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DEPARTMENT OF COMMERCE

National Institute of Standards and Technology

[Docket Number: 180404350-8350-01]

Current and Future Workforce Needs to Support a Strong Domestic Semiconductor Industry

AGENCY: National Institute of Standards and Technology, Department of Commerce.

ACTION: Notice; Request for Information (RFI).

SUMMARY: The National Institute of Standards and Technology (NIST) on behalf of the Department of Commerce and the National Security Council is seeking information on the scope and sufficiency of efforts to educate, train, and attract the workforce necessary to meet the demands of the current and future semiconductor industry, in support of the President's National Security Strategy.

DATES: Comments must be received by 5:00 p.m. Eastern time on [INSERT DATE 30

DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]. Written comments in response to this RFI should be submitted in accordance with the instructions in the ADDRESSES and SUPPLEMENTARY INFORMATION sections below. Submissions received after that date may not be considered.

ADDRESSES: To respond to this RFI, please submit written comments by e-mail to semiwkfc@nist.gov in any of the following formats: ASCII; Word; RTF; or PDF. Please include your name, organization's name (if any), and cite "Semiconductor Workforce RFI" in the subject line of all correspondence. Comments sent by any other method, to any other address or individual, or received after the end of the comment period, may not be considered. All personal identifying information (e.g., name, address) submitted voluntarily by the sender will be publicly accessible. <u>Do not submit confidential business information, or otherwise sensitive or protected information</u>. Attachments to electronic comments will be accepted in Microsoft Word or Excel, or Adobe PDF formats only.

Comments containing references, studies, research, and other empirical data that are not widely published should include electronic copies of the referenced materials. Please do not submit additional materials.

All submissions, including attachments and other supporting materials, will become part of the public record and subject to public disclosure. Sensitive personal information, such as account numbers or Social Security numbers, or names of other individuals, should not be included. Submissions will not be edited to remove any identifying or contact information. Do not submit confidential business information, or otherwise sensitive or protected information. Comments that contain profanity, vulgarity, threats, or other inappropriate language or content will not be considered.

FOR FURTHER INFORMATION, CONTACT: For questions about this FRN contact: Jason Boehm or David Seiler, U.S. Department of Commerce, National Institute of Standards and Technology, at 301-975-8678 or 301-975-2074.

Please direct media inquiries to Jennifer Huergo in the NIST Public Affairs Office at jennifer.huergo@nist.gov, (301) 975-6343.

SUPPLEMENTARY INFORMATION:

President Trump's National Security Strategy,[1] released in December of 2017, specifically highlights the importance of emerging technologies to economic growth and security, including advances in data science, encryption, autonomous technologies, new materials, advanced computing technologies, and artificial intelligence – all of which are powered by and dependent upon continued advances in semiconductor technology. Maintaining the technological edge of the United States in this critical industry area requires a robust domestic workforce. As part of the National Security Strategy, the United States will seek to maintain and develop the necessary workforce through a multifaceted approach including enhanced support for K-12, undergraduate, and graduate STEM education (with a particular focus on semiconductor technology), targeted technical training, internship and apprenticeship programs, and cooperative education programs.

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[1] https://www.whitehouse.gov/wp-content/uploads/2017/12/NSS-Final-12-18-2017-0905-2.pdf

Responses to this RFI will inform recommendations to the National Security Council on steps the Administration can take to strengthen the technical workforce that supports the semiconductor and related industries. The report will assess the scope and sufficiency of efforts to educate and train the future American semiconductor workforce from primary through higher education, and provide recommendations and a plan on how the government will continue to support the growth and sustainment of this workforce to meet the needs of both the private and public sectors.

In this RFI, NIST seeks specific information from stakeholders of the semiconductor industry such as materials providers, equipment suppliers, manufacturers, designers, trade associations, educational institutions, government entities, and other interested parties about the workforce needs of the semiconductor industry, and potential efforts to strengthen the current and future workforce. In this request, the term "semiconductor" broadly refers to semiconductor materials, devices, sensors, integrated circuits, computing architectures, software tools, design, lithography, fabrication, testing, packaging, embedded software and firmware developers, and related technologies that, through a combination of materials processing, manufacturing, and application, form the foundation and basis for the semiconductor, memory, technology manufacturing, computing, and information technology industry sectors.

NIST seeks information that will assist U.S. Government efforts in developing recommendations for supporting the growth and sustainment of the Nation's semiconductor workforce to meet the current and future needs of the public and private sectors. Our goal is to gather input that will be utilized to refine and target relevant federal resources and programs to attract, educate, and train

the necessary advanced technical workforce necessary to ensure that the U.S. maintains a robust semiconductor industrial base, including the fundamental research needed to continue to innovate in semiconductor technologies, that is necessary to drive future advances in transformational technologies including artificial intelligence (AI), advanced and quantum computing, and autonomous systems.

Request for Information:

Respondents are encouraged – but not required – to respond to any or all of the following questions, and may address related topics. Please identify the questions or topic areas each of your comments addresses. The following questions cover the major areas about which NIST seeks comment. These questions are directed towards domestic semiconductor manufacturers, associated supporting industries, educational institutions, and their stakeholders. Responses may include estimates. Please indicate where the response is an estimate.

Respondents may organize their submissions in response to this RFI in any manner, and all responses that comply with the requirements listed in the DATES and ADDRESSES sections of this notice will be considered.

Comments containing references, studies, research, and other empirical data that are not widely published should include electronic copies of the referenced materials. Do not include in comments or otherwise submit proprietary or confidential information. Comments that contain profanity, vulgarity, threats, or inappropriate language or content will not be considered.

Basic Information

Briefly describe your company or organization in terms of:

a. What is the name of your company or organization

b. How is your company or organization involved with the semiconductor industry (e.g., industry association, university, company involved in semiconductor design, fabrication, package test and assembly, or other)

Workforce Challenges and Needs

1. When hiring technical staff, for what types of positions do you encounter the most difficultly in finding qualified employees?
   a. Have you been able to identify any causes for these recruitment difficulties (lack of appropriate educational programs, lack of collaboration between industry and educational institutions, competition within your industry, competition for talent from outside your industry, etc.)
2. Are there specific educational levels that are needed for your current workforce?
   a. Are there some educational levels where it is harder to find qualified staff?
   b. Have you been able to identify any causes for these difficulties in finding qualified staff (high competition for a specific talent pool, lack of experienced individuals, educational programs not directly aligned with your needs, etc.)

3. Are there certain factors relating to workforce needs that your company or organization prioritizes when locating a new facility, for example a strong base of existing talent, a robust local educational ecosystem, etc.?

4. How do you see the work force needs of your company or organization changing over the next 5 years, 10 years, 15 years?

    a. Do you think that certain levels of education will be more important?

    b. Are there fields of training do that you think will be more important?

5. As the industry continues to evolve and develop and integrate new technologies (e.g. new computing paradigms, new material systems, broader use of AI) are there skillsets that you see as becoming more important?

    a. Do you have an opinion on the types of training needed to develop these skillsets for the future?

    b. From your experience are there types of partnerships with federal agencies and/or educational institutions that would be helpful to prepare this workforce for the future?

6. Are there certain obstacles that you see as the biggest impediment to meeting your workforce needs? For example, a lack of aligned educational programs (including internship and apprenticeship opportunities), a lack of collaboration with such educational programs, a lack of students in science and engineering, a lack of interest in your industry, a lack of facilities with appropriate equipment to train workers (e.g., community colleges without access to fabrication equipment/facilities), or other issues? Please describe.

Potential Workforce Solutions

7. Are there specific approaches your company or organization utilizes to address your workforce needs? For example, tailored partnerships and curricula with regional universities and community colleges, internship or apprenticeship programs, training or retraining of displaced workers, or other approaches?

8. Are there certain approaches or actions that would most effectively stimulate the supply of qualified workers for the semiconductor industry in the near term (e.g., targeted scholarships including internships/apprenticeships, loan repayment incentives, procurement of specialized equipment for schools and universities, immigration and visa reform, etc.)?

9. What approaches do you think would most effectively stimulate the supply of qualified workers for the semiconductor industry over the long term (e.g., professional development opportunities for K-12 teachers and K-12 student programs such as camps, competitions and projects in the semiconductor space)?

10. Although apprenticeship has, in the past, been available mostly to those in the traditional trades, efforts are now underway to expand apprenticeship into new fields, including advanced manufacturing, IT, healthcare, energy supply and distribution, banking and finance and engineering (in partnership with four-year institutions). Have you considered engaging in apprenticeship training to prepare your workforce? Why or why not?

11. Are there examples of partnerships with local educational institutions (e.g. a work-study program) that you use to support your operations?

12. Are there types of support (grants, economic development incentives or other benefits) from federal, state and local government agencies that have helped enable your workforce? Of these types of support what makes them most effective?

Authority: 15 U.S.C. 278s

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