-risk area, in part because of the need to address current and emerging skills gaps that undermine agencies' abilities to achieve their missions.

We also noted that applicants for CHIPS funding are required to complete a workforce plan. The first notice of funding opportunity⁷ for commercial fabrication facilities requires applicants to document workforce needs and provide a strategy to meet these needs via a workforce development plan. To assist applicants with this requirement, CHIPS developed a workforce development planning guide⁸ that requires workforce

⁶ GAO, Feb. 28, 2023. *National Institute of Standards and Technology: Improved Workforce Planning Needed to Address Recruitment and Retention Challenges*, GAO-23-105521. Available online at <https://www.gao.gov/products/gao-23-105521> (accessed August 2023).

⁷ *CHIPS Incentives Program – Commercial Fabrication Facilities*, Feb. 28, 2023.

⁸ *CHIPS for America Workforce Development Planning Guide – Guidance for CHIPS Incentives Applicants*, March 2023.

plans to contain a detailed workforce needs assessment and recruitment, training, and retention strategies.

Although CHIPS leadership recognizes the importance of workforce planning, evidenced by the requirement for applicants to submit workforce plans for CHIPS funding, CHIPS officials did not hold themselves to the same standard by completing their own workforce plan for CPO and CRDO.

NIST OHRM officials acknowledged the importance of workforce planning. However, OHRM officials also cited the urgency of implementing the requirements of the CHIPS Act as a reason it was not developed. OHRM officials plan to expand their office to address workforce planning needs in the future, and they have already made NIST leadership aware of these plans.

Recommendations

1. We recommend that the Director of the CHIPS Program Office and the Acting Director of the CHIPS Research and Development Office collaborate with the Director of the NIST Office of Human Resources Management to develop a comprehensive workforce plan that includes a skills assessment, vacancy analysis, and risk assessment.
2. We recommend that the Director of the NIST Office of Human Resources Management implement lessons learned from CPO and CRDO for future NIST hiring efforts.

Summary of Agency Response and OIG Comments

On April 16, 2024, we received NIST's response to our draft report. NIST concurred with our two recommendations and stated that it will prepare a formal action plan upon issuance of the final report. NIST also provided technical comments. We considered these comments and made changes in the final report where appropriate. The full response is included in appendix B.

We are pleased that NIST concurs with our recommendations and look forward to receiving an action plan that will provide details on its corrective actions.

Appendix A: Objective, Scope, and Methodology

The objective of our evaluation was to assess NIST’s progress in meeting workforce hiring milestones for CPO and CRDO. The scope of our evaluation was the workforce planning performed by CPO and CRDO since August 2022.

To accomplish our objective, we performed the following actions:

- Reviewed relevant laws, regulations, standards, policies, and guidance, including:
 - The CHIPS and Science Act, Pub. L. No. 117-167, 136 Stat. 1366 (2022)
 - Title XCIX of the William M. (Mac) Thornberry National Defense Authorization Act for Fiscal Year 2021
 - *OPM Workforce Development Planning Guide*, November 2022
- Interviewed key personnel to gain an understanding of workforce planning for CPO and CRDO, including:
 - CPO personnel, including the director, chief of staff and chief operating officer, deputy chief of staff, and senior management advisor
 - CRDO personnel, including the deputy director, executive officer, senior management advisor, and CHIPS advisor to the NIST Director
 - Chief of staff to the NIST associate director for management resources
 - NIST OHRM personnel, including the director, division chief for operations and strategic programs, supervisory HR specialist, program manager, and compensation and leave program manager
- Reviewed CHIPS staffing data
- Reviewed the *CHIPS for America Workforce Development Planning Guide*
- Reviewed GAO’s *National Institute of Standards and Technology: Improved Workforce Planning Needed to Address Recruitment and Retention Challenges*⁹

We gained an understanding of internal controls significant within the context of the evaluation objective by interviewing NIST and CHIPS officials and reviewing relevant policies and procedures. We reported the internal control weaknesses in the “Objective, Findings, and Recommendations” section of this report. NIST did not have a comprehensive workforce plan to manage its human capital needs.

⁹ GAO-23-105521 (Feb. 28, 2023).

We assessed the reliability of computer-processed data by interviewing NIST and CHIPS officials and reviewing documentation. We determined that the data was sufficiently reliable for the purposes of this report.

We conducted our evaluation from August 2023 through February 2024 under the authority of the Inspector General Act of 1978, as amended (5 U.S.C. §§ 401-424), and Department Organization Order 10-13, as amended October 21, 2020. We performed our work remotely.

We conducted this evaluation in accordance with *Quality Standards for Inspection and Evaluation* (December 2020) issued by the Council of the Inspectors General on Integrity and Efficiency. Those standards require that the evidence must sufficiently and appropriately support the evaluation findings and provide a reasonable basis for the conclusions and recommendations related to the objectives. We believe that the evidence obtained provides a reasonable basis for our findings, conclusions, and recommendations based on our evaluation objective.

Appendix B: Agency Response

NIST's response to our draft report follows on p. 12.



UNITED STATES DEPARTMENT OF COMMERCE
National Institute of Standards and Technology
Gaithersburg, Maryland 20899-0001

TO: Richard Bachman, Assistant Inspector General for Audit and Evaluation
Office of Inspector General

FROM: Laurie E. Locascio, Ph.D., NAE **LAURIE LOCASCIO**
Under Secretary of Commerce for Standards and Technology &
Director, National Institute of Standards and Technology

SUBJECT: Response to Draft Audit Report: *NIST Surpassed Hiring Goals for CHIPS but Did Not Develop a Comprehensive Workforce Plan, March 20, 2024*

Digitally signed by
LAURIE LOCASCIO
Date: 2024.04.15
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Thank you for the opportunity to respond to the OIG draft report entitled *NIST Surpassed Hiring Goals for CHIPS but Did Not Develop a Comprehensive Workforce Plan, March 20, 2024*.

The auditors found that NIST surpassed its hiring goals for the CHIPS Program Office (CPO) and CHIPS Research and Development Office (CRDO) but did not develop a comprehensive workforce plan to meet its human capital needs. NIST concurs with both findings.

The auditors recommend:

- **OIG's Recommendation #1:** The Director of the CHIPS Program Office and the Director of the CHIPS Research and Development Office collaborate with the Director of the NIST Office of Human Resources Management to develop a comprehensive workforce plan that includes a skills assessment, vacancy analysis, and risk assessment.
- **OIG's Recommendation #2:** The Director of the NIST Office of Human Resources Management implement lessons learned from CPO and CRDO for future NIST hiring efforts.

NIST agrees with the recommendations and will prepare a formal action plan upon issuance of OIG's final report.

If you have any questions, please contact, Amy Egan, Audit Liaison, at (301) 975-2819 or amy.egan@nist.gov.

REPORT

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