ETI EMERGING TECHNOLOGIES INSTITUTE | NDIA

Strengthening STEM Engagement with Minority Serving Institutions

Increasing Collaboration Across the Department of Defense, Industry, and Academia

Workshop Report • November 2023

NDIA Emerging Technologies Institute • Science & Engineering Technology Division

Contributors

NDIA Emerging Technologies Institute

Wilson Miles
Associate Research Fellow

Office of the Chief Scientist of the Air Force

Cynthia Schurr
Special Assistant to the Chief Scientist of the Air Force

University of Texas San Antonio

Michelle Atchison
Director of Federal Relations, Senior National Security Strategist,
Vice Chair, NDIA Science & Engineering Technology (S&ET) Division

Stevens Institute of Technology, Systems Engineering Research Center (SERC)

Payuna Uday
Research Scientist

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Written by Wilson Miles.
Typeset and produced by Hannah Meushaw, Alexander Feeser, and Eve Dorris.
Edited by Jacob Trask.

MEDIA QUERIES:
Habiba Hamid, Director of Public Affairs & Communications at hhamid@NDIA.org

Overview

In May 2023, the National Defense Industrial Association (NDIA)'s Emerging Technologies Institute (ETI), the Office of the Chief Scientist of the Air Force, and NDIA's Science and Engineering Technology (S&ET) Division co-hosted a workshop on "Strengthening DoD-Industry-Academia Collaboration to Increase STEM Engagement with MSIs." The workshop focused on identifying incentives and barriers for STEM students at Minority Serving Institutions (MSIs) to enter the defense industrial base (DIB) and Department of Defense (DoD). This workshop followed a previous NDIA ETI event with the Office of Chief Scientist of the Air Force that focused on how to work with Historically Black Colleges and Universities (HBCUs). Participants discussed their experiences weighing different career options, best practices for DIB-DoD-Academia collaboration, and contract language for hiring practices.

The workshop examined the barriers to entry in DoD and DIB careers for STEM students from MSIs, and what each community – DoD, DIB, and academia – can do to remove those barriers. The event also included a discussion of best practices for public-private partnerships, and how collaboration can yield the greatest impact. Ultimately, while DoD and the DIB share a common mission, companies' decisions to conduct stem engagement with MSIs is determined by the *business case.* Strengthening engagement between DoD and MSIs is an area of increasing attention. Ultimately, developing an understanding of where DoD and the DIB is providing or limiting access to MSI students remains at the forefront of cultivating a robust STEM workforce.

The participants considered the future of STEM engagement with MSIs from their respective backgrounds: government, industry, and academia. The workshop began with opening remarks from the Office of the Chief Scientist of the Air Force and Chair of NDIA's S&ET Division, whose comments provided an overview of "War on Technical Talent" and outlined DoD's workforce goals. This was followed by a presentation by the Systems Engineering Research Center (SERC) at the Stevens Institute of Technology, a University Affiliated Research Center of the DoD, who summarized findings from a SERC report on promoting DoD-DIB collaboration in STEM education and workforce development.[1] One key takeaway from the SERC report is that there exists an abundance of STEM education-related activities, programs, and organizations that individually address aspects of the STEM educational lifecycle at the local, state, and national levels; however, there is a need for DoD and the DIB to bring coherence to activities already underway while building a joint strategy to shape future initiatives. These presentations provided a foundation for the event's three focused group discussions. The day concluded with a discussion among workshop participants to synthesize the findings and provide key recommendations.

1 Read the two-part study commissioned by the Under Secretary of Defense for Research and Engineering here: https://sercproddata.s3.us-east-2.amazonaws.com/technical_reports/reports/1661869835.SERC_A013_WRT%201055_Final%20Technical%20Report%2Bcover.pdf

Workshop Participants

The workshop brought together representatives from the Armed Forces, academia, and industry to explore pathways and incentives to strengthen DoD, DIB, and academic collaborations on STEM education and workforce development at MSIs. To convey the perspectives represented at the event, a list of participant organizations is included in Appendix A.

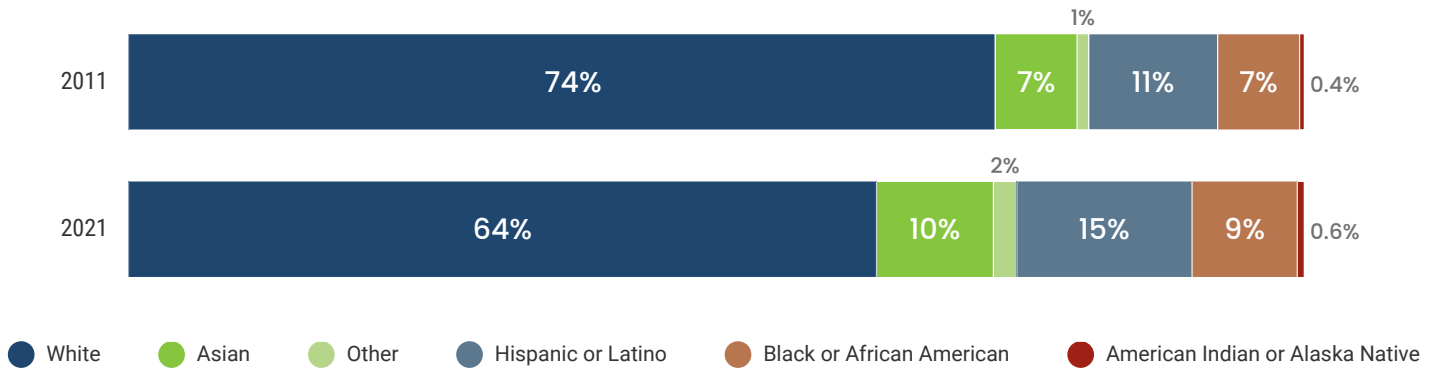
Introduction

The 2022 National Defense Strategy noted that "we will cultivate our talents, recruiting and training a workforce with the skills, abilities, and diversity we need to creatively solve national security challenges in a complex global environment."[2] High level Department of Defense (DoD) documents, such as the National Defense Science and Technology Strategy, aptly point out that investing in the STEM workforce will preserve a strong foundation for research and development in the United States.[3] However, the commercialization and diffusion of leading-edge technologies has resulted in an altered dynamic within science and technology in which there is much more competition for talent across the broader commercial market outside DoD and the DIB. As such, it is important for DoD to be proactive in recruiting, retaining, and cultivating STEM talent to support the development of warfighting capabilities. Both DoD and the DIB are uniquely qualified to attract future generations in support of defense missions.

Moreover, DoD and the DIB play a critical role in engaging and inspiring diverse populations. Building enduring advantages requires investment in the current and future workforce, particularly through recruiting STEM students from MSIs. These institutions include Historically Black Colleges and Universities (HBCUs), Hispanic Serving Institutions (HSIs), Tribal Colleges and Universities (TCUs), and Asian American and Pacific Islander Serving Institutions (AAPISIs). Altogether, two- and four-year MSIs enroll 30% of all undergraduates in the U.S. higher education system and produce one-fifth of the U.S.' STEM bachelor's degrees.[4] While there have been improvements in minority participation in the STEM workforce, Census data shows there is still room for engagement. See Figure 1 for the change in STEM demographics from 2011 to 2021. While HBCUs represent 3% of U.S. colleges and universities in the U.S., they graduate 25% of African American students with bachelor's degrees in the fields of science, technology, engineering, and mathematics.[5] Overall, Hispanic or Latino, Black or African American, and American Indian or Alaska Native (AIAN) are underrepresented in the STEM workforce when compared to their share of total population. For other relevant statistics, see Appendix B and C. This presents an opportunity to enrich the DoD and DIB workforce. The 2022 National Defense Authorization Act recognized this and outlined several efforts to broaden MSI engagement: promote defense research at minority serving institutions; identify actions to increase MSI participation in defense-related engineering, research, development activities and contracts; increase partnerships for MSIs with National Security R&E organizations; and if appropriate, enter partnerships and collaborations with MSIs.[6]

Expanding and diversifying this talent pool requires many lines of effort. Recruiting and retaining STEM talent in the national security domain is complex and impacted by multiple factors. This paper focuses on one important aspect of this topic: increasing minority population participation in the national security STEM workforce.

Figure 1. U.S. STEM Workforce, 2011 - 2021



2 Joe Biden, National Defense Strategy, Washington, DC: White House, 2022. https://media.defense.gov/2022/Oct/27/2003103845/-1/-1/1/2022-NATIONAL-DEFENSE-STRATEGY-NPR-MDR.PDF

3 Department of Defense. *National Defense Science & Technology Strategy 2023.* Under Secretary for Research and Engineering, Washington, DC. May 9, 2023.

4 Jackson, Leigh Miles, and Tom Rudin. "Minority-Serving Institutions: America's Overlooked STEM Asset." Issues in Science and Technology, vol. 35, no. 2, 2019.

5 *HBCU Research, Innovation, Security, and Excellence Act,* H.R. 8140, 117th Cong. (2022).

6 Office of the Federal Register, National Archives and Records Administration. (2021, December 26). *Public Law 117 - 81 - National Defense Authorization Act for Fiscal Year 2022.* U.S. Government Publishing Office.

Key Findings

This section summarizes observations from the workshop. While there are several key takeaways that may not be unique to students at MSIs, all of the findings illuminate challenges that workshop participants believed DoD ought to consider when determining how to reduce barriers for students and expand the DIB.

Lack of Culturally Sensitive Messaging Around Talent Recruitment and Development

DoD's recruiting and messaging was the center of discussion for much of the workshop. Participants from the Air Force, academia, and industry all agreed that there is a lack of a shared information campaign for engaging talent coordinated between DoD and the DIB that is culturally sensitive. Specifically, many Hispanic students are first-generation Americans and are the first in their families to pursue post-secondary education. There is a growing recognition that recruiting needs to include information targeting the parents. Parents always have a significant influence in the choices made by their children regarding educational and professional opportunities. One participant raised the point that many families may not know all of the potential paths available to their children in the DoD or the DIB, yet they are often the key decision-makers regarding their children's education choices. For first-generation Hispanic families, it is important to provide informational resources in their native language, which allows the entire family to support their children's academic and professional path. Parental influence needs to be leveraged. This is especially salient for students in Pre-K, middle school, and high school. Having those touchpoints in K-12 is critical for engaging students with academic or technical training that leads them to technical roles in defense. One Air Force participant reiterated, "When you want to attract and engage students in middle school and high school, the more you expose them and take more time to explain the diversity and nuances of different missions, the more you get them excited." The disciplines that underpin each operational domain (e.g., space, undersea, air, land, and cyber) offer a range of careers, which can be interdisciplinary. However, the message needs to be tailored to each unique situation.

Opportunity to Leverage More Talent from Technical Schools and Community Colleges

Workshop participants from industry, academia, and government noted that the future skilled technical workforce could be bolstered through greater engagement with technical schools and community colleges. Multiple participants noted the difficulty in hiring and retaining clearable talent, especially noting the broader workforce needed for DoD's critical technology areas. A key point is understanding what skills and backgrounds are needed as technologies move from the lab to being manufactured at scale. Oftentimes, the support workforce is left out of the conversation in favor of focusing on producing and retaining undergraduates and doctorates. Moreover, both government and industry workshop participants clarified that meaningful engagement focuses more time on relationship building, aligning programs and funding to specific needs or technologies.

This has led to some in the DIB to reconsider recruitment strategies. Specifically, companies are looking at technical schools and community colleges as sources of talent. Multiple industry and academia participants voiced the need for the DIB and DoD to focus on opportunities for a certificate and vocational trained workforce in addition to the traditional 4-year degree pathway. In 2015, MSIs accounted for almost 31% of all two-year institutions nationwide.[7] Additionally, more undergraduate students – from all backgrounds – are enrolled in STEM fields at four-year MSIs than at four-year non-MSIs.[8] The DIB offers an equally attractive source of fulfilling technical careers. One industry participant noted the potential range of projects that one can work on over the course of their career. The spectrum of opportunities is enticing for many. However, multiple participants noted the difficulty in conveying the opportunities for career fluidity at scale to students.

Academia is uniquely equipped to educate students about career opportunities within DoD and the DIB, be a voice for what students need, and serve as a springboard for future professional opportunities. As mentioned in the above section on recruiting, outreach to technical schools and community colleges requires fitting the message to match the audience. For example, engagement with vocational schools or community colleges ought to be conducted in multiple languages. One participant from a community college noted the success his institution has seen through hosting career opportunity sessions in both English and Spanish. Students are more comfortable articulating their needs to counselors and educators. Dual enrollment programs are also becoming increasingly important in meeting the needs of students, employers, and academia. DoD is demonstrating a concerted effort to enhance STEM education at two-year institutions and community colleges through its STEM Community College Consortium grant program, which provides funding up to $55 million.[9] There are currently 43 organizations participating in five different consortiums through this grant. Of the 43 organizations, 11 are HSIs, 16 are HBCUs, and 2 are Tribal Colleges and Universities.[10] Ultimately, both DoD and the DIB share responsibility for ensuring the funding to academia leads to tangible benefits for defense projects.

Lack of Coherent Joint Message – Particularly for MSIs

DoD is uniquely qualified to engage, inspire, and attract future generations through its resources to support evolving defense mission needs. The key takeaway from the workshop, however, is that "the mission" can mean different things to different people. One motivating factor is not necessarily going to work universally. Patriotism is issue-based, and it is the responsibility of the government to articulate its vision. This also applies to the fourteen critical technology areas that R&E has deemed critical to maintaining the U.S.' national security. Both academia and industry workshop participants emphasized their respective industries' hesitation for making long-term bets on these technologies without stability in funding and transparency in DoD's vision.

7 Jackson, Leigh Miles, and Tom Rudin. "Minority-Serving Institutions: America's Overlooked STEM Asset."
8 Ibid.
9 Department of Defense. *DoD STEM Community College Consortium.* Washington, DC. Washington Headquarters Service. January 25, 2022.
10 Department of Defense. *DOD Awards National Defense Education Program Cooperative Agreements. Defense.Gov,* 15 Sept. 2022, https://www.defense.gov/News/Releases/Release/Article/3159722/dod-awards-national-defense-education-program-cooperative-agreements/#:~:text=The%20Department%20of%20Defense%20announced,Mathematics%20(STEM)%20education%20consortia.

It is well documented that foreign-born workers account for a considerable share of the U.S. STEM workforce at the bachelor's, master's, and doctoral levels.[11] During the SERC briefing, one of the policy recommendations was to prioritize programs with strong links to U.S. citizens. MSIs are perhaps better poised than non-MSIs to solve the STEM national security workforce supply problem, as they are a historically untapped source of U.S. citizens. As such, there is a need for improved recognition of the role that MSIs play and the benefits of bringing in more students from MSIs – both from two-year and four-year institutions.

Lack of Access to Research and Training Opportunities

Multiple workshop participants noted that the biggest barrier for students is access to opportunities. Grants and scholarships are not always sufficient to support students as they pursue education in STEM. There is a growing understanding that funding for students does not cover "basic" living necessities beyond tuition. Other daily considerations include food, lodging, access to IT, or transportation. Students on scholarships are not always able to afford to take time off work to participate in summer programs or relocate to receive technical training.

Academic institutions also have an access problem. One academic participant expressed the need for DoD and the DIB to provide community colleges with access to people who can share information about DoD technology roadmaps, scholarship or funding opportunities, and potential career paths. There are countless disaggregated efforts targeting STEM talent, which makes tracking each activity difficult for institutions with limited resources. Simply becoming aware of opportunities is a challenge at all levels of academia. For example, multiple academia workshop participants noted this information gap exists for students as well as counselors. Oftentimes, these staff members are individuals who are responsible for articulating potential careers or funding to students. Like industry, academia will only make investments from their limited budgets when there is a clear demand. As such, two-year, four-year, and technical schools need to be engaged to ensure they are establishing sustainable approaches to education that meet the needs of students.

Competition with non-Defense Commercial Sector

There are several factors limiting the pathway of STEM students from MSIs to defense industry work – all of which is exacerbated by the significant competition for talent with the private sector. First, DoD and the DIB experience challenges in recruiting and retaining a diverse, highly qualified workforce due to differences in pay compared to private sector employers. In 2022, federal employees on average earned 24.09 percent less than their counterparts in the private sector.[12] Second, the lengthy hiring and clearance process is a deterrent for students. One academic participant noted that the priority at two-year and four-year institutions is to get computer science students into internships and entry-level positions with major technology companies in the commercial sector. This emphasis by colleges on directing students towards the private sector is due to students prioritizing both a higher salary and a smoother onboarding process. For example, onboarding timelines for new federal hires present an acute challenge, as the government averages 98 days to onboard new workers—more than twice as long as the average process in the private sector.[13] Lastly, industry, government, and academic participants all agreed that – for many students – the DIB and DoD is not attractive due to the negative public perception of STEM careers in defense.

Some Barriers Stem from Contract Language

Multiple industry participants noted that contract language sometimes inhibits their ability to flexibly hire. For example, certain requests-for-proposals may require contractors to hire four-year degree holders, excluding community college degree holders. The credential requirement has even limited the ability of contractors to hire veterans. One participant noted that some individuals that leave the military are unable to perform the same job they had while in the military due to the strict hiring requirements. One industry participant mentioned that contracts may dictate that they must execute the project within a certain distance of the place of performance. This can affect how companies approach hiring. Several workshop participants noted that although specifying job location is critical for some defense work, it can restrict the potential pool of students who are able to participate in during both the academic year and summer. For example, many university students do not have the financial flexibility to move where internships are being offered. Multiple workshop participants emphasized the importance of ensuring students are able to intern in the DoD or DIB. Ultimately, obtaining experience working in defense is crucial for gaining awareness of potential careers, eventual employment in defense, and overall retention in the long-term.

Aperiodic Nature of Contracts Affects STEM Talent Development for the Industrial Base

Ultimately, the DIB is opportunistic in nature. When considering workforce composition and hiring practices, industry's key consideration is its impact on their competitiveness in winning contracts. When examining how to support educational opportunities for DIB personnel, understanding industry skillsets requirements is critical for discerning how different backgrounds can contribute to different projects. Moreover, companies respond to demand. Industry is more incentivized to make internal investments when it sees that contracts will follow. Multiple industry participants noted that industry *will* respond to the need for expanding the pool of potential students for a skilled technical workforce, however industry needs to be able to clearly tie its workforce to a contract. The intermittent and sometimes unpredictable nature of funded programs and critical technology contracts – such as the case for the history of hypersonics and directed energy – negatively affects industry's ability to plan, invest in infrastructure, and assign the workforce it needs for executing projects in emerging high-priority fields.

11 Foreign-born workers with a bachelor's degree or higher accounted for 21% of workers in S&E occupations at the bachelor's degree level, 38% at the master's degree level, and 45% at the doctorate level, with the highest shares as computer and mathematical scientists for all degree levels
National Science Board, National Science Foundation. 2022. *Science and Engineering Indicators 2022: The State of U.S. Science and Engineering.* NSB-2022-1. Alexandria, VA. Available at https://ncses.nsf.gov/pubs/nsb20221.

12 "Federal Salaries Fall Further Behind Private Sector, New Report Shows." Nteu.Org, 28 Oct. 2022, https://www.nteu.org/media-center/news-releases/2022/10/28/fedsalcouncil#:~:text=Federal%20employees%20on%20average%20earned,the%20gap%20was%2022.47%20percent.

13 Kuzminski, Katherine, et al. "The Future of Civilians in National Security." Center for New American Security, 17 Aug. 2023, interactives.cnas.org/reports/the-future-of-civilians-in-national-security/.

Challenges with Security Clearances

Students must obtain a clearance to work on most government projects. It is essential to their career and can often be a deterrent to hiring and retaining personnel. This is a result of the lengthy waiting periods for receiving clearances and students may choose to prioritize an immediate income over a potential clearance. Individuals cannot receive a clearance without a government customer. Once a student obtains their clearance, they are required to work on government-sponsored projects. One industry representative raised the idea of allowing students to work on non-DoD projects that align with government priorities, yet still receive their clearance through the government. Many companies use their own internal funding for research investments and would like to be able to bring in students to this work. However, since this type of work may not receive government money, it excludes the possibility of students also receiving a clearance. The inability to include students in this work minimizes the opportunities students have in defense companies and the number of students these companies can bring into their work.

Examples of Successful Public-Private Partnerships

Although DoD could contract for educational, training, and recruiting services, it might find more flexibility in establishing a public-private partnership. While there are many legal and regulatory definitions applicable to public-private partnerships, the examples below demonstrate how these arrangements can allow for robust sharing of people, infrastructure, and information – without establishing formal contractual obligations on either side. The following examples below are not explicitly focused on bringing in STEM students from MSIs, but rather showcase how creative partnerships can address different needs of both the public and private sector. The goals include partnerships focused on research and development, manufacturing, and education.

SEMATECH

SEMATECH was a consortium formed in 1987 out of a need for revitalizing the U.S. semiconductor industry due to global competition with Japan. It consisted of member companies cooperating on research in key areas of semiconductor technology.[14] The consortium focused on addressing challenges in manufacturing effectiveness, finding ways to speed development, reduce costs, share risks, and increase productivity. It first received $500 million over five years in federal funding, which was matched by industry contributions, but continued to receive government money until 1997. To meet its goals, which included reducing the time needed for chip miniaturization, SEMATECH built a global network of partnerships with equipment and material suppliers, universities, research institutes, and government partners.[15] While there are many lessons learned from SEMATECH, three relevant takeaways outlined by GAO are: 1) industry was best suited to lead the consortium, as they can best direct a R&D program designed to meet their needs, 2) the consortium made a comprehensive assessment of the industry and prepared realistic objectives and milestones, and 3) criteria should be established for determining how or when the government should end its funding for a consortium.[16] This type of public-private partnership pertains to MSI workforce development because the solution will require a coordinated effort by DoD and the DIB to bring in qualified, diverse STEM students while appropriately managing both public and private funds.

Manufacturing USA

Manufacturing USA is a national network of 16 manufacturing innovation institutes created for the government and the DIB to collaborate on technology, supply chain, and education and workforce development.[17] It was formally established in 2014 by Congress to serve as a platform for DoD, Department of Commerce, and the DIB to increase U.S. manufacturing competitiveness. Each manufacturing institute has a unique technology focus, including photonic solutions, additive manufacturing, or biotechnology.[18] DoD and the DIB work together to identify industrial needs, share knowledge, and create programs to implement together. Oftentimes, DoD, industry, and academia share the same facilities. Manufacturing workforce development is a key initiative of Manufacturing USA, where each institute helps to define the skills and training needed for future requirements. For example, the ARM Institute developed RoboticsCareers.org, which is the U.S.' first resource to connect manufacturers, workers, and job seekers with education programs to develop skills for careers in automation and robotics.[19] Manufacturing USA acknowledges that flexibility will expand the pool of participants, which is necessary for underrepresented populations for whom classroom programs can be a challenge due to a lack of transportation and time constraints. This important consideration echoes many of the workshop participants' claims about the state of current workforce needs. Manufacturing USA is an active partnership necessary for the future of U.S. manufacturing; it leverages public and private resources for dual-use applications by providing manufacturing facilities and services to a wide range of stakeholders – all of whom are critical to Manufacturing USA's goals.

University of Texas San Antonio's National Security Collaboration Center

UTSA's National Security Collaboration Center (NSCC) is comprised of more than 60 partners, where individuals from government, industry, and academia – many of whom are co-located on campus – can collaborate and develop solutions for current and future national security issues.[20] NSCC is also a member of U.S. Cyber Command's Academic Engagement Network. Also, collocated with NSCC is the Data School of Science and the Cybersecurity Manufacturing Innovation

14 Government Accountability Office. *Federal Research: Lessons Learned From SEMATECH*. Washington, DC, United States General Accounting Office. September 1992.
15 Ibid.
16 Ibid.
17 Manufacturing USA. *Report to Congress FY 2021*. Washington, DC. August 2022.
18 Manufacturing USA, "Manufacturing Institutes," www.manufacturingusa.com/institutes.
19 Manufacturing USA, "Manufacturing Workforce Development," www.manufacturingusa.com/key-initiatives/manufacturing-workforce-development.
20 The University of Texas San Antonio, "NSCC Ecosystem," nscc.utsa.edu/partnerships.html.

Institute (CyManII), a DOE sponsored manufacturing institute, focused on cybersecurity and workforce development. UTSA is the U.S.' only Hispanic Serving Institution with three National Center of Excellence designations from the National Security Agency and the Department of Homeland Security. As such, UTSA's NSCC is an example of an educational partnership that provides unique academic experiences for many Hispanic students and researchers, exposing them to real-world problems and positioning them for success in the workforce. A collocated and cross-sector collaborative environment is key to the NSCC's success, as it enables the cross-sharing of faculty and student research in key focus areas for government as well as monthly engagements with government staff.

Recommendations

1. **DoD should create a working group that consists of industry, government, and academia representatives to continue discussing the identification and the elimination or alleviation of those barriers for STEM students from MSIs.** One of the duties of the working group is to host regular partnership meetings with MSIs. These meetings would dig deeper into how DoD, the DIB, and academia can collaborate to reduce barriers for STEM students from MSIs and provide incentives for their entrance into defense work. The working group should develop recommendations for DoD, the DIB, and Congress for addressing the barriers identified.

2. **The DIB should create an affinity group consisting of companies who want to work more with MSIs.** This group would consist of varying company sizes, ranging from the primes to small businesses. The intention of the affinity group should be to discuss how industry can improve U.S. manufacturers' technological position through elevated engagement with MSIs and evaluate the state of their working relationship with MSIs in the short- and long-term.

3. **The DIB should sponsor participation by MSI faculty and students in appropriate technical conferences and scientific, technical, and industry associations.** In doing so, the DIB can provide a practical benefit to MSI faculty and students in the near-term. Technical events and associations strengthen the workforce by encouraging the sharing of knowledge and professional opportunities as well as mentorship.

4. **DoD and the DIB should organize regular roundtable meetings with post-secondary education/community colleges to enhance information exchanges.** Academia has a critical role in advancing the mission shared by DoD and the DIB. The information community colleges require includes job opportunities, internships, scholarships, and other funding sources. Engaging with community colleges is especially important for developing the skilled technical workforce needed as emerging technologies begin to mature and move from prototyping to production.

5. **DoD should consider using contract language that enables industry to more flexibly hire entry-level personnel and recent graduates.** Where it fits, less strict language would allow industry to creatively expand the talent pool by hiring students and early career professionals that allow companies to better compete for a contract. Specific language could include allowing industry to hire employees that are not co-located at the place of performance or do not have a four-year degree.

6. **The Secretary of Defense should ensure that the Under Secretary of Defense for Personnel and Readiness establishes well-defined metrics for tracking DoD efforts towards eliminating barriers to diversity.** While DoD has developed mechanisms to improve department-wide data analysis, the Government Accountability Office states that DoD neither has clear policies for collecting barrier-related data nor clear roles and measures for tracking DoD progress in eliminating barriers.[21] Future steps include synthesizing the identified barriers to diversity in the STEM workforce, tracking what actions DoD is implementing to eliminate those barriers, and documenting the results. Unclear oversight roles may hinder meaningful progress and without additional actions, DoD lacks reasonable assurance that its efforts will effectively contribute to its diverse, highly qualified workforce goals.

7. **DoD should sponsor clearances for non-government funded work.** Currently, students cannot receive government sponsorship for clearances pertaining to non-government funded work, such as research that companies would like to invest internally in. By sponsoring clearances for non-government funded projects at specific industry or academia partners, the government can expand the number of students working in defense. As a requirement for this flexibility, the organization conducting the research should ensure that the project is relevant to government needs.

8. **DIB investments in approved collaborative partnerships for STEM education-related activities should be enumerated in the FAR as an allowable expense for reimbursement in contract rates.** As noted, industry responds to financial incentives and clear demand signals. Reimbursing investments made into STEM education activities that bring in students from MSIs would be a clear financial opportunity that could drive behavior from the DIB. However, there needs to be clear well-defined guidelines and metrics for success to ensure government money is used appropriately. These expenses should be limited to DIB efforts to increase STEM-educational activities beyond their current level.

21 Government Accountability Office. DoD Civilian Workforce: Actions Needed to Analyze and Eliminate Barriers to Diversity. Washington, DC. June 21, 2023.

Conclusion

The workshop was a good starting point for finding pathways into DoD and the DIB for STEM students from MSIs. ETI's partnership with the Office of the Chief Scientist of the Air Force and NDIA's Science and Engineering Technology Division reflects both DoD and industry's growing desire to bring in more STEM students from MSIs into defense. The workshop's findings illuminated many barriers and incentives for STEM students at MSIs. However, much more work needs to be done.

Strengthening the DoD and DIB talent pool by targeting under-served and minority populations will require a multi-pronged solution. While MSIs are a key component of this effort, this challenge is much broader, including the need to recruit and retain foreign born talent. In support of finding actionable steps forward, ETI will continue to work on workforce issues by leveraging its government relationships as well as NDIA's industry and academic members.

Appendix A: Workshop Organizations

- Northrop Grumman
- Office of the Chief Scientist of the Air Force
- Cerberus Capital Management
- Directed Energy Professional Society
- CNF Technologies Corporation
- University of Texas San Antonio
- Peraton
- Northern Virginia Community College
- Stevens Institute of Technology
- Hispanic Association of Colleges and Universities
- Air Force Research Laboratory, USAF
- United States Air Force
- United States Space Force

Appendix B: Census Data Graphs

Figure 2. U.S. Population Ages 18 – 34 and S&E Degree Recipients by Degree Level and Race and Ethnicity: 2020

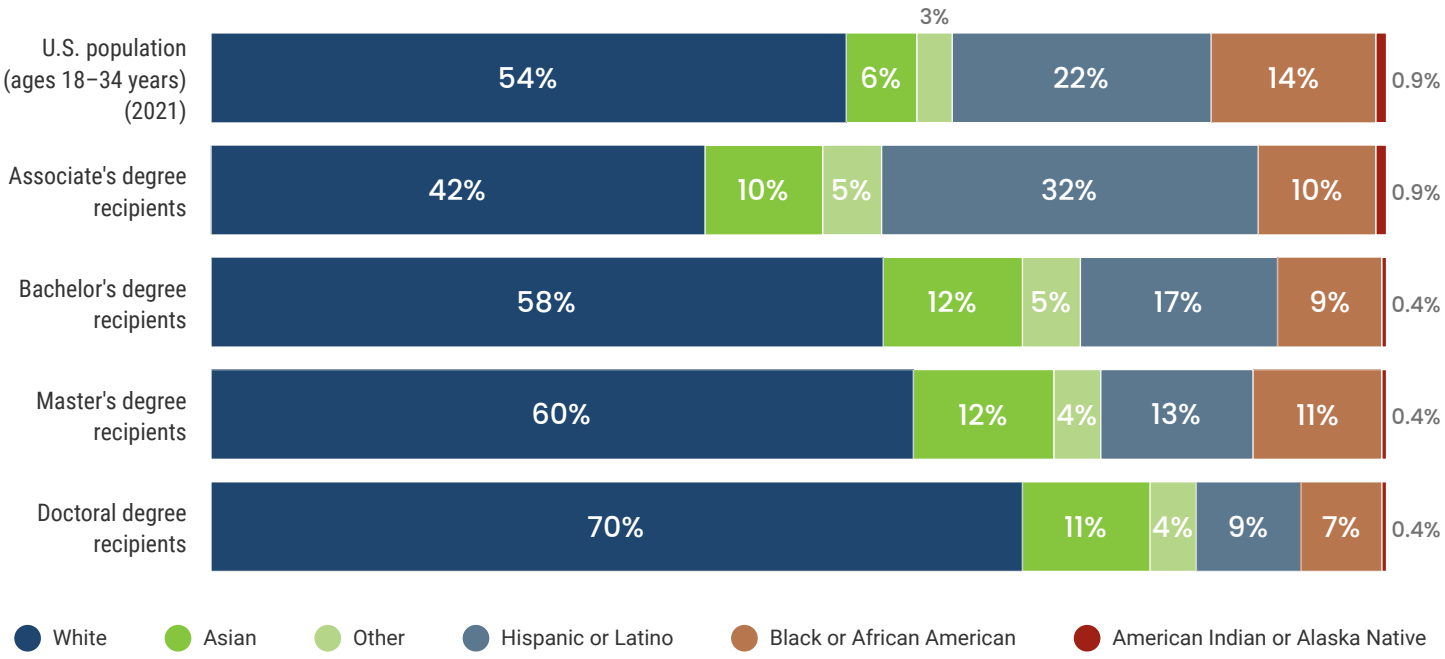
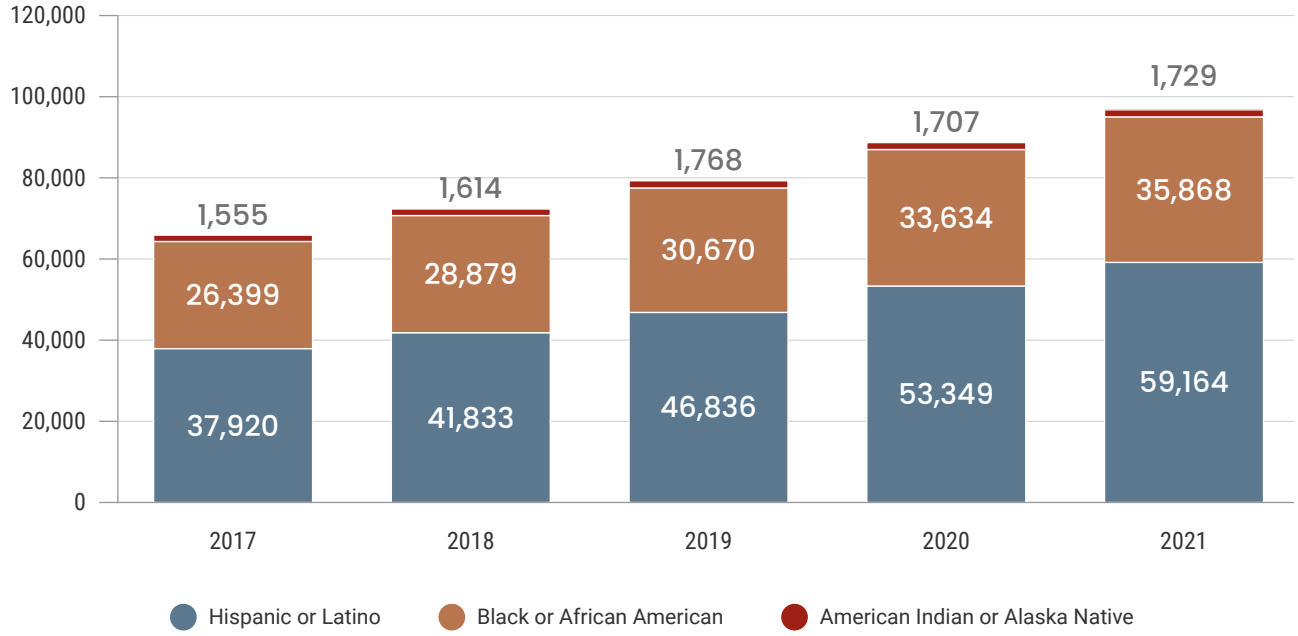
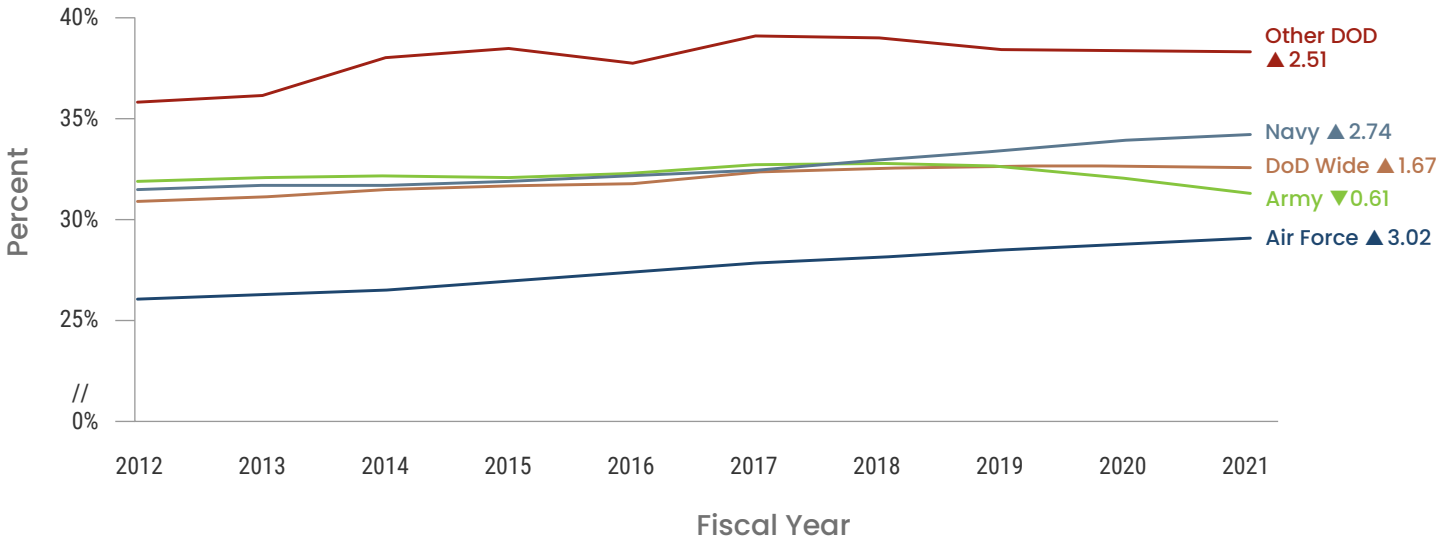


Figure 3. S&E Graduate Students – Underrepresented Minorities, 2017–2021



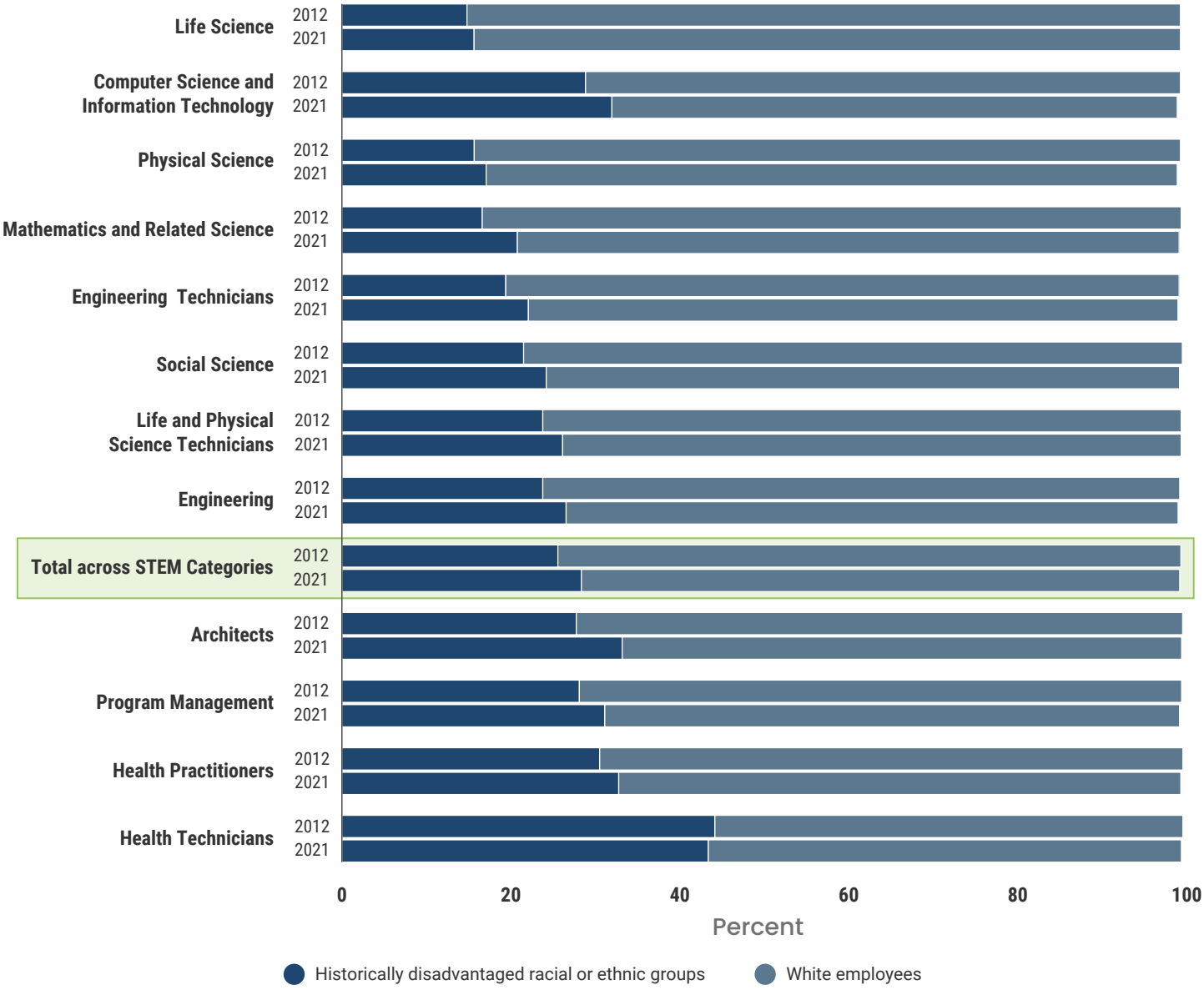
Appendix C: DoD Civilian Workforce: 2012 - 2021

Figure 4. Representation of Historically Disadvantaged Racial or Ethnic Groups in the DOD Federal Civilian Workforce, Fiscal Years 2012 - 2021



Source: GAO analysis of Department of Defense (DOD) data. | GA0-23-105284

Figure 5. Representation of Employees from Historically Disadvantaged Racial or Ethnic Groups and White Employees in the DoD Civilian Workforce by STEM Occupational Category, Fiscal Years 2012 and 2021



Source: GAO analysis of Department of Defense (DOD) workforce data. | GA0-23-105284

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