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117TH CONGRESS, 1st Session } HOUSE OF REPRESENTATIVES { REPORT 117–73

NATIONAL SCIENCE FOUNDATION FOR THE FUTURE ACT

JUNE 28, 2021.—Committed to the Committee of the Whole House on the State of the Union and ordered to be printed

Ms. JOHNSON of Texas, from the Committee on Science, Space, and Technology, submitted the following

R E P O R T

[To accompany H.R. 2225]

The Committee on Science, Space, and Technology, to whom was referred the bill (H.R. 2225) to authorize appropriations for fiscal years 2022, 2023, 2024, 2025, and 2026 for the National Science Foundation, and for other purposes, having considered the same, reports favorably thereon with an amendment and recommends that the bill as amended do pass.

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I. AMENDMENT

The amendment is as follows:
Strike all after the enacting clause and insert the following:

SECTION 1. SHORT TITLE.

This Act may be cited as the "National Science Foundation for the Future Act".

SEC. 2. FINDINGS.

Congress finds the following:

(1) Over the past seven decades, the National Science Foundation has played a critical role in advancing the United States academic research enterprise by supporting fundamental research and education across science and engineering disciplines.

(2) Discoveries enabled by sustained investment in fundamental research and the education of the United States science and engineering workforce have led to transformational innovations and spawned new industries.

(3) While the traditional approach to investment in research has delivered myriad benefits to society, a concerted effort is needed to ensure the benefits of federally funded science and engineering are enjoyed by all Americans.

(4) As countries around the world increase investments in research and STEM education, United States global leadership in science and engineering is eroding, posing significant risks to economic competitiveness, national security, and public well-being.

(5) To address major societal challenges and sustain United States leadership in innovation, the Federal Government must increase investments in research, broaden participation in the STEM workforce, and bolster collaborations among universities, National Laboratories, field stations and marine laboratories, companies, labor organizations, non-profit funders of research, local policymakers, civil societies and stakeholder communities, and international partners.

SEC. 3. DEFINITIONS.

In this Act:

(1) ACADEMIES.—The term "Academies" means the National Academies of Sciences, Engineering, and Medicine.

(2) ARTIFICIAL INTELLIGENCE.—The term "artificial intelligence" has the meaning given such term in section 5002 of the William M. (MAC) Thornberry National Defense Authorization Act for Fiscal Year 2021.

(3) AWARDEE.—The term "awardee" means the legal entity to which Federal assistance is awarded and that is accountable to the Federal Government for the use of the funds provided.

(4) BOARD.—The term "Board" means the National Science Board.

(5) DIRECTOR.—The term "Director" means the Director of the National Science Foundation.

(6) EMERGING RESEARCH INSTITUTION.—The term "emerging research institution" means an institution of higher education with an established undergraduate student program that has, on average for 3 years prior to the time of application for an award, received less than $35,000,000 in Federal research funding.

(7) FEDERAL SCIENCE AGENCY.—The term "Federal science agency" means any Federal agency with an annual extramural research expenditure of over $100,000,000.

(8) FOUNDATION.—The term "Foundation" means the National Science Foundation.

(9) INSTITUTION OF HIGHER EDUCATION.—The term "institution of higher education" has the meaning given the term in section 101(a) of the Higher Education Act of 1965 (20 U.S.C. 1001(a)).

(10) LABOR ORGANIZATION.—The term "labor organization" has the meaning given the term in section 2(5) of the National Labor Relations Act (29 U.S.C. 152(5)), except that such term shall also include—

(A) any organization composed of labor organizations, such as a labor union federation or a State or municipal labor body; and

(B) any organization which would be included in the definition for such term under such section (5) but for the fact that the organization represents—

(i) individuals employed by the United States, any wholly owned Government corporation, any Federal Reserve Bank, or any State or political subdivision thereof;

(ii) individuals employed by persons subject to the Railway Labor Act (45 U.S.C. 151 et seq.); or

(iii) individuals employed as agricultural laborers.

(11) NON-PROFIT ORGANIZATION.—The term "non-profit organization" means an organization which is described in section 501(c)(3) of the Internal Revenue Code of 1986 and exempt from tax under section 501(a) of such code.

(12) NSF INCLUDES.—The term "NSF includes" means the initiative carried out under section 6(c).

(13) PREK-12.—The term "preK-12" means pre-kindergarten through grade 12.

(14) SKILLED TECHNICAL WORK.—The term "skilled technical work" means an occupation that requires a high level of knowledge in a technical domain and does not require a bachelor's degree for entry.

(15) STEM.—The term "STEM" has the meaning given the term in section 2 of the America COMPETES Reauthorization Act of 2010 (42 U.S.C. 6621 note).

(16) STEM EDUCATION.—The term "STEM education" has the meaning given the term in section 2 of the STEM Education Act of 2015 (42 U.S.C. 6621 note).

SEC. 4. AUTHORIZATION OF APPROPRIATIONS.

(a) FISCAL YEAR 2022.—

(1) IN GENERAL.—There are authorized to be appropriated to the Foundation $12,504,890,000 for fiscal year 2022.

(2) SPECIFIC ALLOCATIONS.—Of the amount authorized under paragraph (1)—

(A) $10,025,000,000 shall be made available to carry out research and related activities, of which—

(i) $55,000,000 shall be for the Mid-Scale Research Infrastructure Program; and

(ii) $1,400,000,000 shall be for the Directorate for Science and Engineering Solutions;

(B) $1,583,160,000 shall be made available for education and human resources, of which—

(i) $73,700,000 shall be for the Robert Noyce Teacher Scholarship Program;

(ii) $59,500,000 shall be for the NSF Research Traineeship Program;

(iii) $416,300,000 shall be for the Graduate Research Fellowship Program; and

(iv) $70,000,000 shall be for the Cybercorps Scholarship for Service Program;

(C) $249,000,000 shall be made available for major research equipment and facilities construction, of which $76,250,000 shall be for the Mid-Scale Research Infrastructure Program;

(D) $620,000,000 shall be made available for agency operations and award management;

(E) $4,620,000 shall be made available for the Office of the National Science Board; and

(F) $23,120,000 shall be made available for the Office of the Inspector General.

(b) FISCAL YEAR 2023.—

(1) IN GENERAL.—There are authorized to be appropriated to the Foundation $14,620,800,000 for fiscal year 2023.

(2) SPECIFIC ALLOCATIONS.—Of the amount authorized under paragraph (1)—

(A) $11,870,000,000 shall be made available to carry out research and related activities, of which—

(i) $60,000,000 shall be for the Mid-Scale Research Infrastructure Program; and

(ii) $2,300,000,000 shall be for the Directorate for Science and Engineering Solutions;

(B) $1,654,520,000 shall be made available for education and human resources, of which—

(i) $80,400,000 shall be for the Robert Noyce Teacher Scholarship Program;

(ii) $64,910,000 shall be for the NSF Research Traineeship Program;

(iii) $454,140,000 shall be for the Graduate Research Fellowship Program; and

(iv) $72,000,000 shall be for the Cybercorps Scholarship for Service Program;

(C) $355,000,000 shall be made available for major research equipment and facilities construction, of which $80,000,000 shall be for the Mid-Scale Research Infrastructure Program;

(D) $710,000,000 shall be made available for agency operations and award management;

(E) $4,660,000 shall be made available for the Office of the National Science Board; and

(F) $26,610,000 shall be made available for the Office of the Inspector General.

(c) FISCAL YEAR 2024.—

(1) IN GENERAL.—There are authorized to be appropriated to the Foundation $15,945,020,000 for fiscal year 2024.

(2) SPECIFIC ALLOCATIONS.—Of the amount authorized under paragraph (1)—

(A) $13,050,000,000 shall be made available to carry out research and related activities, of which—

(i) $70,000,000 shall be for the Mid-Scale Research Infrastructure Program; and

(ii) $2,900,000,000 shall be for the Directorate for Science and Engineering Solutions;

(B) $1,739,210,000 shall be made available for education and human resources, of which—

(i) $87,100,000 shall be for the Robert Noyce Teacher Scholarship Program;

(ii) $70,320,000 shall be for the NSF Research Traineeship Program;

(iii) $491,990,000 shall be for the Graduate Research Fellowship Program; and

(iv) $78,000,000 shall be for the Cybercorps Scholarship for Service Program;

(C) $370,000,000 shall be made available for major research equipment and facilities construction, of which $85,000,000 shall be for the Mid-Scale Research Infrastructure Program;

(D) $750,000,000 shall be made available for agency operations and award management;

(E) $4,700,000 shall be made available for the Office of the National Science Board; and

(F) $31,110,000 shall be made available for the Office of the Inspector General.

(d) FISCAL YEAR 2025.—

(1) IN GENERAL.—There are authorized to be appropriated to the Foundation $17,004,820,000 for fiscal year 2025.

(2) SPECIFIC ALLOCATIONS.—Of the amount authorized under paragraph (1)—

(A) $14,000,000,000 shall be made available to carry out research and related activities, of which—

(i) $75,000,000 shall be for the Mid-Scale Research Infrastructure Program; and

(ii) $3,250,000,000 shall be for the Directorate for Science and Engineering Solutions;

(B) $1,823,470,000 shall be made available for education and human resources, of which—

(i) $93,800,000 shall be for the Robert Noyce Teacher Scholarship Program;

(ii) $75,730,000 shall be for the NSF Research Traineeship Program;

(iii) $529,830,000 shall be for the Graduate Research Fellowship Program; and

(iv) $84,000,000 shall be for the Cybercorps Scholarship for Service Program;

(C) $372,000,000 shall be made available for major research equipment and facilities construction, of which $90,000,000 shall be for the Mid-Scale Research Infrastructure Program;

(D) $770,000,000 shall be made available for agency operations and award management;

(E) $4,740,000 shall be made available for the Office of the National Science Board; and

(F) $34,610,000 shall be made available for the Office of the Inspector General.

(e) FISCAL YEAR 2026.—

(1) IN GENERAL.—There are authorized to be appropriated to the Foundation $17,939,490,000 for fiscal year 2026.

(2) SPECIFIC ALLOCATIONS.—Of the amount authorized under paragraph (1)—

(A) $14,800,000,000 shall be made available to carry out research and related activities, of which—

(i) $80,000,000 shall be for the Mid-Scale Research Infrastructure Program; and

(ii) $3,400,000,000 shall be for the Directorate for Science and Engineering Solutions;

(B) $1,921,600,000 shall be made available for education and human resources, of which—

(i) $100,500,000 shall be for the Robert Noyce Teacher Scholarship Program;

(ii) $81,140,000 shall be for the NSF Research Traineeship Program;

(iii) $567,680,000 shall be for the Graduate Research Fellowship Program; and

(iv) $90,000,000 shall be for the Cybercorps Scholarship for Service Program;

(C) $375,000,000 shall be made available for major research equipment and facilities construction, of which $100,000,000 shall be for the Mid-Scale Research Infrastructure Program;

(D) $800,000,000 shall be made available for agency operations and award management;

(E) $4,780,000 shall be made available for the Office of the National Science Board; and

(F) $38,110,000 shall be made available for the Office of the Inspector General.

SEC. 5. STEM EDUCATION.

(a) PREK-12 STEM EDUCATION.—

(1) DECADAL SURVEY OF STEM EDUCATION RESEARCH.—Not later than 45 days after the date of enactment of this Act, the Director shall enter into a contract with the Academies to review and assess the status and opportunities for PreK–12 STEM education research and make recommendations for research priorities over the next decade.

(2) SCALING INNOVATIONS IN PREK-12 STEM EDUCATION.—

(A) IN GENERAL.—The Director shall establish a program to award grants, on a competitive basis, to institutions of higher education or non-profit organizations (or consortia of such institutions or organizations) to establish no fewer than 3 multidisciplinary Centers for Transformative Education Research and Translation (in this section referred to as "Centers") to support research and development on widespread and sustained implementation of STEM education innovations.

(B) APPLICATION.—An institution of higher education or non-profit organization (or a consortium of such institutions or organizations) seeking funding under subparagraph (A) shall submit an application to the Director at such time, in such manner, and containing such information as the Director may require. The application shall include, at a minimum, a description of how the proposed Center will—

(i) establish partnerships among academic institutions, local or State education agencies, and other relevant stakeholders in supporting programs and activities to facilitate the widespread and sustained implementation of promising, evidence-based STEM education practices, models, programs, curriculum, and technologies;

(ii) support enhanced STEM education infrastructure, including cyberlearning technologies, to facilitate the widespread adoption of promising, evidence-based practices;

(iii) support research and development on scaling practices, partnerships, and alternative models to current approaches, including approaches sensitive to the unique combinations of capabilities, resources, and needs of varying localities, educators, and learners;

(iv) include a focus on the learning needs of under resourced schools and learners in low-resource or underachieving local education agencies in urban and rural communities and the development of high-quality curriculum that engages these learners in the knowledge and practices of STEM fields;

(v) include a focus on the learning needs and unique challenges facing students with disabilities; and

(vi) support research and development on scaling practices and models to support and sustain highly-qualified STEM educators in urban and rural communities.

(C) ADDITIONAL CONSIDERATIONS.—In awarding a grant under this paragraph, the Director may also consider the extent to which the proposed Center will—

(i) leverage existing collaborations, tools, and strategies supported by the Foundation, including NSF INCLUDES and the Convergence Accelerators;

(ii) support research on and the development and scaling of innovative approaches to distance learning and education for various student populations;

(iii) support education innovations that leverage new technologies or deepen understanding of the impact of technology on educational systems; and

(iv) include a commitment from local or State education administrators to making the proposed reforms and activities a priority.

(D) PARTNERSHIP.—In carrying out the program under subparagraph (A), the Director shall explore opportunities to partner with the Department of Education, including through jointly funding activities under this paragraph.

(E) ANNUAL MEETING.—The Director shall encourage and facilitate an annual meeting of the Centers to foster collaboration among the Centers and to further disseminate the results of the Centers' activities.

(F) REPORT.—Not later than 5 years after the date of enactment of this Act, the Director shall submit to Congress a report describing the activities carried out pursuant to this paragraph that includes—

(i) a description of the focus and proposed goals of each Center; and

(ii) an assessment of the program's success in helping to promote scalable solutions in PreK-12 STEM education.

(3) NATIONAL ACADEMIES STUDY.—Not later than 45 days after the date of enactment of this Act, the Director shall enter into an agreement with the Academies to conduct a study to—

(A) review the research literature and identify research gaps regarding the interconnected factors that foster and hinder successful implementation of promising, evidence-based PreK-12 STEM education innovations at the local, regional, and national level;

(B) present a compendium of promising, evidence-based PreK-12 STEM education practices, models, programs, and technologies;

(C) identify barriers to widespread and sustained implementation of such innovations; and

(D) make recommendations to the Foundation, the Department of Education, the National Science and Technology Council's Committee on Science, Technology, Engineering, and Mathematics Education, State and local educational agencies, and other relevant stakeholders on measures to address such barriers.

(4) SUPPORTING PRE-K–8 INFORMAL STEM OPPORTUNITIES.—Section 3 of the STEM Education Act of 2015 (42 U.S.C. 1862q) is amended by adding at the end the following:

"(c) PRE-K–8 INFORMAL STEM PROGRAM.—

"(1) IN GENERAL.—The Director of the National Science Foundation shall provide grants to institutions of higher education or a non-profit organizations (or a consortia of such intuitions or organization) on a merit-reviewed, competitive basis for research on programming that engages students in grades PREK-8, including underrepresented and rural students, in STEM in order to prepare such students to pursue degrees or careers in STEM.

"(2) USE OF FUNDS.—

"(A) IN GENERAL.—Grants awarded under this section shall be used toward research to advance the engagement of students, including underrepresented and rural students, in grades PREK-8 in STEM through providing before-school, after-school, out-of-school, or summer activities, including in single-gender environments or programming, that are designed to encourage interest, engagement, and skills development for students in STEM.

"(B) PERMITTED ACTIVITIES.—The activities described in subparagraph (A) may include—

"(i) the provision of programming described in such subparagraph for the purpose of research described in such subparagraph;

"(ii) the use of a variety of engagement methods, including cooperative and hands-on learning;

"(iii) exposure of students to role models in the fields of STEM and near-peer mentors;

"(iv) training of informal learning educators, youth-serving professionals, and volunteers who lead informal STEM programs in using evidence-based methods consistent with the target student population being served;

"(v) education of students on the relevance and significance of STEM careers, provision of academic advice and assistance, and activities designed to help students make real-world connections to STEM content;

"(vi) the attendance of students at events, competitions, and academic programs to provide content expertise and encourage career exposure in STEM, which may include the purchase of parts and supplies needed to participate in such competitions;

"(vii) activities designed to engage parents and families of students in grades PREK-8 in STEM;

"(viii) innovative strategies to engage students, such as using leadership skills and outcome measures to impart youth with the confidence to pursue STEM coursework and academic study;

"(ix) coordination with STEM-rich environments, including other nonprofit, nongovernmental organizations, out-of-classroom settings, single-gender environments, institutions of higher education, vocational facilities, corporations, museums, or science centers; and

"(x) the acquisition of instructional materials or technology-based tools to conduct applicable grant activity.

"(3) APPLICATION.—An applicant seeking funding under the section shall submit an application at such time, in such manner, and containing such information as may be required. Applications that include or partner with a nonprofit, nongovernmental organization that has extensive experience and expertise in increasing the participation of students in PREK-8 in STEM are encouraged. The application may include the following:

"(A) A description of the target audience to be served by the research activity or activities for which such funding is sought.

"(B) A description of the process for recruitment and selection of students to participate in such activities.

"(C) A description of how such activity or activities may inform programming that engages students in grades PREK-8 in STEM.

"(D) A description of how such activity or activities may inform programming that promotes student academic achievement in STEM.

"(E) An evaluation plan that includes, at a minimum, the use of outcome-oriented measures to determine the impact and efficacy of programming being researched.

"(4) EVALUATIONS.—Each recipient of a grant under this section shall provide, at the conclusion of every year during which the grant funds are received, an evaluation in a form prescribed by the Director.

"(5) ACCOUNTABILITY AND DISSEMINATION.—

"(A) EVALUATION REQUIRED.—The Director shall evaluate the activities established under this section. Such evaluation shall—

"(i) use a common set of benchmarks and tools to assess the results of research conducted under such grants; and

"(ii) to the extent practicable, integrate the findings of the research resulting from the activity or activities funded through the grant with the current research on serving students with respect to the pursuit of degrees or careers in STEM, including underrepresented and rural students, in grades PREK-8.

"(B) REPORT ON EVALUATIONS.—Not later than 180 days after the completion of the evaluation under subparagraph (A), the Director shall submit to Congress and make widely available to the public a report that includes—

"(i) the results of the evaluation; and

"(ii) any recommendations for administrative and legislative action that could optimize the effectiveness of the program under this section.

"(6) COORDINATION.—In carrying out this section, the Director shall, for purposes of enhancing program effectiveness and avoiding duplication of activities, consult, cooperate, and coordinate with the programs and policies of other relevant Federal agencies.".

(b) UNDERGRADUATE STEM EDUCATION.—

(1) RESEARCH ON STEM EDUCATION AND WORKFORCE NEEDS.—The Director shall award grants, on a competitive basis, to four-year institutions of higher education or non-profit organizations (or consortia of such institutions or organizations) to support research and development activities to—

(A) encourage greater collaboration and coordination between institutions of higher education and industry to enhance education, foster hands-on learn experiences, and improve alignment with workforce needs;

(B) understand the current composition of the STEM workforce and the factors that influence growth, retention, and development of that workforce;

(C) increase the size, diversity, capability, and flexibility of the STEM workforce; and

(D) increase dissemination and widespread adoption of effective practices in undergraduate education and workforce development.

(2) ADVANCED TECHNOLOGICAL EDUCATION PROGRAM UPDATE.—Section 3(b) of the Scientific and Advanced-Technology Act of 1992 (42 U.S.C. 1862i(b)) is amended to read as follows:

"(b) NATIONAL COORDINATION NETWORK FOR SCIENCE AND TECHNICAL EDUCATION.—The Director shall award grants to institutions of higher education, nonprofit organizations, and associate-degree granting colleges (or consortia of such institutions or organizations) to establish a network of centers for science and technical education. The centers shall—

"(1) coordinate research, training, and education activities funded by awards under subsection (a) and share information and best practices across the network of awardees;

"(2) serve as a national and regional clearinghouse and resource to communicate and coordinate research, training, and educational activities across disciplinary, organizational, geographic, and international boundaries and disseminate best practices; and

"(3) develop national and regional partnerships between PreK–12 schools, two-year colleges, institutions of higher education, workforce development programs, labor organizations, and industry to meet workforce needs.".

(3) INNOVATIONS IN STEM EDUCATION AT COMMUNITY COLLEGES.—

(A) IN GENERAL.—The Director shall award grants on a merit-reviewed, competitive basis to institutions of higher education or non-profit organizations (or consortia of such institutions or organizations) to advance research on the nature of learning and teaching at community colleges and to improve outcomes for students who enter the workforce upon completion of their STEM degree or credential or transfer to 4-year institutions, including by—

(i) examining how to scale up successful programs at Community Colleges that are improving student outcomes in foundational STEM courses;

(ii) supporting research on effective STEM teaching practices in community college settings;

(iii) designing and developing new STEM curricula;

(iv) providing STEM students with hands-on training and research experiences, internships, and other experiential learning opportunities;

(v) increasing access to high quality STEM education through new technologies;

(vi) re-skilling or up-skilling incumbent workers for new STEM jobs;

(vii) building STEM career and seamless transfer pathways; and

(viii) developing novel mechanisms to identify and recruit talent into STEM programs, in particular talent from groups historically underrepresented in STEM.

(B) PARTNERSHIPS.—In carrying out activities under this paragraph, the Director shall encourage applications to develop, enhance, or expand cooperative STEM education and training partnerships between institutions of higher education, industry, and labor organizations.

(c) ADVANCED TECHNOLOGICAL MANUFACTURING ACT.—

(1) FINDINGS AND PURPOSE.—Section 2 of the Scientific and Advanced-Technology Act of 1992 (42 U.S.C. 1862h) is amended—

(A) in subsection (a)—

(i) in paragraph (3), by striking "science, mathematics, and technology" and inserting "science, technology, engineering, and mathematics or STEM";

(ii) in paragraph (4), by inserting "educated" and before "trained"; and

(iii) in paragraph (5), by striking "scientific and technical education and training" and inserting "STEM education and training"; and

(B) in subsection (b)—

(i) in paragraph (2), by striking "mathematics and science" and inserting "STEM fields"; and

(ii) in paragraph (4), by striking "mathematics and science instruction" and inserting "STEM instruction".

(2) MODERNIZING REFERENCES TO STEM.—Section 3 of the Scientific and Advanced-Technology Act of 1992 (42 U.S.C. 1862i) is amended—

(A) in the section heading, by striking "**SCIENTIFIC AND TECHNICAL EDUCATION** " and inserting "**STEM EDUCATION**";

(B) in subsection (a)—

(i) in the subsection heading, by striking "SCIENTIFIC AND TECHNICAL EDUCATION " and inserting "STEM EDUCATION";

(ii) in the matter preceding paragraph (1)—

(I) by inserting "and education to prepare the skilled technical workforce to meet workforce demands" before ", and to improve";

(II) by striking "core education courses in science and mathematics" and inserting "core education courses in STEM fields";

(III) by inserting "veterans and individuals engaged in" before "work in the home"; and

(IV) by inserting "and on building a pathway from secondary schools, to associate-degree-granting institutions, to careers that require technical training" before ", and shall be designed";

(iii) in paragraph (1)—

(I) by inserting "and study" after "development"; and

(II) by striking "core science and mathematics courses" and inserting "core STEM courses";

(iv) in paragraph (2), by striking "science, mathematics, and advanced-technology fields" and inserting "STEM and advanced-technology fields";

(v) in paragraph (3)(A), by inserting "to support the advanced-technology industries that drive the competitiveness of the United States in the global economy" before the semicolon at the end;

(vi) in paragraph (4), by striking "scientific and advanced-technology fields" and inserting "STEM and advanced-technology fields"; and

(vii) in paragraph (5), by striking "advanced scientific and technical education" and inserting "advanced STEM and advanced-technology";

(C) in subsection (c)—

(i) in paragraph (1)—

(I) in subparagraph (A)—

(aa) in the matter preceding clause (i), by striking "to encourage" and all that follows through "such means as—" and inserting "to encourage the development of career and educational pathways with multiple entry and exit points leading to credentials and degrees, and to assist students pursuing pathways in STEM fields to transition from associate-degree-granting colleges to bachelor-degree-granting institutions, through such means as—";

(bb) in clause (i), by striking "to ensure" and inserting "to develop articulation agreements that ensure"; and

(cc) in clause (ii), by striking "courses at the bachelor-degree-granting institution" and inserting "the career and educational pathways supported by the articulation agreements";

(II) in subparagraph (B)—

(aa) in clause (i), by inserting "veterans and individuals engaged in" before "work in the home";

(bb) in clause (iii)—

(AA) by striking "bachelor's-degree-granting institutions" and inserting "institutions or work sites"; and

(BB) by inserting "or industry internships" after "summer programs"; and

(cc) by striking the flush text following clause (iv); and

(III) by striking subparagraph (C);

(ii) in paragraph (2)—

(I) by striking "mathematics and science programs" and inserting "STEM programs";

(II) by inserting "and, as appropriate, elementary schools," after "with secondary schools";

(III) by striking "mathematics and science education" and inserting "STEM education";

(IV) by striking "secondary school students" and inserting "students at these schools";

(V) by striking "science and advanced-technology fields" and inserting "STEM and advanced-technology fields"; and

(VI) by striking "agreements with local educational agencies" and inserting "articulation agreements or dual credit courses with local secondary schools, or other means as the Director determines appropriate,"; and

(iii) in paragraph (3)—

(I) by striking subparagraph (B);

(II) by striking "shall—"and all that follows through "establish a" and inserting "shall establish a";

(III) by striking "the fields of science, technology, engineering, and mathematics" and inserting "STEM fields"; and

(IV) by striking "; and" and inserting ", including jobs at Federal and academic laboratories.";

(D) in subsection (c)—

(i) in paragraph (1)—

(I) in subparagraph (A)—

(aa) in the matter preceding clause (i), by striking "to encourage" and all that follows through "such means as—" and inserting "to encourage the development of career and educational pathways with multiple entry and exit points leading to credentials and degrees, and to assist students pursuing pathways in STEM fields to transition from associate-degree-granting colleges to bachelor-degree-granting institutions, through such means as—";

(bb) in clause (i), by striking "to ensure" and inserting "to develop articulation agreements that ensure"; and

(cc) in clause (ii), by striking "courses at the bachelor-degree-granting institution" and inserting "the career and educational pathways supported by the articulation agreements";

(II) in subparagraph (B)—

(aa) in clause (i), by inserting "veterans and individuals engaged in" before "work in the home";

(bb) in clause (iii)—

(AA) by striking "bachelor's-degree-granting institutions" and inserting "institutions or work sites"; and

(BB) by inserting "or industry internships" after "summer programs"; and

(cc) by striking the flush text following clause (iv); and

(III) by striking subparagraph (C);

(ii) in paragraph (2)—

(I) by striking "mathematics and science programs" and inserting "STEM programs";

(II) by inserting "and, as appropriate, elementary schools," after "with secondary schools";

(III) by striking "mathematics and science education" and inserting "STEM education";

(IV) by striking "secondary school students" and inserting "students at these schools";

(V) by striking "science and advanced-technology fields" and inserting "STEM and advanced-technology fields"; and

(VI) by striking "agreements with local educational agencies" and inserting "articulation agreements or dual credit courses with local secondary schools, or other means as the Director determines appropriate,"; and

(iii) in paragraph (3)—

(I) by striking subparagraph (B);

(II) by striking "shall—"and all that follows through "establish a" and inserting "shall establish a";

(III) by striking "the fields of science, technology, engineering, and mathematics" and inserting "STEM fields"; and

(IV) by striking "; and" and inserting ", including jobs at Federal and academic laboratories.";

(E) in subsection (d)(2)—

(i) in subparagraph (D), by striking "and" after the semicolon;

(ii) in subparagraph (E), by striking the period at the end and inserting a "; and"; and

(iii) by adding at the end the following:

"(F) as appropriate, applications that apply the best practices for STEM education and technical skills education through distance learning or in a simulated work environment, as determined by research described in subsection (f); and";

(F) in subsection (g), by striking the second sentence;

(G) in subsection (h)(1)—

(i) in subparagraph (A), by striking "2022" and inserting "2026";

(ii) in subparagraph (B), by striking "2022" and inserting "2026"; and

(iii) in subparagraph (C)—

(I) by striking "up to $2,500,000" and inserting "not less than $3,000,000"; and

(II) by striking "2022" and inserting "2026";

(H) in subsection (i)—

(i) by striking paragraph (3); and

(ii) by redesignating paragraphs (4) and (5) as paragraphs (3) and (4), respectively; and

(I) in subsection (j)—

(i) by striking paragraph (1) and inserting the following:

"(1) the term advanced-technology includes technological fields such as advanced manufacturing, agricultural-, biological- and chemical-technologies, energy and environmental technologies, engineering technologies, information technologies, micro and nano-technologies, cybersecurity technologies, geospatial technologies, and new, emerging technology areas;";

(ii) in paragraph (4), by striking "separate bachelor-degree-granting institutions" and inserting "other entities";

(iii) by striking paragraph (7);

(iv) by redesignating paragraphs (8) and (9) as paragraphs (7) and (8), respectively;

(v) in paragraph (7), as redesignated by subparagraph (D), by striking "and" after the semicolon;

(vi) in paragraph (8), as redesignated by subparagraph (D)—

(I) by striking "mathematics, science, engineering, or technology" and inserting "science, technology, engineering, or mathematics"; and

(II) by striking the period at the end and inserting "; and"; and

(vii) by adding at the end the following:

"(9) the term skilled technical workforce means workers—

"(A) in occupations that use significant levels of science and engineering expertise and technical knowledge; and

"(B) whose level of educational attainment is less than a bachelor degree.".

(3) AUTHORIZATION OF APPROPRIATIONS.—Section 5 of the Scientific and Advanced-Technology Act of 1992 (42 U.S.C. 1862j) is amended to read as follows:

"SEC. 5. AUTHORIZATION OF APPROPRIATIONS.

"There are authorized to be appropriated to the Director for carrying out sections 2 through 4, $150,000,000 for fiscal years 2022 through 2026.".

(d) GRADUATE STEM EDUCATION.—

(1) MENTORING AND PROFESSIONAL DEVELOPMENT.—

(A) MENTORING PLANS.—

(i) UPDATE.—Section 7008 of the America Creating Opportunities to Meaningfully Promote Excellence in Technology, Education, and Science Act (42 U.S.C. 1862o) is amended by—

(I) inserting "and graduate student" after "postdoctoral"; and

(II) inserting "The requirement may be satisfied by providing such individuals with access to mentors, including individuals not listed on the grant." after "review criterion.".

(ii) EVALUATION.—Not later than 45 days after the date of enactment of this Act, the Director shall enter into an agreement with a qualified independent organization to evaluate the effectiveness of the postdoctoral mentoring plan requirement for improving mentoring for Foundation-supported postdoctoral researchers.

(B) CAREER EXPLORATION.—

(i) IN GENERAL.—The Director shall award grants, on a competitive basis, to institutions of higher education and non-profit organizations (or consortia of such institutions or organizations) to develop innovative approaches for facilitating career exploration of academic and non-academic career options and for providing opportunity-broadening experiences, including work-integrated opportunities, for graduate students and postdoctoral scholars that can then be considered, adopted, or adapted by other institutions and to carry out research on the impact and outcomes of such activities.

(ii) REVIEW OF PROPOSALS.—In selecting grant recipients under this subparagraph, the Director shall consider, at a minimum—

(I) the extent to which the administrators of the institution are committed to making the proposed activity a priority; and

(II) the likelihood that the institution or organization will sustain or expand the proposed activity effort beyond the period of the grant.

(C) DEVELOPMENT PLANS.—The Director shall require that annual project reports for awards that support graduate students and postdoctoral scholars include certification by the principal investigator that each graduate student and postdoctoral scholar receiving substantial support from such award, as determined by the Director, in consultation with faculty advisors, has developed and annually updated an individual development plan to map educational goals, career exploration, and professional development.

(D) PROFESSIONAL DEVELOPMENT SUPPLEMENT.—The Director shall carry out a five-year pilot initiative to award up to 2,500 administrative supplements of up to $2,000 to existing research grants annually, on a competitive basis, to support professional development experiences for graduate students and postdoctoral researchers who receive a substantial portion of their support under such grants, as determined by the Director. Not more than 10 percent of supplements awarded under this subparagraph may be used to support professional development experiences for postdoctoral researchers.

(E) GRADUATE EDUCATION RESEARCH.—The Director shall award grants, on a competitive basis, to institutions of higher education or non-profit organizations (or consortia of such institutions or organizations) to support research on the graduate education system and outcomes of various interventions and policies, including—

(i) the effects of traineeships, fellowships, internships, and teaching and research assistantships on outcomes for graduate students;

(ii) the effects of graduate education and mentoring policies and procedures on degree completion, including differences by—

(I) gender, race and ethnicity, sexual orientation, gender identity, and citizenship; and

(II) student debt load;

(iii) the development and assessment of new or adapted interventions, including approaches that improve mentoring relationships, develop conflict management skills, and promote healthy research teams; and

(iv) research, data collection, and assessment of the state of graduate student mental health and wellbeing, factors contributing to and consequences of poor graduate student mental health, and the development, adaptation, and assessment of evidence-based strategies and policies to support emotional wellbeing and mental health.

(2) GRADUATE RESEARCH FELLOWSHIP PROGRAM UPDATE.—

(A) SENSE OF CONGRESS.—It is the sense of Congress that the Foundation should increase the number of new graduate research fellows supported annually over the next 5 years to no fewer than 3,000 fellows.

(B) PROGRAM UPDATE.—Section 10 of the National Science Foundation Act of 1950 (42 U.S.C. 1869) is amended—

(i) in subsection (a), by inserting "and as will address national workforce demand in critical STEM fields" after "throughout the United States";

(ii) in subsection (b), by striking "of $12,000" and inserting "of at least $16,000"; and

(iii) by adding at the end the following:

"(c) OUTREACH.—The Director shall ensure program outreach to recruit fellowship applicants from fields of study that are in areas of critical national need, from all regions of the country, and from historically underrepresented populations in STEM.".

(C) CYBERSECURITY SCHOLARSHIPS AND GRADUATE FELLOWSHIPS.—The Director shall ensure that students pursuing master's degrees and doctoral degrees in fields relating to cybersecurity are considered as applicants for scholarships and graduate fellowships under the Graduate Research Fellowship Program under section 10 of the National Science Foundation Act of 1950 (42 U.S.C. 1869).

(3) STUDY ON GRADUATE STUDENT FUNDING.—

(A) IN GENERAL.—Not later than 45 days after the date of enactment of this Act, the Director shall enter into an agreement with a qualified independent organization to evaluate—

(i) the role of the Foundation in supporting graduate student education and training through fellowships, traineeships, and other funding models; and

(ii) the impact of different funding mechanisms on graduate student experiences and outcomes, including whether such mechanisms have differential impacts on subsets of the student population.

(B) REPORT.—Not later than 1 year after the date of enactment of this Act, the organization charged with carrying out the study under subparagraph (A) shall publish the results of its evaluation, including a recommendation for the appropriate balance between fellowships, traineeships, and other funding models.

(4) FELLOWSHIPS AND TRAINEESHIPS FOR EARLY-CAREER AI RESEARCHERS.—

(A) ARTIFICIAL INTELLIGENCE TRAINEESHIPS.—

(i) IN GENERAL.—The Director of the National Science Foundation shall award grants to institutions of higher education to establish traineeship programs for graduate students who pursue artificial intelligence-related research leading to a masters or doctorate degree by providing funding and other assistance, and by providing graduate students opportunities for research experiences in government or industry related to the students' artificial intelligence studies.

(ii) USE OF FUNDS.—A institution of higher education shall use grant funds provided under clause (i) for the purposes of—

(I) providing traineeships to students who are pursuing research in artificial intelligence leading to a masters or doctorate degree;

(II) paying tuition and fees for students receiving traineeships;

(III) creating and requiring courses or training programs in technology ethics for students receiving traineeships;

(IV) creating opportunities for research in technology ethics for students receiving traineeships;

(V) establishing scientific internship programs for students receiving traineeships in artificial intelligence at for-profit institutions, nonprofit research institutions, or government laboratories; and

(VI) other costs associated with the administration of the program.

(B) ARTIFICIAL INTELLIGENCE FELLOWSHIPS.—The Director of the National Science Foundation shall award fellowships to masters and doctoral students and postdoctoral researchers who are pursuing degrees or research in artificial intelligence and related fields, including in the field of technology ethics. In making such awards, the Director shall conduct outreach, including through formal solicitations, to solicit proposals from students and postdoctoral researchers seeking to carry out research in aspects of technology ethics with relevance to artificial intelligence systems.

(e) STEM WORKFORCE DATA.—

(1) SKILLED TECHNICAL WORKFORCE PORTFOLIO REVIEW.—

(A) IN GENERAL.—Not later than 1 year after the date of enactment of this Act, the Director shall conduct a full portfolio analysis of the Foundation's skilled technical workforce investments across all Directorates in the areas of education, research, infrastructure, data collection, and analysis.

(B) REPORT.—Not later than 180 days after the date of the review under subparagraph (A) is complete, the Director shall submit to Congress and make widely available to the public a summary report of the portfolio review.

(2) SURVEY DATA.—

(A) ROTATING TOPIC MODULES.—To meet evolving needs for data on the state of the science and engineering workforce, the Director shall assess, through coordination with other Federal statistical agencies and drawing on input from relevant stakeholders, the feasibility and benefits of incorporating questions or topic modules to existing National Center for Science and Engineering Statistics surveys that would vary from cycle to cycle.

(B) NEW DATA.—Not later than 1 year after the date of enactment of this Act, the Director shall submit to Congress and the Board the results of an assessment, carried out in coordination with other Federal agencies and with input from relevant stakeholders, of the feasibility and benefits of incorporating new questions or topic modules to existing National Center for Science and Engineering Statistics surveys on—

(i) the skilled technical workforce;

(ii) working conditions and work-life balance;

(iii) harassment and discrimination;

(iv) sexual orientation and gender identity;

(v) immigration and emigration; and

(vi) any other topics at the discretion of the Director.

(C) LONGITUDINAL DESIGN.—The Director shall continue and accelerate efforts to enhance the usefulness of National Center for Science and Engineering Statistics survey data for longitudinal research and analysis.

(D) GOVERNMENT ACCOUNTABILITY OFFICE REVIEW.—Not later than 1 year after the date of enactment of this Act, the Comptroller General of the United States shall submit a report to Congress that—

(i) evaluates Foundation processes for ensuring the data and analysis produced by the National Center for Science and Engineering Statistics meets current and future needs; and

(ii) includes such recommendations as the Comptroller General determines are appropriate to improve such processes.

(f) CYBER WORKFORCE DEVELOPMENT RESEARCH AND DEVELOPMENT.—

(1) IN GENERAL.—The Director shall award grants on a merit-reviewed, competitive basis to institutions of higher education or non-profit organizations (or a consortia of such institutions or organizations) to carry out research on the cyber workforce.

(2) RESEARCH.—In carrying out research pursuant to paragraph (1), the Director shall support research and development activities to—

(A) Understand the current state of the cyber workforce, including factors that influence growth, retention, and development of that workforce;

(B) examine paths to entry and re-entry into the cyber workforce;

(C) understand trends of the cyber workforce, including demographic representation, educational and professional backgrounds present, competencies available, and factors that shape employee recruitment, development, and retention and how to increase the size, diversity, and capability of the cyber workforce;

(D) examine and evaluate training practices, models, programs, and technologies; and

(E) other closely related topics as the Director determines appropriate.

(3) REQUIREMENTS.—In carrying out the activities described in paragraph (1), the Director shall—

(A) collaborate with the National Institute for Standards and Technology, including the National Initiative for Cybersecurity Education, the Department of Homeland Security, the Department of Defense, the Office of Personnel Management, and other Federal departments and agencies, as appropriate;

(B) align with or build on the National Initiative on Cybersecurity Education Cybersecurity Workforce Framework wherever practicable and applicable;

(C) leverage the collective body of knowledge from existing cyber workforce development research and education activities; and

(D) engage with other Federal departments and agencies, research communities, and potential users of information produced under this subsection.

(g) FEDERAL CYBER SCHOLARSHIP-FOR-SERVICE PROGRAM.—

(1) SENSE OF CONGRESS.—It is the sense of Congress that—

(A) since cybersecurity risks are constant in the growing digital world, it is critical that the United States stay ahead of malicious cyber activity with a workforce that can safeguard our innovation, research, and work environments; and

(B) Federal investments into the Federal Cyber Scholarship-for-Service Program at the National Science Foundation play a critical role in preparing and sustaining a strong, talented, and much-needed national cybersecurity workforce and should be strengthened.

(2) IN GENERAL.—Section 302(b)(1) of the Cybersecurity Enhancement Act of 2014 (15 U.S.C. 7442(b)(1)) is amended by striking the semicolon at the end and inserting the following "and cybersecurity-related aspects of other related fields as appropriate, including artificial intelligence, quantum computing and aerospace.".

(h) CYBERSECURITY WORKFORCE DATA INITIATIVE.—The Director, acting through the National Center for Science and Engineering Statistics established in section 505 of the America COMPETES Reauthorization Act of 2010 (42 U.S.C. 1862p) and in coordination with the Director of the National Institute of Standards and Technology and other appropriate Federal statistical agencies, shall establish a cybersecurity workforce data initiative that—

(1) assesses the feasibility of providing nationally representative estimates and statistical information on the cybersecurity workforce;

(2) utilizes the National Initiative for Cybersecurity Education (NICE) Cybersecurity Workforce Framework (NIST Special Publication 800–181), or other

frameworks, as appropriate, to enable a consistent measurement of the cybersecurity workforce;

(3) utilizes and complements existing data on employer requirements and unfilled positions in the cybersecurity workforce;

(4) consults key stakeholders and the broader community of practice in cybersecurity workforce development to determine data requirements needed to strengthen the cybersecurity workforce;

(5) evaluates existing Federal survey data for information pertinent to developing national estimates of the cybersecurity workforce;

(6) evaluates administrative data and other supplementary data sources, as available, to describe and measure the cybersecurity workforce; and

(7) collects statistical data, to the greatest extent practicable, on credential attainment and employment outcomes information for the cybersecurity workforce.

SEC. 6. BROADENING PARTICIPATION.

(a) PRESIDENTIAL AWARDS FOR EXCELLENCE IN MATHEMATICS AND SCIENCE TEACHING.—

(1) IN GENERAL.—Section 117(a) of the National Science Foundation Authorization Act of 1988 (42 U.S.C.1881b(a)) is amended—

(A) in subparagraph (B)—

(i) by striking "108" and inserting "110";

(ii) by striking clause (iv);

(iii) in clause (v), by striking the period at the end and inserting "; and";

(iv) by redesignating clauses (i), (ii), (iii), and (v) as subclauses (I), (II), (III), and (IV), respectively, and moving the margins of such subclauses (as so redesignated) two ems to the right; and

(v) by striking "In selecting teachers" and all that follows through "two teachers—" and inserting the following:

"(C) In selecting teachers for an award authorized by this subsection, the President shall select—

"(i) at least two teachers—"; and

(B) in subparagraph (C), as designated by paragraph (1)(A)(v), by adding at the end the following:

"(ii) at least one teacher—

"(I) from the Commonwealth of the Northern Mariana Islands;

"(II) from American Samoa;

"(III) from the Virgin Islands of the United States; and

"(IV) from Guam.".

(2) EFFECTIVE DATE.—The amendments made by paragraph (1) shall apply with respect to awards made on or after the date of the enactment of this Act.

(b) ROBERT NOYCE TEACHER SCHOLARSHIP PROGRAM UPDATE.—

(1) SENSE OF CONGRESS.—It is the sense of Congress that over the next five years the Foundation should increase the number of scholarships awarded under the Robert Noyce Teacher Scholarship program established under section 10 of the National Science Foundation Authorization Act of 2002 (42 U.S.C. 1862n–1) by 50 percent.

(2) OUTREACH.—To increase the diversity of participants, the Director shall support symposia, forums, conferences, and other activities to expand and enhance outreach to—

(A) historically Black colleges and universities that are part B institutions, as defined in section 322(2) of the Higher Education Act of 1965 (20 U.S.C. 1061(2));

(B) minority institutions, as defined in section 365(3) of the Higher Education Act of 1965 (20 U.S.C. 1067k(3));

(C) institutions of higher education that are located near or serve rural communities;

(D) labor organizations;

(E) emerging research institutions; and

(F) higher education programs that serve or support veterans.

(c) NSF INCLUDES INITIATIVE.—The Director shall award grants and cooperative agreements, on a competitive basis, to institutions of higher education or non-profit organizations (or consortia of such institutions or organizations) to carry out a comprehensive national initiative to facilitate the development of networks and partnerships to build on and scale up effective practices in broadening participation in STEM studies and careers of groups historically underrepresented in such studies and careers.

(d) BROADENING PARTICIPATION ON MAJOR FACILITIES AWARDS.—The Director shall require organizations seeking a cooperative agreement for the management of the operations and maintenance of a Foundation project to demonstrate prior experience and current capabilities in employing best practices in broadening participation in science and engineering and ensure implementation of such practices is considered in oversight of the award.

(e) PARTNERSHIPS WITH EMERGING RESEARCH INSTITUTIONS.—The Director shall establish a five-year pilot program to enhance partnerships between emerging research institutions and institutions classified as very high research activity by the Carnegie Classification of Institutions of Higher Education at the time of application. In carrying out this program, the Director shall—

(1) require that each proposal submitted by a multi-institution collaboration for an award, including those under section 9, that exceeds $1,000,000, as appropriate, specify how the applicants will support substantive, meaningful, and mutually-beneficial partnerships with one or more emerging research institutions;

(2) require awardees funded under paragraph (1) to direct no less than 25 percent of the total award to one or more emerging research institutions to build research capacity, including through support for faculty salaries and training, field and laboratory research experiences for undergraduate and graduate students, and maintenance and repair of research equipment and instrumentation;

(3) require awardees funded under paragraph (1) to report on the partnership activities as part of the annual reporting requirements of the Foundation;

(4) solicit feedback on the partnership directly from partner emerging research institutions, in such form as the Director deems appropriate; and

(5) submit a report to Congress after the third year of the pilot program that includes—

(A) an assessment, drawing on feedback from the research community and other sources of information, of the effectiveness of the pilot program for improving the quality of partnerships with emerging research institutions; and

(B) if deemed effective, a plan for permanent implementation of the pilot program.

(f) TRIBAL COLLEGES AND UNIVERSITIES PROGRAM UPDATE.—

(1) IN GENERAL.—Section 525 of the America COMPETES Reauthorization Act of 2010 (42 U.S.C. 1862p–13) is amended—

(A) in subsection (a) by—

(i) striking "Native American" and inserting "American Indian, Alaska Native, and Native Hawaiian"; and

(ii) inserting "post-secondary credentials and" before "associate's"; and

(iii) striking "or baccalaureate degrees" and inserting ", baccalaureate, and graduate degrees"; and

(B) in subsection (b) by striking "undergraduate"; and

(C) in subsection (c) by inserting "and STEM" after "laboratory".

(2) AUTHORIZATION OF APPROPRIATIONS.—There is authorized to be appropriated to the Director to carry out this program $107,250,000 for fiscal year 2022 through fiscal year 2026.

(g) DIVERSITY IN TECH RESEARCH.—The Director shall award grants, on a competitive basis, to institutions of higher education or non-profit organizations (or consortia of such institutions or organizations) to support basic and applied research that yields a scientific evidence base for improving the design and emergence, development and deployment, and management and ultimate effectiveness of organizations of all kinds, including research related to diversity, equity, and inclusion in the technology sector.

(h) CONTINUING SUPPORT FOR EPSCOR.—

(1) SENSE OF CONGRESS.—

(A) IN GENERAL.—It is the sense of Congress that—

(i) since maintaining the Nation's scientific and economic leadership requires the participation of talented individuals nationwide, EPSCoR investments into State research and education capacities are in the Federal interest and should be sustained; and

(ii) EPSCoR should maintain its experimental component by supporting innovative methods for improving research capacity and competitiveness.

(B) DEFINITION OF EPSCOR.—In this subsection, the term "EPSCoR" has the meaning given the term in section 502 of the America COMPETES Reauthorization Act of 2010 (42 U.S.C. 1862p note).

(2) UPDATE OF EPSCOR.—Section 517(f)(2) of the America COMPETES Reauthorization Act of 2010 (42 U.S.C. 1862p–9(f)(2)) is amended—

(A) in subparagraph (A), by striking "and" at the end; and

(B) by adding at the end the following:

"(C) to increase the capacity of rural communities to provide quality STEM education and STEM workforce development programming to students, and teachers; and".

(i) FOSTERING STEM RESEARCH DIVERSITY AND CAPACITY PROGRAM.—

(1) IN GENERAL.—The Director shall establish a program to make awards on a competitive, merit-reviewed basis to eligible institutions to implement and study innovative approaches for building research capacity in order to engage and retain students from a range of institutions and diverse backgrounds in STEM.

(2) ELIGIBLE INSTITUTION DEFINED.—In this subsection the term "eligible institution" means an institution of higher education that, according to the data published by the National Center for Science and Engineering Statistics, is not, on average, among the top 100 institutions in Federal research and development expenditures during the 3 year period prior to the year of the award.

(3) PURPOSE.—The program established in paragraph (1) shall be focused on achieving simultaneous impacts at the student, faculty, and institutional levels by increasing the research capacity at eligible institutions and the number of undergraduate and graduate students pursuing STEM degrees from eligible institutions.

(4) REQUIREMENTS.—In carrying out this program, the Director shall—

(A) require eligible institutions seeking funding under this subsection to submit an application to the Director at such time, in such manner, containing such information and assurances as the Director may require. The application shall include, at a minimum a description of how the eligible institution plans to sustain the proposed activities beyond the duration of the grant;

(B) require applicants to identify disciplines and focus areas in which the eligible institution can excel, and explain how the applicant will use the award to build capacity to bolster the institutional research competitiveness of eligible entities to support grants awarded by the Foundation and increase regional and national capacity in STEM;

(C) require the awards funded under this subsection to support research and related activities, which may include—

(i) development or expansion of research programs in disciplines and focus areas in subparagraph (B);

(ii) faculty recruitment and professional development in disciplines and focus areas in subparagraph (B), including for early-career researchers;

(iii) stipends for undergraduate and graduate students participating in research in disciplines and focus areas in subparagraph (B);

(iv) acquisition of instrumentation necessary to build research capacity at an eligible institution in disciplines and focus areas in subparagraph (B);

(v) an assessment of capacity-building and research infrastructure needs;

(vi) administrative research development support; and

(vii) other activities necessary to build research capacity; and

(D) require that no eligible institution should receive more than $10,000,000 in any single year of funds made available under this section.

(5) ADDITIONAL CONSIDERATIONS.—In awarding a grant under this subsection, the Director may also consider—

(A) the extent to which the applicant will support students from diverse backgrounds, including first-generation undergraduate students;

(B) the geographic and institutional diversity of the applying institutions; and

(C) how the applicants can leverage public-private partnerships and existing partnerships with Federal Research Agencies.

(6) DUPLICATION.—The Director shall ensure the awards made under this subsection are complementary and not duplicative of existing program;

(7) REPORT.—The Director shall submit a report to Congress after the third year of the program that includes—

(A) an assessment of the effectiveness of the program for growing the geographic and institutional diversity of Institutions of Higher Education receiving research awards from the Foundation;

(B) an assessment of the quality, quantity and geographic and institutional diversity of Institutions of Higher Education conducting Foundation sponsored research since the establishment of the program in this subsection;

(C) an assessment of the quantity and diversity of undergraduate and graduate students graduating from eligible institutions with STEM degrees; and

(D) statistical summary data on the program, including the geographic and institutional allocation of award funding, the number and diversity of supported graduate and undergraduate students, and how it contributes to capacity building at eligible entities.

(8) AUTHORIZATION OF APPROPRIATIONS.—There is authorized to be appropriated to the Director $150,000,000 for each of the fiscal years 2022 through 2026 to carry out the activities under this subsection.

(j) CAPACITY-BUILDING PROGRAM FOR DEVELOPING UNIVERSITIES.—

(1) IN GENERAL.—The Director of the National Science Foundation shall make awards, on a competitive basis, to eligible institutions described in paragraph (2) to support the mission of the Foundation and to build institutional research capacity at eligible institutions.

(2) ELIGIBLE INSTITUTION.—

(A) IN GENERAL.—To be eligible to receive an award under this subsection, an institution—

(i) shall be—

(I) a historically Black college or university;

(II) a Tribal College or University;

(III) a minority-serving institution; or

(IV) an institution of higher education with an established STEM capacity building program focused on traditionally underrepresented populations in STEM, including Native Hawaiians, Alaska Natives, and Indians; and

(ii) shall have not more than $50,000,000 in annual federally-financed research and development expenditures for science and engineering as reported through the National Science Foundation Higher Education Research and Development Survey.

(B) PARTNERSHIPS.—An eligible institution receiving a grant under this subsection may carry out the activities of the grant through a partnership with other entities, including community colleges and other eligible institutions.

(3) PROPOSALS.—To receive an award under this subsection, an eligible institution shall submit an application to the Director at such time, in such manner, and containing such information as the Director may require, including a plan that describes how the eligible institution will establish or expand research office capacity and how such award would be used to—

(A) conduct an assessment of capacity-building and research infrastructure needs of an eligible institution;

(B) enhance institutional resources to provide administrative research development support to faculty at an eligible institution;

(C) bolster the institutional research competitiveness of an eligible institution to support grants awarded by the Foundation;

(D) support the acquisition of instrumentation necessary to build research capacity at an eligible institution in research areas directly associated with the Foundation;

(E) increase capability of an eligible institution to move technology into the marketplace;

(F) increase engagement with industry to execute research through the SBIR and STTR programs (as defined in section 9(e) of the Small Business Act (15 U.S.C. 638(e)) and direct contracts at an eligible institution;

(G) provide student engagement and research training opportunities at the undergraduate, graduate, and postdoctoral levels at an eligible institution;

(H) further faculty development initiatives and strengthen institutional research training infrastructure, capacity, and competitiveness of an eligible institution; or

(I) address plans and prospects for long-term sustainability of institutional enhancements at an eligible institution resulting from the award including, if applicable, how the award may be leveraged by an eligible institution to build a broader base of support.

(4) AWARDS.—Awards made under this subsection shall be for periods of 3 years, and may be extended for periods of not more than 5 years.

(5) DEFINITIONS.—In this subsection:

(A) HISTORICALLY BLACK COLLEGE OR UNIVERSITY.—The term "historically Black college or university" has the meaning given the term "part B institution" in section 322 of the Higher Education Act of 1965 (20 U.S.C. 1061).

(B) MINORITY-SERVING INSTITUTION.—The term "minority-serving institution" or "MSI" means—

(i) a Hispanic-serving institution as defined in section 502 of the Higher Education Act of 1965 (20 U.S.C. 1101a);

(ii) an Alaska Native-serving Institution or a Native Hawaiian-serving institution as such terms are defined in section 317 of the Higher Education Act of 1965 (20 U.S.C. 1059d); and

(iii) a Predominantly Black institution, an Asian American and Native American Pacific Islander-serving institution, or a Native American-serving nontribal institution as such terms are defined in section 371 of the Higher Education Act of 1965 (20 U.S.C. 1067q(c)).

(C) TRIBAL COLLEGE OR UNIVERSITY.—The term "Tribal College or University" has the meaning given such term in section 316 of the Higher Education Act of 1965 (20 U.S.C. 1059c).

(6) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the Director of the National Science Foundation $100,000,000 for each of fiscal years 2022 through 2026 to carry out the activities in this Act.

(k) CHIEF DIVERSITY OFFICER OF THE NSF.—

(1) CHIEF DIVERSITY OFFICER.—

(A) APPOINTMENT.—The Director shall appoint a senior agency official within the Office of the Director as a Chief Diversity Officer.

(B) QUALIFICATIONS.—The Chief Diversity Officer shall have significant experience, within the Federal Government and the science community, with diversity- and inclusion-related matters, including—

(i) civil rights compliance;

(ii) harassment policy, reviews, and investigations;

(iii) equal employment opportunity; and

(iv) disability policy.

(C) OVERSIGHT.—The Chief Diversity Officer shall direct the Office of Diversity and Inclusion of the Foundation and report directly to the Director in the performance of the duties of the Chief Diversity Officer under this subsection.

(2) DUTIES.—The Chief Diversity Officer is responsible for providing advice on policy, oversight, guidance, and coordination with respect to matters of the Foundation related to diversity and inclusion, including ensuring the geographic diversity of the Foundation programs. Other duties may include—

(A) establishing and maintaining a strategic plan that publicly states a diversity definition, vision, and goals for the Foundation;

(B) defining a set of strategic metrics that are—

(i) directly linked to key organizational priorities and goals;

(ii) actionable; and

(iii) actively used to implement the strategic plan under paragraph (1);

(C) advising in the establishment of a strategic plan for diverse participation by individuals and institutions of higher education, including community colleges, historically Black colleges and universities, Tribal colleges or universities, minority-serving institutions, institutions of higher education with an established STEM capacity building program focused on traditionally underrepresented populations in STEM, including Native Hawaiians, Alaska Natives, and Indians, and institutions from jurisdictions eligible to participate under section 113 of the National Science Foundation Authorization Act of 1988 (42 U.S.C. 1862g);

(D) advising in the establishment of a strategic plan for outreach to, and recruiting from, untapped locations and underrepresented populations;

(E) advising on a diversity and inclusion strategy for the Foundation's portfolio of PreK-12 STEM education focused programs and activities, including goals for addressing barriers to participation;

(F) advising on the application of the Foundation's broader impacts review criterion; and

(G) performing such additional duties and exercise such powers as the Director may prescribe.

(3) FUNDING.—From any amounts appropriated for the Foundation for each of fiscal years 2022 through 2026, the Director shall allocate $5,000,000 to carry out this subsection for each such year.

SEC. 7. FUNDAMENTAL RESEARCH.

(a) BROADER IMPACTS.—

(1) ASSESSMENT.—Not later than 45 days after the date of enactment of this Act, the Director shall enter into an agreement with a qualified independent organization to assess how the Broader Impacts review criterion is applied across the Foundation and make recommendations for improving the effectiveness for meeting the goals established in section 526 of the America Creating Opportunities to Meaningfully Promote Excellence in Technology, Education, and Science Reauthorization Act of 2010 (42 U.S.C. 1862p-14).

(2) ACTIVITIES.—The Director shall award grants on a competitive basis, to institutions of higher education or non-profit organizations (or consortia of such institutions or organizations) to support activities to increase the efficiency, effectiveness, and availability of resources for implementing the Broader Impacts review criterion, including—

(A) training and workshops for program officers, merit review panelists, grant office administrators, faculty, and students to improve understanding of the goals and the full range of potential broader impacts available to researchers to satisfy this criterion;

(B) repositories and clearinghouses for sharing best practices and facilitating collaboration; and

(C) tools for evaluating and documenting societal impacts of research.

(b) SENSE OF CONGRESS.—It is the sense of Congress that the Director should continue to identify opportunities to reduce the administrative burden on researchers.

(c) RESEARCH INTEGRITY AND SECURITY.—

(1) OFFICE OF RESEARCH SECURITY AND POLICY.—The Director shall maintain a Research Security and Policy office within the Office of the Director with no fewer than 4 full time equivalent positions, in addition to the Chief of Research Security established in paragraph (2) of this subsection. The functions of the Research Security and Policy office shall be to coordinate all research security policy issues across the Foundation, including by—

(A) consulting and coordinating with the Foundation Office of Inspector General and with other Federal science agencies and intelligence and law enforcement agencies, as appropriate, through the National Science and Technology Council in accordance with the authority provided under section 1746 of the National Defense Authorization Act for Fiscal Year 2020 (Public Law 116–92; 42 U.S.C. 6601 note), to identify and address potential security risks that threaten research integrity and other risks to the research enterprise;

(B) serving as the Foundation's primary resource for all issues related to the security and integrity of the conduct of Foundation-supported research;

(C) conducting outreach and education activities for awardees on research policies and potential security risks;

(D) educating Foundation program managers and other directorate staff on evaluating Foundation awards and awardees for potential security risks; and

(E) communicating reporting and disclosure requirements to awardees and applicants for funding.

(2) CHIEF OF RESEARCH SECURITY.—The Director shall appoint a senior agency official within the Office of the Director as a Chief of Research Security, whose primary responsibility is to manage the office established under paragraph (1).

(3) REPORT TO CONGRESS.—No later than 180 days after the date of enactment of this Act, the Director shall provide a report to the Committee on Science, Space, and Technology of the House of Representatives, the Committee on Commerce, Science, and Transportation of the Senate, the Committee on Appropriations of the House of Representatives, and the Committee on Appropriations of the Senate on the resources and the number of full time employees needed to carry out the functions of the Office established in paragraph (1).

(4) ONLINE RESOURCE.—The Director shall develop an online resource hosted on the Foundation's website containing up-to-date information, tailored for institutions and individual researchers, including—

(A) an explanation of Foundation research security policies;

(B) unclassified guidance on potential security risks that threaten scientific integrity and other risks to the research enterprise;

(C) examples of beneficial international collaborations and how such collaborations differ from foreign government interference efforts that threaten research integrity;

(D) promising practices for mitigating security risks that threaten research integrity; and

(E) additional reference materials, including tools that assist organizations seeking Foundation funding and awardees in information disclosure to the Foundation.

(5) RISK ASSESSMENT CENTER.—The Director shall enter into an agreement with a qualified independent organization to create a new risk assessment center to—

(A) help the Foundation develop the online resources under paragraph (4); and

(B) help awardees in assessing and identifying issues related to nondisclosure of current and pending research funding, risks to the Foundation merit review process, and other issues that may negatively affect the Foundation proposal and award process due to undue foreign interference.

(6) RESEARCH GRANTS.—The Director shall continue to award grants, on a competitive basis, to institutions of higher education or non-profit organizations (or consortia of such institutions or organizations) to support research on the conduct of research and the research environment, including research on research misconduct or breaches of research integrity and detrimental research practices.

(7) AUTHORITIES.—

(A) IN GENERAL.—In addition to existing authorities for preventing waste, fraud, abuse, and mismanagement of federal funds, the Director, acting through the Office of Research Security and Policy and in coordination with the Foundation's Office of Inspector General, shall have the authority to—

(i) conduct risk assessments, including through the use of open-source analysis and analytical tools, of research and development award applications and disclosures to the Foundation, in coordination with the Risk Assessment Center established in paragraph (5);

(ii) request the submission to the Foundation, by an institution of higher education or other organization applying for a research and development award, of supporting documentation, including copies of contracts, grants, or any other agreement specific to foreign appointments, employment with a foreign institution, participation in a foreign talent program and other information reported as current and pending support for all covered individuals in a research and development award application; and

(iii) upon receipt and review of the information provided under clause (ii) and in consultation with the institution of higher education or other organization submitting such information, initiate the substitution or removal of a covered individual from a research and development award, reduce the award funding amount, or suspend or terminate the award if the Director determines such contracts, grants, or agreements include obligations that—

(I) interfere with the capacity for Foundation-supported activities to be carried out; or

(II) create duplication with Foundation-supported activities.

(B) LIMITATIONS.—In exercising the authorities under this paragraph, the Director shall—

(i) take necessary steps, as practicable, to protect the privacy of all covered individuals and other parties involved in the application and disclosure assessments under clause (A)(i);

(ii) endeavor to provide justification for requests for supporting documentation made under clause (A)(ii);

(iii) require that allegations be proven by a preponderance of evidence; and

(iv) as practicable, afford subjects an opportunity to provide comments and rebuttal and an opportunity to appeal before final administrative action is taken.

(8) MALIGN FOREIGN TALENT RECRUITMENT PROGRAM PROHIBITION.—

(A) IN GENERAL.—Not later than 12 months after the date of enactment of this Act, the Director shall establish a requirement that, as part of an application for a research and development award from the agency—

(i) each covered individual listed on the application for a research and development award certify that they are not an active participant of a malign foreign talent recruitment program from a foreign country of concern and will not be a participant in such a program for the duration of the award; and

(ii) each institution of higher education or other organization applying for such an award certify that each covered individual who is em-

ployed by the institution of higher education or other organization has been made aware of the requirement under this subsection.

(B) INTERNATIONAL COLLABORATION.—Each policy developed under subparagraph (A) shall not prohibit—

(i) making scholarly presentations regarding scientific information not otherwise controlled under current law;

(ii) participation in international conferences or other international exchanges, partnerships or programs that involve open and reciprocal exchange of scientific information, and which are aimed at advancing international scientific understanding; and

(iii) other international activities deemed appropriate by the Director.

(C) LIMITATION.—The policy developed under subparagraph (A) shall not apply retroactively to research and development awards made prior to the establishment of the policy by the Director.

(D) DEFINITIONS.—In this subsection:

(i) COVERED INDIVIDUAL.—The term "covered individual" means the principal investigator, co-principal investigators, and any other person at the institution who is responsible for the design, conduct, or reporting of research or educational activities funded or proposed for funding by the Foundation.

(ii) FOREIGN COUNTRY OF CONCERN.—The term "foreign country of concern" means the People's Republic of China, the Democratic People's Republic of Korea, the Russian Federation, the Islamic Republic of Iran, or any other country deemed to be a country of concern as determined by the Department of State.

(iii) MALIGN FOREIGN GOVERNMENT TALENT RECRUITMENT PROGRAM.—The term "malign foreign government talent recruitment program" means any program or activity that includes compensation, including cash, research funding, honorific titles, promised future compensation, or other types of remuneration, provided by the foreign state or an entity sponsored by the foreign state to the targeted individual in exchange for the individual transferring knowledge and expertise to the foreign country.

(9) SECURITY TRAINING MODULES.—

(A) IN GENERAL.—Not later than 90 days after the date of enactment of this Act, the Director, in collaboration with the Director of the National Institutes of Health and other relevant Federal research agencies, shall enter into an agreement or contract with a qualified entity for the development of online research security training modules for the research community, including modules focused on international collaboration and international travel, foreign interference, and rules for proper use of funds, disclosure, conflict of commitment, and conflict of interest.

(B) STAKEHOLDER INPUT.—Prior to entering into the agreement under clause (A), the Director shall seek input from academic, private sector, intelligence, and law enforcement stakeholders regarding the scope and content of training modules, including the diversity of needs across institutions of higher education and other grantees of different sizes and types, and recommendations for minimizing administrative burden on institutions of higher education and researchers.

(C) DEVELOPMENT.—The Director shall ensure that the entity identified in (A)—

(i) develops modules that can be adapted and utilized across Federal science agencies; and

(ii) develops and implements a plan for regularly updating the modules as needed.

(D) GUIDELINES.—The Director, in collaboration with the Director of the National Institutes of Health, shall develop guidelines for institutions of higher education and other organizations receiving Federal research and development funds to use in developing their own training programs to address the unique needs, challenges, and risk profiles of such institutions, including adoption of training modules developed under this paragraph.

(E) IMPLEMENTATION.—Drawing on stakeholder input under subparagraph (B), not later than 12 months after the date of enactment of this Act, the Director shall establish a requirement that, as part of an application for a research and development award from the Foundation—

(i) each covered individual listed on the application for a research and development award certify that they have completed research security training that meets the guidelines developed under clause (D) within one year of the application; and

(ii) each institution of higher education or other organization applying for such award certify that each covered individual who is employed by the institution or organization and listed on the application has been made aware of the requirement under this subparagraph.

(F) DEFINITIONS.—In this subsection:

(i) COVERED INDIVIDUAL.—The term "covered individual" means the principal investigator, co-principal investigators, and any other person at the institution who is responsible for the design, conduct, or reporting of research or educational activities funded or proposed for funding by the Foundation.

(ii) FEDERAL RESEARCH AGENCY.—The term "Federal research agency" means any Federal agency with an annual extramural research expenditure of over $100,000,000.

(iii) RESEARCH AND DEVELOPMENT AWARD.—The term "research and development award" means support provided to an individual or entity by a Federal research agency to carry out research and development activities, which may include support in the form of a grant, contract, cooperative agreement, or other such transaction. The term does not include a grant, contract, agreement or other transaction for the procurement of goods or services to meet the administrative needs of a Federal research agency.

(10) RESPONSIBLE CONDUCT IN RESEARCH TRAINING.—Section 7009 of the America Creating Opportunities to Meaningfully Promote Excellence in Technology, Education, and Science Act (42 U.S.C. 1862o-1) is amended by—

(A) striking "and postdoctoral researchers" and inserting "postdoctoral researchers, faculty, and other senior personnel"; and

(B) by inserting before the period at the end the following ", including mentor training".

(11) NATIONAL ACADEMIES GUIDE TO RESPONSIBLE CONDUCT IN RESEARCH.—

(A) IN GENERAL.—Not later than 180 days after the date of enactment of this Act, the Director shall enter into an agreement with the Academies to update the report entitled "On Being a Scientist: A Guide to Responsible Conduct in Research" issued by the Academies. The report, as so updated, shall include—

(i) updated professional standards of conduct in research;

(ii) promising practices for preventing, addressing, and mitigating the negative impact of harassment, including sexual harassment and gender harassment as defined in the 2018 Academies report entitled "Sexual Harassment of Women: Climate, Culture, and Consequences in Academic Sciences, Engineering, and Medicine"; and

(iii) promising practices for mitigating potential security risks that threaten research integrity.

(B) REPORT.—Not later than 18 months after the effective date of the agreement under subparagraph (A), the Academies, as part of such agreement, shall submit to the Director and the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate the report referred to in such subparagraph, as updated pursuant to such subparagraph.

(d) RESEARCH ETHICS.—

(1) SENSE OF CONGRESS.—It is the sense of Congress that—

(A) a number of emerging areas of research have potential ethical, social, safety, and security implications that might be apparent as early as the basic research stage;

(B) the incorporation of ethical, social, safety, and security considerations into the research design and review process for Federal awards, may help mitigate potential harms before they happen;

(C) the Foundation's agreement with the Academies to conduct a study and make recommendations with respect to governance of research in emerging technologies is a positive step toward accomplishing this goal; and

(D) the Foundation should continue to work with stakeholders to understand and adopt policies that promote best practices for governance of research in emerging technologies at every stage of research.

(2) ETHICS STATEMENTS.—Drawing on stakeholder input, not later than 18 months after the date of enactment of this Act, the Director shall amend award proposal instructions to include a requirement for an ethics statement to be included as part of any proposal for funding prior to making the award. Such statement shall be considered by the Director in the review of proposals, taking into consideration any relevant input from the peer-reviewers for the proposal,

and shall factor into award decisions as deemed necessary by the Director. Such statements may include, as appropriate—

(A) any foreseeable or quantifiable risks to society, including how the research could enable products, technologies, or other outcomes that could intentionally or unintentionally cause significant societal harm;

(B) how technical or social solutions can mitigate such risks and, as appropriate, a plan to implement such mitigation measures; and

(C) how partnerships and collaborations in the research can help mitigate potential harm and amplify potential societal benefits.

(3) GUIDANCE.—The Director shall solicit stakeholder input to develop clear guidance on what constitutes a foreseeable or quantifiable risk as described in paragraph (2)(A), and to the extent practicable harmonize this policy with existing ethical policies or related requirements for human subjects.

(4) RESEARCH.—The Director shall award grants, on a competitive basis, to institutions of higher education or non-profit organizations (or consortia of such institutions or organizations) to support—

(A) research to assess the potential ethical and societal implications of Foundation-supported research and products or technologies enabled by such research, including the benefits and risks identified pursuant to paragraph (2)(A); and

(B) the development and verification of approaches to proactively mitigate foreseeable risks to society, including the technical and social solutions identified pursuant to paragraph (2)(B).

(5) ANNUAL REPORT.—The Director shall encourage awardees to update their ethics statements as appropriate as part of the annual reports required by all awardees under the award terms and conditions.

(e) RESEARCH REPRODUCIBILITY AND REPLICABILITY.—Consistent with existing Federal law for privacy, intellectual property, and security, the Director shall facilitate the public access to research products, including data, software, and code, developed as part of Foundation-supported projects.

(1) DATA MANAGEMENT PLANS.—

(A) The Director shall require that every proposal for funding for research include a machine-readable data management plan that includes a description of how the awardee will archive and preserve public access to data, software, and code developed as part of the proposed project.

(B) In carrying out the requirement in subparagraph (A), the Director shall—

(i) provide necessary resources, including trainings and workshops, to educate researchers and students on how to develop and review high quality data management plans;

(ii) ensure program officers and merit review panels are equipped with the resources and training necessary to review the quality of data management plans; and

(iii) ensure program officers and merit review panels treat data management plans as essential elements of grant proposals, where appropriate.

(2) OPEN REPOSITORIES.—The Director shall—

(A) coordinate with the heads of other Federal science agencies, and solicit input from the scientific community, to develop and widely disseminate a set of criteria for trusted open repositories, accounting for discipline-specific needs and necessary protections for sensitive information, to be used by Federally funded researchers for the sharing of data, software, and code;

(B) work with stakeholders to identify significant gaps in available repositories meeting the criteria developed under subparagraph (A) and options for supporting the development of additional or enhanced repositories;

(C) award grants on a competitive basis to institutions of higher education or non-profit organizations (or consortia of such institutions or organizations) for the development, upgrades, and maintenance of open data repositories that meet the criteria developed under subparagraph (A);

(D) work with stakeholders and build on existing models, where appropriate, to establish a single, public, web-based point of access to help users locate repositories storing data, software, and code resulting from or used in Foundation-supported projects;

(E) work with stakeholders to establish the necessary policies and procedures and allocate the necessary resources to ensure, as practicable, data underlying published findings resulting from Foundation-supported projects are deposited in repositories meeting the criteria developed under subparagraph (A) at the time of publication;

(F) incentivize the deposition of data, software, and code into repositories that meet the criteria developed under subparagraph (A); and

(G) coordinate with the scientific publishing community to develop uniform consensus standards around data archiving and sharing.

(3) RESEARCH, DEVELOPMENT, AND EDUCATION.—The Director shall award grants, on a competitive basis to institutions of higher education or non-profit organizations (or consortia of such institutions or organizations) to—

(A) support research and development of open source, sustainable, usable tools and infrastructure that support reproducibility for a broad range of studies across different disciplines;

(B) support research on computational reproducibility, including the limits of reproducibility and the consistency of computational results in the development of new computation hardware, tools, and methods; and

(C) support the education and training of students, faculty, and researchers on computational methods, tools, and techniques to improve the quality and sharing of data, code, and supporting metadata to produce reproducible research.

(f) CLIMATE CHANGE RESEARCH.—

(1) IN GENERAL.—The Director shall award grants, on a competitive basis, to institutions of higher education or non-profit organizations (or consortia of such institutions or organizations) to support research to improve our understanding of the climate system and related human and environmental systems.

(2) USE OF FUNDS.—Activities funded by a grant under this subsection may include—

(A) fundamental research on climate forcings, feedbacks, responses, and thresholds in the earth system, including impacts on and contributions from local and regional systems;

(B) research on climate-related human behaviors and institutions;

(C) research on climate-related risk, vulnerability, resilience, and adaptive capacity of coupled human-environment systems, including risks to ecosystem stability and risks to vulnerable populations;

(D) research to support the development and implementation of effective strategies and tools for mitigating and adapting to climate change, including social strategies and research focused on local level forecasting, impacts, and challenges;

(E) research on the design, development, and assessment of effective information and decision-support systems, including understanding and developing effective dissemination pathways;

(F) improved modeling, projections, analyses, and assessments of climate and other Earth system changes;

(G) research to understand the atmospheric processes related to solar radiation management strategies and technologies and examine related economic, geopolitical, societal, environmental, and ethical implications, not including research designed to advance future deployment of these strategies and technologies.

(H) the development of effective strategies for educating and training future climate change researchers, and climate change response and mitigation professionals, in both research and development methods, as well as community engagement and science communication;

(I) the development of effective strategies for public and community engagement in the all stages of the research and development process; and

(J) partnerships with other agencies to address climate related challenges for specific agency missions.

(g) VIOLENCE RESEARCH.—

(1) IN GENERAL.—The Director shall award grants, on a competitive basis, to institutions of higher education or non-profit organizations (or consortia of such institutions or organizations) to support research to improve our understanding of the nature, scope, causes, consequences, prevention, and response to all forms of violence.

(2) USE OF FUNDS.—Activities funded by a grant under this subsection may include—

(A) research on the magnitude and distribution of fatal and nonfatal violence;

(B) research on risk and protective factors;

(C) research on the design, development, implementation, and evaluation of interventions for preventing and responding to violence;

(D) research on scaling up effective interventions; and

(E) one or more interdisciplinary research centers to conduct violence research, foster new and expanded collaborations, and support capacity build-

ing activities to increase the number and diversity of new researchers trained in cross-disciplinary violence research.

(h) SOCIAL, BEHAVIORAL, AND ECONOMIC SCIENCES.—The Director shall—

(1) actively communicate opportunities and solicit proposals for social, behavioral, and economic science researchers to participate in cross-cutting and interdisciplinary programs, including the Convergence Accelerator and Big Ideas activities, and the Mid-Scale Research Infrastructure program; and

(2) ensure social, behavioral, and economic science researchers are represented on relevant merit review panels for such activities.

(i) MEASURING IMPACTS OF FEDERALLY FUNDED R&D.——The Director shall award grants on a competitive, merit-reviewed basis to institutions of higher education or non-profit organizations (or consortia of such institutions or organizations) to support research and development of data, models, indicators, and associated analytical tools to improve our understanding of the impacts of Federally funded research on society, the economy, and the workforce, including domestic job creation.

(j) FOOD-ENERGY-WATER RESEARCH.—The Director shall award grants on a competitive basis to institutions of higher education or non-profit organizations (or consortia of such institutions or organizations) to—

(1) support research to significantly advance our understanding of the food-energy-water system through quantitative and computational modeling, including support for relevant cyberinfrastructure;

(2) develop real-time, cyber-enabled interfaces that improve understanding of the behavior of food-energy-water systems and increase decision support capability;

(3) support research that will lead to innovative solutions to critical food-energy-water system problems; and

(4) grow the scientific workforce capable of studying and managing the food-energy-water system, through education and other professional development.

(k) BIOLOGICAL FIELD STATIONS AND MARINE LABORATORIES.—The Director shall continue to support enhancing, repairing and maintaining research instrumentation, laboratories, telecommunications and housing at biological field stations and marine laboratories.

(l) SUSTAINABLE CHEMISTRY RESEARCH AND EDUCATION.—In accordance with section 263 of the National Defense Authorization Act for Fiscal Year 2021, the Director shall carry out activities in support of sustainable chemistry, including—

(1) establishing a program to award grants, on a competitive basis, to institutions of higher education or non-profit organizations (or consortia of such institutions or organizations) to support—

(A) individual investigators and teams of investigators, including to the extent practicable, early career investigators for research and development;

(B) collaborative research and development partnerships among universities, industry, and non-profit organizations; and

(C) integrating sustainable chemistry principles into elementary, secondary, undergraduate, and graduate chemistry and chemical engineering curriculum and research training, as appropriate to that level of education and training; and

(2) incorporating sustainable chemistry into existing Foundation research and development programs.

(m) RISK AND RESILIENCE RESEARCH.—The Director shall award grants on a competitive basis to institutions of higher education or non-profit organizations (or consortia of such institutions or organizations) to advance knowledge of risk assessment and predictability and to support the creation of tools and technologies, including advancing data analytics and utilization of artificial intelligence, for increased resilience through—

(1) improvements in our ability to understand, model, and predict extreme events and natural hazards, including pandemics;

(2) the creation of novel engineered systems solutions for resilient complex infrastructures, particularly those that address critical interdependence among infrastructures and leverage the growing infusion of cyber-physical-social components into the infrastructures;

(3) development of equipment and instrumentation for innovation in resilient engineered infrastructures;

(4) multidisciplinary research on the behaviors individuals and communities engage in to detect, perceive, understand, predict, assess, mitigate, and prevent risks and to improve and increase resilience.

(5) advancements in multidisciplinary wildfire science, including those related to air quality impacts, human behavior, and early detection and warning; and

(n) UAV TECHNOLOGIES.—The Director shall carry out a program of research and related activities for unmanned aerial vehicle technologies, which may include a

prize competition pursuant to section 24 of the Stevenson-Wydler Technology Innovation Act of 1980 (15 U.S.C. 3719) and support for undergraduate and graduate curriculum development.

(o) LEVERAGING INTERNATIONAL EXPERTISE IN RESEARCH.—The Director shall explore and advance opportunities for leveraging international capabilities and resources that align with the Foundation and United States research community priorities and have the potential to benefit United States prosperity, security, health, and well-being, including through binational research and development organizations and foundations and by sending teams of Foundation scientific staff for site visits of scientific facilities and agencies in other countries.

(p) BIOLOGICAL RESEARCH COLLECTIONS.—

(1) IN GENERAL.—The Director shall continue to support databases, tools, methods, and other activities that secure and improve existing physical and digital biological research collections, improve the accessibility of collections and collection-related data for research and educational purposes, develop capacity for curation and collection management, and to transfer ownership of collections that are significant to the biological research community, including to museums and universities.

(2) SPECIMEN MANAGEMENT PLAN.—In consultation with other relevant Federal science agencies, the Director shall require that every proposal for funding for research that involves collecting or generating specimens include a specimen management plan that includes a description of how the specimens and associated data will be accessioned into and permanently maintained in an established biological collection.

(3) ACTION CENTER FOR BIOLOGICAL COLLECTIONS.—The Director shall award grants on a competitive basis to institutions of higher education or non-profit organizations (or consortia of such institutions or organizations) to establish an Action Center for Biological Collections to facilitate coordination and data sharing among communities of practice for research, education, workforce training, evaluation, and business model development.

(q) CLEAN WATER RESEARCH AND TECHNOLOGY ACCELERATION.—The Director shall award grants on a competitive, merit-reviewed basis to institutions of higher education or non-profit organizations (or consortia of such institutions or organizations) to—

(1) support transdisciplinary research to significantly advance our understanding of water availability, quality, and dynamics and the impact of human activity and a changing climate on urban and rural water and wastewater systems;

(2) develop, pilot and deploy innovative technologies, systems, and other approaches to identifying and addressing challenges that affect water availability, quality, and security, including through direct engagement with affected communities and partnerships with the private sector, State, tribal, and local governments, non-profit organizations and water management professionals; and

(3) grow the scientific workforce capable of studying and managing water and wastewater systems, through education, training, and other professional development.

(r) TECHNOLOGY AND BEHAVIORAL SCIENCE RESEARCH.—The Director shall award grants on a merit-based, competitive basis for research to—

(1) increase understanding of social media and consumer technology access and use patterns and related psychological and behavioral issues, particularly for adolescents; and

(2) explore the role of social media and consumer technology in rising rates of depressive symptoms, suicidal ideation, drug use, and deaths of despair, particularly for communities experiencing long-term economic distress.

(s) MANUFACTURING RESEARCH AMENDMENT.—Section 506(a) of the America COMPETES Reauthorization Act of 2010 (42 U.S.C. 1862p–1(a)) is amended—

(1) in paragraph (5), by striking "and" at the end;

(2) in paragraph (6)—

(A) by striking "and" before "virtual manufacturing"; and

(B) by striking the period at the end and inserting "; and artificial intelligence and machine learning;"; and

(3) by adding at the end the following:

"(7) additive manufacturing, including new material designs, complex materials, rapid printing techniques, and real-time process controls; and

"(8) continuous manufacturing of biological products and similar innovating monitoring and control techniques.".

(t) CRITICAL MINERALS MINING RESEARCH AND DEVELOPMENT.—

(1) IN GENERAL.—The Director of the National Science Foundation shall award grants, on a competitive basis, to institutions of higher education or non-

profit organizations (or consortium of such institutions or organizations) to support basic research that will accelerate innovation to advance critical minerals mining strategies and technologies for the purpose of making better use of domestic resources and eliminating national reliance on minerals and mineral materials that are subject to supply disruptions.

(2) USE OF FUNDS.—Activities funded by a grant under this subsection may include—

(A) advancing mining research and development activities to develop new mapping and mining technologies and techniques, including advanced critical mineral extraction, production, separation, alloying, or processing techniques and technologies that can decrease energy intensity, potential environmental impact and costs of those activities;

(B) conducting long-term earth observation of reclaimed mine sites, including the study of the evolution of microbial diversity at such sites;

(C) examining the application of artificial intelligence for geological exploration of critical minerals, including what the size and diversity of data sets would be required;

(D) examining the application of machine learning for detection and sorting of critical minerals, including what the size and diversity of data sets would be required;

(E) conducting detailed isotope studies of critical minerals and the development of more refined geologic models;

(F) improved understanding of the geological and geochemical processes through which critical minerals form and are concentrated into economically viable deposits; or

(G) providing training and researcher opportunities to undergraduate and graduate students to prepare the next generation of mining engineers and researchers.

(3) EXISTING PROGRAMS.—The Director shall ensure awards made under this subsection are complementary and not duplicative of existing programs across the foundation and Federal Government.

(u) STUDY OF AI RESEARCH CAPACITY.—

(1) IN GENERAL.—The Director of the National Science Foundation shall conduct a study, or support the development of a study through the Science and Technology Policy Institute or by any other appropriate organization as determined by the Director, on artificial intelligence research capacity at U.S. institutions of higher education.

(2) STUDY CONTENTS.—The Director shall ensure that, at a minimum, the study under subsection (a) addresses the following topics:

(A) Which universities are putting out significant peer-reviewed artificial intelligence research, including based on quantity and number of citations.

(B) For each of the universities described in paragraph (1), what specific factors enable their AI research, including computing power, data sets and availability, specialized curriculum, and industry and other partnerships.

(C) How universities not included in paragraph (1) could implement the factors in paragraph (2) to produce AI research, as well as case studies that universities can look to as examples and potential pilot programs that the Federal Government could develop or support to help universities produce AI research.

(3) WORKSHOPS.—The Director may support workshops to help inform the study required under this subsection.

(4) PUBLICATION.—The Director shall ensure that the study carried out under this subsection is made publicly available not later than 12 months after the date of enactment of this Act.

(v) ADVANCING IOT FOR PRECISION AGRICULTURE.—

(1) NATIONAL SCIENCE FOUNDATION DIRECTIVE ON AGRICULTURAL SENSOR RESEARCH.—In awarding grants under its sensor systems and networked systems programs, the Director shall include in consideration of portfolio balance research and development on sensor connectivity in environments of intermittent connectivity and intermittent computation—

(A) to improve the reliable use of advance sensing systems in rural and agricultural areas; and

(B) that considers—

(i) direct gateway access for locally stored data;

(ii) attenuation of signal transmission;

(iii) loss of signal transmission; and

(iv) at-scale performance for wireless power.

(2) UPDATING CONSIDERATIONS FOR PRECISION AGRICULTURE TECHNOLOGY WITHIN THE NSF ADVANCED TECHNICAL EDUCATION PROGRAM.—Section 3 of the

Scientific and Advanced-Technology Act of 1992 (42 U.S.C. 1862i) is amended in subsection (e)(3)—

(A) in subparagraph (C), by striking "and" after the semicolon;

(B) in subparagraph (D), by striking the period at the end and inserting "; and"; and

(C) by adding at the end the following:

"(E) applications that incorporate distance learning tools and approaches.".

(3) GAO REVIEW.—Not later than 18 months after the date of enactment of this Act, the Comptroller General of the United States shall provide—

(A) a technology assessment of precision agriculture technologies, such as the existing use of—

(i) sensors, scanners, radio-frequency identification, and related technologies that can monitor soil properties, irrigation conditions, and plant physiology;

(ii) sensors, scanners, radio-frequency identification, and related technologies that can monitor livestock activity and health;

(iii) network connectivity and wireless communications that can securely support digital agriculture technologies in rural and remote areas;

(iv) aerial imagery generated by satellites or unmanned aerial vehicles;

(v) ground-based robotics;

(vi) control systems design and connectivity, such as smart irrigation control systems;

(vii) Global Positioning System-based applications; and

(viii) data management software and advanced analytics that can assist decision making and improve agricultural outcomes; and

(B) a review of Federal programs that provide support for precision agriculture research, development, adoption, education, or training, in existence on the date of enactment of this Act.

(w) ASTRONOMY AND SATELLITE CONSTELLATIONS.—The Director shall support research into and the design, development, and testing of mitigation measures to address the impact of satellite constellations on Foundation scientific programs by—

(1) awarding grants on a competitive basis to support investigations into the impacts of satellite constellations on ground-based optical, infrared, and radio astronomy, including through existing programs such Spectrum and Wireless Innovation enabled by Future Technologies (SWIFT) and the Spectrum Innovation Initiative;

(2) supporting research on satellite impacts and benefits and mitigation strategies to be carried out at one or more Foundation supported Federally Funded Research and Development Centers or large facilities, as appropriate; and

(3) supporting workshops related to the impact of satellite constellations on scientific research and how those constellations could be used to improve scientific research.

SEC. 8. RESEARCH INFRASTRUCTURE.

(a) FACILITY OPERATION AND MAINTENANCE.—

(1) IN GENERAL.—The Director shall continue the Facility Operation Transition pilot program for a total of five years.

(2) COST SHARING.—The Facility Operation Transition program shall provide funding for 10–50 percent of the operations and maintenance costs for major research facilities that are within the first five years of operation, where the share is determined based on—

(A) the operations and maintenance costs of the major research facility; and

(B) the capacity of the managing directorate or division to absorb such costs.

(3) REPORT.—After the fifth year of the pilot program, the Director shall transmit a report to Congress that includes—

(A) an assessment, that includes feedback from the research community, of the effectiveness of the pilot program for—

(i) supporting research directorates and divisions in balancing investments in research grants and funding for the initial operation and maintenance of major facilities;

(ii) incentivizing the development of new world-class facilities;

(iii) facilitating interagency and international partnerships;

(iv) funding core elements of multi-disciplinary facilities; and

(v) supporting facility divestment costs; and

(B) if deemed effective, a plan for permanent implementation of the pilot program.

(b) REVIEWS.—The Director shall periodically carry out reviews within each of the directorates and divisions to assess the cost and benefits of extending the operations of research facilities that have exceeded their planned operational lifespan.

(c) HELIUM CONSERVATION.—

(1) MAJOR RESEARCH INSTRUMENTATION SUPPORT.—

(A) IN GENERAL.—The Director shall support, through the Major Research Instrumentation program, proposal requests that include the purchase, installation, operation, and maintenance of equipment and instrumentation to reduce consumption of helium.

(B) COST SHARING.—The Director may waive the cost-sharing requirement for helium conservation measures for non-Ph.D.-granting institutions of higher education and Ph.D.-granting institutions of higher education that are not ranked among the top 100 institutions receiving Federal research and development funding, as documented by the National Center for Science and Engineering Statistics.

(2) ANNUAL REPORT.—No later than 1 year after the date of enactment of this Act and annually for the subsequent two years, the Director shall submit an annual report to Congress on the use of funding awarded by the Foundation for the purchase and conservation of helium. The report should include—

(A) the volume and price of helium purchased;

(B) changes in pricing and availability of helium; and

(C) any supply disruptions impacting a substantial number of institutions.

(d) ADVANCED COMPUTING.—

(1) COMPUTING NEEDS.—To gather information about the computational needs of Foundation-funded projects, the Director shall require grant proposals submitted to the Foundation, as appropriate, to include estimates of computational resource needs for projects that require use of advanced computing. The Director shall encourage and provide access to tools that facilitate the inclusion of these measures, including those identified in the 2016 Academies report entitled "Future Directions for NSF Advanced Computing Infrastructure to Support U.S. Science and Engineering in 2017–2020".

(2) REPORTS.—The Director shall document and publish every two years a summary of the amount and types of advanced computing capabilities that are needed to fully meet the Foundation's project needs as identified under paragraph (1).

(3) ROADMAP.—To set priorities and guide strategic decisions regarding investments in advanced computing capabilities, the Director shall develop, publish, and regularly update a 5-year advanced computing roadmap that—

(A) describes the advanced computing resources and capabilities that would fully meet anticipated project needs, including through investments in the Mid-Scale Research Infrastructure program and the Major Research Equipment and Facilities Construction account;

(B) draws on community input, information contained in research proposals, allocation requests, insights from Foundation-funded cyber-infrastructure operators, and Foundation-wide information gathering regarding community needs;

(C) considers computational needs of planned major facilities;

(D) reflects anticipated technology trends;

(E) informs users and potential partners about future facilities and services;

(F) addresses the needs of groups historically underrepresented in STEM and geographic regions with low availability and high demand for advanced computing resources;

(G) considers how Foundation-supported advanced computing capabilities can be leveraged for activities through the Directorate for Science and Engineering Solutions; and

(H) provides an update to Congress about the level of funding necessary to fully meet computational resource needs for the research community.

(4) SECURING AMERICAN RESEARCH FROM CYBER THEFT.—

(A) NETWORKING AND INFORMATION TECHNOLOGY RESEARCH AND DEVELOPMENT UPDATE.—Section 101(a)(1) of the High-Performance Computing Act of 1991 (15 U.S.C. 5511) is amended—

(i) by moving the margins of subparagraphs (D) and (J) through (O) two ems to the left;

(ii) by redesignating subparagraphs (J) through (O) as subparagraphs (K) through (P), respectively; and

(iii) by inserting after subparagraph (I) the following:

"(J) provide for improving the security, reliability, and resiliency of computing and networking systems used by institutions of higher education and other nonprofit research institutions for the processing, storage and transmission of sensitive federally funded research and associated data;".

(B) COMPUTING ENCLAVE PILOT PROGRAM.—

(i) IN GENERAL.—The Director of the National Science Foundation, in consultation with the Director of the National Institute of Standards and Technology and the Secretary of Energy, shall establish a pilot program to award grants to ensure the security of federally-supported research data and to assist regional institutions of higher education and their researchers in compliance with regulations regarding the safeguarding of sensitive information and other relevant regulations and Federal guidelines.

(ii) STRUCTURE.—In carrying out the pilot program established pursuant to clause (i), the Director shall select three institutions of higher education from among institutions classified under the Indiana University Center for Postsecondary Research Carnegie Classification as a doctorate-granting university with a very high level of research activity, and with a history of working with secure information for the development, installation, maintenance, or sustainment of secure computing enclaves.

(iii) REGIONALIZATION.—

(I) IN GENERAL.—In selecting universities pursuant to clause (ii), the Director shall give preference to institutions of higher education with the capability of serving other regional universities.

(II) GEOGRAPHIC DISPERSAL.—The enclaves should be geographically dispersed to better meet the needs of regional interests.

(iv) PROGRAM ELEMENTS.—The Director shall work with institutions of higher education selected pursuant to clause (ii) to—

(I) develop an approved design blueprint for compliance with Federal data protection protocols;

(II) develop a comprehensive and confidential list, or a bill of materials, of each binary component of the software, firmware, or product that is required to deploy additional secure computing enclaves;

(III) develop templates for all policies and procedures required to operate the secure computing enclave in a research setting;

(IV) develop a system security plan template; and

(V) develop a process for managing a plan of action and milestones for the secure computing enclave.

(v) DURATION.—Subject to other availability of appropriations, the pilot program established pursuant to clause (i) shall operate for not less than 3 years.

(vi) REPORT.—

(I) IN GENERAL.—The Director of the National Science Foundation shall report to Congress not later than 6 months after the completion of the pilot program under clause (i).

(II) CONTENTS.—The report required under subclause (I) shall include—

(aa) an assessment of the pilot program under clause (i), including an assessment of the security benefits provided by such secure computing enclaves;

(bb) recommendations related to the value of expanding the network of secure computing enclaves; and

(cc) recommendations on the efficacy of the use of secure computing enclaves by other Federal agencies in a broader effort to expand security of Federal research.

(vii) AUTHORIZATION OF APPROPRIATIONS.—There is authorized to be appropriated to the Director, $38,000,000 for fiscal years 2022 through 2024, to carry out the activities outlined in this section.

(e) NATIONAL SECURE DATA SERVICE.—

(1) IN GENERAL.—The Director, in consultation with the Chief Statistician of the United States, shall establish a demonstration project to develop, refine and test models to inform the full implementation of the Commission on Evidence-Based Policymaking recommendation for a government-wide data linkage and access infrastructure for statistical activities conducted for statistical purposes, as defined in chapter 35 of title 44, United States Code.

(2) ESTABLISHMENT.—Not later than one year after the date of enactment of this Act, the Director shall establish a National Secure Data Service demonstration project. The National Secure Data Service demonstration project shall be—

(A) aligned with the principles, best practices, and priority actions recommended by the Advisory Committee on Data for Evidence Building, to the extent feasible; and

(B) operated directly by or via a contract that is managed by the National Center for Science and Engineering Statistics.

(3) DATA.—In carrying out this subsection, the Director shall engage with Federal and State agencies to collect, acquire, analyze, report, and disseminate statistical data in the United States and other nations to support government-wide evidence-building activities consistent with the Foundations for Evidence-Based Policymaking Act of 2018.

(4) PRIVACY AND CONFIDENTIALITY PROTECTIONS.—If the Director issues a management contract under paragraph (2), the awardee shall be designated as an "agent" under chapter 35 of title 44, United States Code, subchapter III, section 3561 et seq., with all requirements and obligations for protecting confidential information delineated in the Confidential Information Protection and Statistical Efficiency Act of 2018 and the Privacy Act of 1974.

(5) TECHNOLOGY.—In carrying out this subsection, the Director shall consider application and use of systems and technologies that incorporate protection measures to reasonably ensure confidential data and statistical products are protected in accordance with obligations under chapter 35 of title 44, United States Code, subchapter III, section 3561 et seq., including systems and technologies that ensure raw data and other sensitive inputs are not accessible to recipients of statistical outputs from the National Secure Data Service demonstration project.

(6) TRANSPARENCY.—The National Secure Data Service established under paragraph (2) shall maintain a public website with up-to-date information on supported projects.

(7) REPORT.—Not later than 2 years after the date of enactment of this Act, the National Secure Data Service demonstration project established under paragraph (2) shall submit a report to Congress that includes—

(A) a description of policies for protecting data, consistent with applicable federal law;

(B) a comprehensive description of all completed or active data linkage activities and projects;

(C) an assessment of the effectiveness of the demonstration project for mitigating risks and removing barriers to a sustained implementation of the National Secure Data Service as recommended by the Commission on Evidence-Based Policymaking; and

(D) if deemed effective by the Director, a plan for scaling up the demonstration project to facilitate data access for evidence building while ensuring transparency and privacy.

(8) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the Director to carry out this subsection $9,000,000 for each of fiscal years 2022 through 2026.

SEC. 9. DIRECTORATE FOR SCIENCE AND ENGINEERING SOLUTIONS.

(a) ESTABLISHMENT.—Subject to the availability of appropriated funds, there is established within the Foundation the Directorate for Science and Engineering Solutions to advance research and development solutions to address societal and national challenges for the benefit of all Americans.

(b) PURPOSE.—The purpose of the Directorate established under subsection (a) is to support use-inspired research, accelerate the translation of Foundation-supported fundamental research and to advance technologies, facilitate commercialization and use of Federally funded research, and expand the pipeline of United States students and researchers in areas of societal and national importance.

(c) ACTIVITIES.—The Director shall achieve the purposes described in subsection (b) by awarding financial assistance through the Directorate to—

(1) support transformational advances in use-inspired and translational research through diverse funding mechanisms and models, including convergence accelerators;

(2) translate research into science and engineering innovations, including through developing innovative approaches to connect research with societal outcomes, developing approaches to technology transfer that do not rely only on traditional market and commercialization tools, education and training for students and researchers on engaging with end users and the public, partnerships that facilitate research uptake, application, and scaling, prototype development,

entrepreneurial education, developing tech-to-market strategies, and partnerships that connect research products to businesses, accelerators, and incubators and encourage the formation and growth of new companies;

(3) develop and expand sustainable and mutually-beneficial use-inspired and translational research and development partnerships and collaborations among institutions of higher education, including minority serving institutions and emerging research institutions, non-profit organizations, labor organizations, businesses and other for-profit entities, Federal or State agencies, community organizations, other Foundation directorates, national labs, field stations and marine laboratories, international entities as appropriate, binational research and development foundations and funds, excluding foreign entities of concern, and other organizations;

(4) build capacity for use-inspired and translational research at institutions of higher education, including necessary administrative support;

(5) expand opportunities for researchers to contribute to use-inspired and translational research including through support for workshops and conferences, targeted incentives and training, and multidisciplinary research centers;

(6) support the education, mentoring, and training of undergraduate students, graduate students, and postdoctoral researchers in use-inspired and translational approaches to research and entrepreneurship in key focus areas identified under subsection (g) through scholarships, fellowships, and traineeships;

(7) support translational research infrastructure, including platforms and testbeds, data management and software tools, and networks and communication platforms for interactive and collective learning and information sharing;

(8) identify social, behavioral, and economic drivers and consequences of technological innovations; and

(9) ensure the programmatic work of the Directorate and Foundation incorporates a worker perspective through participation by labor organizations and workforce training organizations.

(d) ASSISTANT DIRECTOR.—

(1) IN GENERAL.—The Director shall appoint an Assistant Director responsible for the management of the Directorate established under this section.

(2) TERM LIMIT.—The Assistant Director appointed under paragraph (1) shall serve a term lasting no longer than 4 years.

(3) QUALIFICATIONS.—The Assistant Director shall be an individual, who by reason of professional background and experience, is specially qualified to—

(A) advise the Director on all matters pertaining to use-inspired and translational research, development, and commercialization at the Foundation, including partnership with the private sector and other users of Foundation funded research; and

(B) develop and implement the necessary policies and procedures to promote a culture of use-inspired and translational research within the Directorate and across the Foundation and carry out the responsibilities under paragraph (4).

(4) RESPONSIBILITIES.—The responsibilities of the Assistant Director shall include—

(A) advising the Director on all matters pertaining to use-inspired and translational research and development activities at the Foundation, including effective practices for convergence research;

(B) identifying opportunities for and facilitating coordination and collaboration, where appropriate, on use-inspired and translational research, development, commercialization, and societal application activities—

(i) among the offices, directorates, and divisions within the Foundation; and

(ii) between the Foundation and stakeholders in academia, the private sector, including non-profit entities, labor organizations, Federal or State agencies, and international entities, as appropriate;

(C) ensuring that the activities carried out under this section are not duplicative of activities supported by other parts of the Foundation or other relevant Federal agencies;

(D) approving all new programs within the Directorate;

(E) developing and testing diverse merit-review models and mechanisms for selecting and providing awards for use-inspired and translational research and development at different scales, from individual investigator awards to large multi-institution collaborations;

(F) assessing the success of programs;

(G) administering awards to achieve the purposes described in subsection (b); and

(H) performing other such duties pertaining to the purposes in subsection (b) as are required by the Director.

(5) RELATIONSHIP TO THE DIRECTOR.—The Assistant Director shall report to the Director.

(6) RELATIONSHIP TO OTHER PROGRAMS.—No other directorate within the Foundation shall report to the Assistant Director.

(e) ADVISORY COMMITTEE.—

(1) IN GENERAL.—In accordance with the Federal Advisory Committee Act (5 U.S.C. App.) the Director shall establish an advisory committee to assess, and make recommendations regarding, the activities carried out under this section.

(2) MEMBERSHIP.—The advisory committee members shall—

(A) be individuals with relevant experience or expertise, including individuals from industry and national labs, educators, academic subject matter experts, including individuals with knowledge of the technical and social dimensions of science and technology, technology transfer experts, labor organizations, and representatives of civil society, community organizations, and other nongovernmental organizations; and

(B) consist of at least 10 members broadly representative of stakeholders, including no less than 3 members from the private sector, none of whom shall be an employee of the Federal Government.

(3) RESPONSIBILITIES.—The Committee shall be responsible for—

(A) reviewing and evaluating activities carried out under this section; and

(B) assessing the success of the Directorate in and proposing new strategies for fulfilling the purposes in subsection (b).

(f) EXISTING PROGRAMS.—The Convergence Accelerator, the Growing Convergence Research Big Idea, and any other program, at the discretion of the Director, may be managed by the Directorate.

(g) FOCUS AREAS.—In consultation with the Assistant Director, the Board, and other Federal agencies and taking into account advice under subsection (e), the Director shall identify, and regularly update, up to 5 focus areas to guide activities under this section. In selecting such focus areas, the Director shall consider the following societal challenges:

(1) Climate change and environmental sustainability.

(2) Global competitiveness and domestic job creation in critical technologies.

(3) Cybersecurity.

(4) National security.

(5) STEM education and workforce.

(6) Social and economic inequality.

(h) TECHNOLOGY RESEARCH INSTITUTES.—

(1) IN GENERAL.—The Director may award grants and cooperative agreements to institutions of higher education, or consortia thereof, for the planning, establishment, and support of Technology Research Institutes in key technology areas, as determined by the Director.

(2) USES OF FUNDS.—Funds awarded under this section may be used by a Technology Research Institute to—

(A) conduct fundamental research to advance innovation in a key technology;

(B) conduct research involving a key technology to solve challenges with social, economic, health, scientific, and national security implications;

(C) further the development, adoption, and commercialization of innovations in key technology focus areas, including through partnership with other Federal agencies and Federal laboratories, industry, including startup companies, labor organizations, civil society organizations, and state and local, and Tribal governments.

(D) develop and manage multi-user research testbeds and instrumentation for key technologies;

(E) develop and manage an accessible repository, as appropriate, for research data and computational models relevant to the relevant key technology field, consistent with applicable privacy and intellectual property laws;

(F) convene national workshops for researchers and other stakeholders in that technology area;

(G) establish traineeship programs for graduate students who pursue research related to the technology leading to a masters or doctorate degree by providing funding and other assistance, and by providing graduate students opportunities for research experiences in government or industry related to the students' studies in that technology area;

(H) engage in outreach and engagement to broaden participation in technology research and education; and

(I) support such other activities that the Director determines appropriate.

(3) CONSIDERATIONS.—In making awards under this section, the Director may consider the extent to which the activities proposed—

(A) have the potential to create an innovation ecosystem, or enhance existing ecosystems, to translate Technology Research Institute research into applications and products, as appropriate to the topic of each Institute;

(B) support transdisciplinary research and development across multiple institutions of higher education and organizations;

(C) support transdisciplinary education activities, including curriculum development, research experiences, and faculty professional development across undergraduate, graduate, and professional academic programs;

(D) involve partnerships with multiple types of institutions, including emerging research institutions, HBCUs, and minority serving institutions, and with other Federal agencies, Federal laboratories, industry, state, local, and Tribal governments, labor organizations, civil society organizations, and other entities that may use or be affected by the technology; and

(E) include a component that addresses the ethical, societal, safety, and security implications relevant to the application of the technology.

(4) DURATION.—

(A) INITIAL PERIOD.—An award under this section shall be for an initial period of 5 years.

(B) RENEWAL.—An established Technology Institute may apply for, and the Director may grant, extended funding for periods of 5 years on a merit-reviewed basis.

(5) APPLICATION.—An institution of higher education or consortia thereof seeking financial assistance under this section shall submit to the Director an application at such time, in such manner, and containing such information as the Director may require.

(6) COMPETITIVE, MERIT-REVIEW.—In making awards under the section, the Director shall—

(A) use a competitive, merit review process that includes peer review by a diverse group of individuals with relevant expertise from both the private and public sectors; and

(B) ensure the focus areas of the Institute do not substantially and unnecessarily duplicate the efforts of any other Technology Research Institute or any other similar effort at another Federal agency.

(7) COLLABORATION.—In making awards under this section, the Director may collaborate with Federal departments and agencies whose missions contribute to or are affected by the technology focus area of the institute.

(i) ENTREPRENEURIAL FELLOWSHIPS.—

(1) IN GENERAL.—The Director shall award fellowships to Ph.D.-trained scientists and engineers to help develop leaders capable of maturing promising ideas and technologies from lab to market and forge connections between academic research and government, industry, and finance.

(2) APPLICATIONS.—An applicant for a fellowship under this subsection shall submit to the Director an application at such time, in such manner, and containing such information as the Director may require. At a minimum, the Director shall require that applicants

(A) have completed a doctoral degree in a STEM field no more than 5 years prior to the data of the application; and

(B) have included in the application a letter of support from the intended host institution that describes how the fellow will be embedded in that institution's research environment.

(3) OUTREACH.—The Director shall conduct program outreach to recruit fellowship applicants—

(A) from diverse research institutions;

(B) from all regions of the country; and

(C) from groups historically underrepresented in STEM fields;

(4) The Director may enter into an agreement with a third-party entity to administer the fellowships, subject to the provisions of this subsection.

(5) AUTHORIZATION OF APPROPRIATIONS.—There is authorized to be appropriated to the Director $100,000,000 for fiscal years 2022 through 2026, to carry out the activities outlined in this subsection.

(j) LOW-INCOME SCHOLARSHIP PROGRAM.—

(1) IN GENERAL.—The Director of the National Science Foundation (referred to in this section as the "Director") shall award scholarships to low-income indi-

viduals to enable such individuals to pursue associate, undergraduate, or graduate level degrees in mathematics, engineering, or computer science.

(2) ELIGIBILITY.—

(A) IN GENERAL.—To be eligible to receive a scholarship under this section, an individual—

(i) must be a citizen of the United States, a national of the United States (as defined in section 1101(a) of title 8), an alien admitted as a refugee under section 1157 of title 8, or an alien lawfully admitted to the United States for permanent residence;

(ii) shall prepare and submit to the Director an application at such time, in such manner, and containing such information as the Director may require; and

(iii) shall certify to the Director that the individual intends to use amounts received under the scholarship to enroll or continue enrollment at an institution of higher education (as defined in section 1001(a) of title 20) in order to pursue an associate, undergraduate, or graduate level degree in mathematics, engineering, computer science, or other technology and science programs designated by the Director.

(B) ABILITY.—Awards of scholarships under this section shall be made by the Director solely on the basis of the ability of the applicant, except that in any case in which 2 or more applicants for scholarships are deemed by the Director to be possessed of substantially equal ability, and there are not sufficient scholarships available to grant one to each of such applicants, the available scholarship or scholarships shall be awarded to the applicants in a manner that will tend to result in a geographically wide distribution throughout the United States of recipients' places of permanent residence.

(3) SCHOLARSHIP AMOUNT AND RENEWAL.—The amount of a scholarship awarded under this section shall be determined by the Director. The Director may renew scholarships for up to 5 years.

(4) AUTHORIZATION.—Of amounts authorized for the Directorate for Science and Engineering Solutions, $100,000,000 shall be authorized for this program.

(k) TRANSFER OF FUNDS.—

(1) IN GENERAL.—Funds made available to carry out this section shall be available for transfer to other offices, directorates, or divisions within the Foundation for such use as is consistent with the purposes for which such funds are provided.

(2) PROHIBITION ON TRANSFER FROM OTHER OFFICES.—No funds shall be available for transfer to the Directorate established under this section from other offices, directorates, or divisions within the Foundation.

(l) AUTHORITIES.—In addition to existing authorities available to the Foundation, the Director may exercise the following authorities in carrying out the activities under this section:

(1) AWARDS.—In carrying out this section, the Director may provide awards in the form of grants, contracts, cooperative agreements, cash prizes, and other transactions.

(2) APPOINTMENTS.—The Director shall have the authority to make appointments of scientific, engineering, and professional personnel for carrying out research and development functions which require the services of specially qualified personnel relating to the focus areas identified under subsection (g) and such other areas of national research priorities as the Director may determine.

(m) ETHICAL, LEGAL, AND SOCIETAL CONSIDERATIONS.—The Director shall establish policies regarding engagement with experts in the social dimensions of science and technology and set up formal avenues for public input, as appropriate, to ensure that ethical, legal, and societal considerations are explicitly integrated into the priorities for the Directorate, including the selection of focus areas under subsection (g), the award-making process, and throughout all stages of supported projects.

(n) REPORTS AND ROADMAPS.—

(1) ANNUAL REPORT.—The Director shall provide to the relevant authorizing and appropriations committees of Congress an annual report describing projects supported by the Directorate during the previous year.

(2) ROADMAP.—Not later than 1 year after the date of enactment of this Act, the Director shall provide to the relevant authorizing and appropriations committees of Congress a roadmap describing the strategic vision that the Directorate will use to guide investment decisions over the following 3 years.

(o) EVALUATION.—

(1) IN GENERAL.—After the Directorate has been in operation for 6 years, the National Science Board shall evaluate how well the Directorate is achieving the purposes identified in subsection (b), including an assessment of the impact of Directorate activities on the Foundation's primary science mission.

(2) INCLUSIONS.—The evaluation shall include—

(A) a recommendation on whether the Directorate should be continued or terminated; and

(B) a description of lessons learned from operation of the Directorate.

(3) AVAILABILITY.—On completion of the evaluation, the evaluation shall be made available to Congress and the public.

(p) LIMITATION.—No amounts may be appropriated for the Directorate for each of fiscal years 2022, 2023, 2024, 2025, or 2026 unless—

(1) a specific appropriation is made for the Directorate; and

(2) the amount appropriated for the activities of the Foundation, other than the activities authorized under this section, for each such fiscal year exceeds the amount appropriated for the Foundation for fiscal year 2021, as adjusted for inflation in accordance with the Consumer Price Index published by the Bureau of Labor Statistics of the Department of Labor.

SEC. 10. ADMINISTRATIVE AMENDMENTS.

(a) SUPPORTING VETERANS IN STEM CAREERS.—Section 3(c) of the Supporting Veterans in STEM Careers Act is amended by striking "annual" and inserting "biennial".

(b) SUNSHINE ACT COMPLIANCE.—Section 15 of the National Science Foundation Authorization Act of 2002 is amended—

(1) so that paragraph (3) reads as follows:

"(3) COMPLIANCE REVIEW.—The Inspector General of the Foundation shall conduct a review of the compliance by the Board with the requirements described in paragraph (2) as necessary based on a triennial risk assessment. Any review deemed necessary shall examine the proposed and actual content of closed meetings and determine whether the closure of the meetings was consistent with section 552b of title 5, United States Code."; and

(2) by striking paragraphs (4) and (5) and inserting the following:

"(4) MATERIALS RELATING TO CLOSED PORTIONS OF MEETING.—To facilitate the risk assessment required under paragraph (3) of this subsection, and any subsequent review conducted by the Inspector General, the Office of the National Science Board shall maintain the General Counsel's certificate, the presiding officer's statement, and a transcript or recording of any closed meeting, for at least 3 years after such meeting.".

(c) SCIENCE AND ENGINEERING INDICATORS REPORT SUBMISSION.—Section 4(j)(1) of the National Science Foundation Act of 1950 (42 U.S.C. 1863(j)(1)) is amended by striking "January 15" and inserting "March 15".

SEC. 11. PLANNING AND CAPACITY BUILDING GRANTS.

Section 602 of the American Innovation and Competitiveness Act (42 U.S.C. 1862s–9) is amended—

(1) by redesignating subsection (e) as subsection (f); and

(2) by inserting after subsection (d), the following:

"(e) PLANNING AND CAPACITY BUILDING GRANTS.—

"(1) IN GENERAL.—Under the program established in section 508 of the America COMPETES Reauthorization Act of 2010 (42 U.S.C. 1862p–2) and the activities authorized under this section, the Director shall award grants to eligible entities for planning and capacity building at institutions of higher education.

"(2) ELIGIBLE ENTITY DEFINED.—In this subsection, the term 'eligible entity' means an institution of higher education (or a consortium of such institutions) that, according to the data published by the National Center for Science and Engineering Statistics, is not, on average, among the top 100 institutions in Federal R&D expenditures during the 3 year period prior to the year of the award.

"(3) USE OF FUNDS.—In addition to activities listed under subsection (c), an eligible entity receiving a grant under this subsection may use funds to—

"(A) ensure the availability of staff, including technology transfer professionals, entrepreneurs in residence, and other mentors as required to accomplish the purpose of this subsection;

"(B) revise institution policies, including policies related to intellectual property and faculty entrepreneurship, and taking other necessary steps to implement relevant best practices for academic technology transfer;

"(C) develop new local and regional partnerships among institutions of higher education and between institutions of higher education and private sector entities and other relevant organizations with the purpose of building networks, expertise, and other capacity to identify promising research that may have potential market value and enable researchers to pursue further development and transfer of their ideas into possible commercial or other use;

"(D) develop seminars, courses, and other educational opportunities for students, post-doctoral researchers, faculty, and other relevant staff at institutions of higher education to increase awareness and understanding of entrepreneurship, patenting, business planning, and other areas relevant to technology transfer, and connect students and researchers to relevant resources, including mentors in the private sector; and

"(E) create and fund competitions to allow entrepreneurial students and faculty to illustrate the commercialization potential of their ideas.

"(4) MINIMUM DURATION AND SIZE OF AWARD.—Grants awarded under this subsection shall be at least 3 years in duration and $500,000 in total amount.

"(5) APPLICATION.—An eligible entity seeking funding under this subsection shall submit an application to the Director of the Foundation at such time, in such manner, and containing such information and assurances as such Director may require. The application shall include, at a minimum, a description of how the eligible entity submitting an application plans to sustain the proposed activities beyond the duration of the grant.

"(6) AUTHORIZATION OF APPROPRIATIONS.—From within funds authorized under section 9, there are authorized to carry out the activities under this subsection $40 million for each of fiscal years 2022 through 2026.".

II. PURPOSE OF THE BILL

The purpose of the bill is to authorize funding for the National Science Foundation (NSF) for fiscal years (FY) 2022, 2023, 2024, 2025 and 2026, to provide policy and programmatic direction related to science and engineering research supported by the Foundation, STEM education and broadening participation activities, research infrastructure, and to establish a new Directorate for Science and Engineering Solutions.

III. BACKGROUND AND NEED FOR THE LEGISLATION

NSF is an independent federal agency created by the *National Science Foundation Act of 1950* (P.L. 81–507). NSF's mission to support science and engineering across all disciplines is unique among federal science agencies. NSF currently funds research and education activities at more than 1,800 universities, colleges, and other public and private institutions in 50 states, the District of Columbia and U.S. territories. NSF estimates that in FY 2022 approximately 366,800 people will be directly involved in NSF programs and activities, including senior researchers, postdoctoral associates, graduate and undergraduate students, and K–12 teachers and students.

Although NSF's research and development (R&D) budget accounts for only about 4 percent of all federally funded R&D, the role of NSF in promoting fundamental research is vital to the nation's scientific enterprise, as NSF provides approximately 25 percent of the federal support for basic research conducted at academic institutions. NSF provides the majority of federal academic support for basic research in many science and engineering fields, including computer science, mathematics, biology, social and psychological sciences, and environmental sciences.

The last comprehensive reauthorization of the National Science Foundation was included in the *COMPETES Act of 2010* (P.L. 111–358), which authorized appropriations for NSF for FY 2011, 2012, and 2013. Since that time, individual programs and agency management issues have been addressed through other bills, including the *American Innovation and Competitiveness Act* (P.L. 114–329), and multiagency laws focused on specific research or technology areas, including the *National Quantum Initiative Act* (P.L. 115–

368) and the *National Artificial Intelligence Initiative Act* (P.L. 116–283).

Although NSF-funded research has had a tremendous impact on society, funding for NSF has not been sufficient to maximize the agency's potential contribution to the nation's research enterprise. Funding for NSF has been flat in constant dollars in the decade since the 2010 *COMPETES Act*. NSF is currently able to fund less than one quarter of the grant proposals submitted, and $3 billion of top-rated grant applications are declined. These unfunded proposals represent a rich portfolio of research opportunities. Further, in the last decade, the global landscape of competition in science and technology has changed, with a significant erosion of U.S. leadership. As a result, there is a need to reinvest in the U.S. research enterprise, including by providing increased support for the National Science Foundation's core mission to advance fundamental research while promoting new approaches to advance innovation and solutions to our nation's challenges, including competitiveness, and ensure a STEM ready workforce in the coming decades.

IV. Committee Hearings

Pursuant to Rule XIII clause 3(c)(6)(A), the Committee designates the following hearings as having been used to develop or consider the legislation:

On April 15, 2021, the Science, Space, and Technology Committee held a hearing entitled, "Reimagining Our Innovation Future." The purpose of the hearing was to examine the current outlook for U.S. leadership in science and technology and discuss how new investments and new, inclusive models of partnership in science and technology can be leveraged to ensure continued leadership and address economic, security, environmental, public health, and other societal challenges from the local to the global level. The hearing witnesses included Mr. Norm Augustine; Dr. Frances H. Arnold, Linus Pauling Professor of Chemical Engineering, Bioengineering and Biochemistry at the California Institute of Technology; The Honorable Ernest J. Moniz, President and Chief Executive Officer of the Energy Futures Initiative and Former Secretary of the U.S. Department of Energy; and Dr. Farnam Jahanian, President of Carnegie Mellon University.

On April 28, 2021 and May 6, 2021, the Research and Technology Subcommittee held a two-part hearing entitled, "National Science Foundation: Advancing Research for the Future of U.S. Innovation." The purpose of the hearings was to discuss opportunities and challenges for leveraging and expanding the National Science Foundation mission to continue to advance excellent research; improve STEM education and research training; increase research accessibility, accountability, and security; and accelerate research to address major societal challenges. The Subcommittee considered the merits of the NSF for the Future Act for addressing such opportunities and challenges. The hearing witnesses included Dr. Sethuraman Panchanathan, Director of the National Science Foundation; Dr. Ellen Ochoa, Chair of the National Science Board, Dr. Roger M. Wakimoto, Vice Chancellor for Research and Creative Activities at the University of California, Los Angeles; Ms. Gabriela Cruz Thompson, Director of University Research and Collaboration at Intel Corporation's Intel Labs; Dr. Mahmud Farooque, Associate

Director of the Consortium for Science, Policy and Outcomes and Clinical Associate Professor at the Arizona State University School for the Future of Innovation in Society; Dr. Gerald Blazey, Vice President for Research and Innovation Partnerships at Northern Illinois University; Dr. P. Barry Butler, President of Embry-Riddle Aeronautical University.

V. Committee Consideration and Votes

On March 26, 2021, Chairwoman Eddie Bernice Johnson, Ranking Member Frank Lucas, Chairwoman Haley Stevens, and Ranking Member Michael Waltz introduced H.R. 2225, the *National Science Foundation for the Future Act.* The bill was referred to the House Committee on Science, Space, and Technology.

On May 13, 2021, the Research and Technology Subcommittee met to consider H.R. 2225. Ms. Moore offered an amendment to direct NSF to support research to improve STEM education at community colleges. *The amendment was agreed to on a voice vote.* Ms. Moore offered a second amendment to direct NSF to support water system research and technology development. *The amendment was agreed to on a voice vote.* Mr. Meijer offered an amendment to ensure students getting a master's or doctorate in fields related to cybersecurity are eligible to apply for the Graduate Research Fellowship Program. *The amendment was agreed to on a voice vote.* Mr. Gonzalez offered an amendment to direct NSF to support research on the cybersecurity workforce. *The amendment was agreed to on a voice vote.* Mr. LaTurner offered an amendment highlighting the importance of the EPSCoR program. *The amendment was agreed to on a voice vote.* Mr. Waltz and Mr. Foster offered an amendment to authorize the Office of Security and Policy and direct NSF to require and support the development of online security training modules for the research community. *The amendment was agreed to on a voice vote.* Ms. Wild offered an amendment to expand the scope of activities to include research equipment and instrumentation for resilient engineered infrastructure. *The amendment was agreed to on a voice vote*. Ms. Wild offered a second amendment to direct NSF to support social and behavioral science research on consumer technology and mental health. *The amendment was agreed to on a voice vote.* Mr. Lamb offered an amendment to update the list of technology areas eligible for funding through the NSF's advanced manufacturing research program to include additive manufacturing. *The amendment was agreed to on a voice vote.* Mr. Foster offered an amendment to establish a requirement for grant proposals to include information on computing needs and include information about computing needs and a path toward fully addressing them in its advanced computing roadmap. *The amendment was agreed to on a voice vote.* Mr. Beyer offered an amendment to establish a National Secure Data Service demonstration project. *The amendment was agreed to on a voice vote.* Ms. Stevens offered an amendment to build technology transfer capacity at smaller research institutions. *The amendment was agreed to on a voice vote.* With a quorum present, Chairwoman Stevens moved that the Subcommittee favorably report the bill, H.R. 2225, as amended, to the Full Committee on Science, Space, and Technology. *The motion was agreed to by a voice vote*.

On June 15, 2021, the Full Committee on Science, Space, and Technology met to consider the bill. An amendment was offered by Chairwoman Johnson, which made technical changes to the bill and added provisions in response to stakeholder feedback and Committee Member priorities, including codifying a new Chief Diversity Officer position, updating the Advanced Technological Education program, providing support for research capacity building at non-research-intensive universities and minority-serving institutions, and establishing a new university technology institutes program. *The amendment was agreed to on a voice vote.* Ms. Lofgren offered an amendment to increase the authorized appropriations to $78 billion. *The amendment was agreed to on a voice vote.* Mr. Foster offered and withdrew an amendment expressing the sense of Congress that the authorizations for future years are to be interpreted as having value equivalent to that in 2021. Mr. Babin offered and withdrew an amendment prohibiting any funds authorized in the Act from going to any entity with ties to Confucius Institutes. Ms. Lofgren offered an amendment to expand eligibility for professional development funding to postdoctoral researchers. *The amendment was agreed to on a voice vote.* Ms. Wild offered an amendment to support research on the state of and strategies for supporting graduate student mental health. *The amendment was agreed to on a voice vote.* Mr. Waltz offered an amendment to clarify the areas of focus for the NSF CyberCorps Scholarship for Service program. *The amendment was agreed to on a voice vote.* Mr. Posey offered an amendment to establish a cybersecurity workforce data initiative. *The amendment was agreed to on a voice vote.* Mr. Feenstra offered an amendment to prohibit NSF grantees from participating in malign foreign talent recruitment programs. *The amendment was agreed to on a voice vote.* Mr. McNerney offered an amendment to allow for research related to solar radiation management. *The amendment was agreed to on a voice vote.* Mr. Perlmutter offered an amendment to include wildfire research under the risk and resilience initiative. Mr. Waltz offered an amendment to clarify eligibility of binational research and development organizations. *The amendment was agreed to on a voice vote.* Mr. McNerney offered an amendment to add GPS applications to the precision agriculture technology assessment to be carried out by the Government Accountability Office. *The amendment was agreed to on a voice vote.* Mr. Beyer offered an amendment to support research related to the impact of satellite constellations on NSF science programs. *The amendment was agreed to on a voice vote.* Mr. Lamb offered an amendment to establish a new entrepreneurial fellowship program within the Directorate for Science and Engineering Solutions. *The amendment was agreed to on a voice vote.* Mr. Foster offered an amendment to authorize appropriations for the Scholarships in STEM program. *The amendment was agreed to on a voice vote.*

VI. Summary of Major Provisions of the Bill

Authorizes appropriations for NSF of $12,504,890,000 for FY 2022, $14,620,800,000 for FY 2023, $15,945,020,000 for FY 2024, $17,004,820,000 for FY 2025, and $17,939,490,000 for FY 2026.

Establishes a new centers program to support translational research and development to help scale up effective PreK–12 STEM education innovations. Supports activities and partnerships to

align undergraduate STEM education with workforce needs. Advances policies and research to modernize the training, mentoring, and professional development of graduate students and postdoctoral researchers. Establishes a pilot program to support partnerships that will expand research opportunities to students who attend minority serving institutions or other emerging research institutions. Supports expanded data collection on the nature of the STEM workforce. Authorizes a 50% increase in funding over 5 years for key STEM education programs.

Requires assessment and research activities to improve the implementation of the Broader Impacts merit review criterion. Creates a new requirement for researchers to prepare a statement on possible security or other risks to society from their research. Expands access to data and other research products resulting from Foundation-funded projects through new data stewardship requirements and investments in open science tools and infrastructure. Supports research related to climate change, violence, the food-energy-water system, sustainable chemistry, risk and resilience, UAV technologies, clean water systems, technology and mental health, critical minerals, precision agriculture, and the impact of satellite constellations on NSF- funded science. Codifies the Office of Research Security and Policy and the Chief of Research Security position to provide guidance and resources to researchers and funds the development of training, resources, and tools to help institutions and researchers understand and mitigate security risks. Establishes a prohibition on participation by NSF-funded researchers in malign talent recruitment programs.

Supports research-enabling infrastructure, including an increase to the Mid-Scale Research Infrastructure program, support for helium conservation equipment, and a roadmap for meeting the research community's growing need for advanced computing capabilities.

Establishes a new Directorate for Science and Engineering Solutions (SES) to support an ecosystem of non-traditional partnerships and collaborations in use-inspired and translational research, including through support for university technology institutes, technology transfer capacity building activities, and entrepreneurial fellowships.

VII. Section-by-Section Analysis (By Title and Section)

Sec. 1. Short title

Sec. 2. Findings

Sec. 3. Definitions

Sec. 4. Authorization of Appropriation

Sec. 5. STEM education and workforce training

(a) PreK–12 STEM Education—Supports a decadal survey to be carried out by the National Academies to identify research priorities in PreK–12 STEM education and an additional study on barriers to the widespread implementation of STEM education innovations. Establishes a program to fund multidisciplinary research and translation centers to scale STEM education innovations.

(b) Undergraduate STEM Education—Supports research and development to improve the alignment of undergraduate STEM education and training with workforce needs. Updates the Advanced Technological Education program to establish a network of centers for science and technical education.

(c) Advanced Technological Manufacturing Act—Amends and doubles the authorized budget for the Advanced Technological Education program.

(d) Graduate STEM Education—Expands requirement for funding proposals to include a mentoring plan to graduate students. Supports activities to facilitate career exploration for graduate students and postdoctoral researchers. Creates a requirement for funding proposals to include individual development plans for graduate students and postdoctoral researchers and provides supplemental funding to facilitate professional development activities. Supports research on the graduate education system. Updates the Graduate Research Fellowship Program to address workforce demand, increase the cost of education allowance, and recruit a more diverse pool of applicants. Requires an evaluation of mechanisms for supporting graduate student education and training.

(e) STEM Workforce Data—Requires a portfolio analysis of Foundation investments in the skilled technical workforce. Requires an assessment of the feasibility and benefits of adding rotating questions/topic modules to existing National Center for Science and Engineering Statistics (NCSES) surveys. Requires an assessment of the feasibility and benefits of incorporating new questions to existing (NCSES) surveys on a range of topics related to the nature of the STEM workforce and the workforce environment. Requires a Government Accountability Office evaluation of the capacity of NCSES to meet current and future needs for data on the STEM workforce.

(f) Cyber Workforce Development Research and Development—Supports research on the cyber workforce.

(g) Federal Cyber Scholarship-for-Service Program—Clarifies that cybersecurity-related aspects of artificial intelligence, quantum computing, aerospace, and other fields are within the scope of the NSF CyberCorps Scholarship-for-Service program.

(h) Cybersecurity Workforce Data Initiative—Establishes a data initiative to measure the cybersecurity workforce.

Sec. 6. Broadening participation

(a) Presidential Awards for Excellence in Mathematics and Science Teaching—Updates the program to allow for the selection of at least one teacher each from the Commonwealth of the Northern Mariana Islands, American Samoa, the Virgin Islands of the United States, and Guam.

(b) Robert Noyce Teacher Scholarship Program Update—Requires outreach to historically Black colleges and universities, minority institutions, higher education programs that serve veterans and rural communities, and emerging research institutions.

(c) NSF INCLUDES Initiative—Codifies the NSF INCLUDES program.

(d) Broadening Participation on Major Facilities Awards—Establishes a requirement for organizations seeking management awards to demonstrate experience and capabilities in employing best prac-

tices in broadening participation and directs the Foundation to consider implementation of such practices in oversight of the award.

(e) Partnerships with Emerging Research Institutions—Establishes a pilot program to require multi-institution proposals seeking funding in excess of $1 million be submitted in partnership with emerging research institutions and requires annual reporting on such grants to include feedback directly from participating emerging research institutions.

(f) Tribal Colleges and Universities Program Update—Expands the scope of the Tribal Colleges and Universities program to include support for activities to build graduate programs.

(g) Diversity in Tech Research—Supports organizational research, including research on diversity, equity, and inclusion in the technology sector.

(h) Continuing Support for EPSCoR—Expresses the sense of Congress that the Foundation should continue to support research and education capacity building through the EPSCoR program.

(i) Fostering STEM Research Diversity and Capacity Program—Supports research capacity building for research institutions not in the top 100 of Federal research funding, including support for developing and expanding research programs, faculty professional development, stipends for students, acquisition of research instrumentation, and administrative research support.

(j) Capacity Building Program for Developing Universities—Supports administrative capacity building activities to increase the capacity of minority serving institutions to compete for and manage Foundation research and development awards.

(k) Chief Diversity Officer of the NSF—Establishes a Chief Diversity Officer position charged with providing guidance and leading the Foundation's strategic planning to broaden participation of individuals and institutions in NSF-funded activities.

Sec. 7. Fundamental research

(a) Broader Impacts—Directs an assessment of the application of the Broader Impacts review criterion across the Foundation and provides support for activities to improve its implementation.

(b) Sense of Congress—Expresses the sense of Congress that the Foundation should continue to identify opportunities to reduce administrative burden on researchers.

(c) Research Integrity and Security—Directs the Foundation to take steps to address security risks to Foundation-supported research, including through the Office of Research Security and Policy, the appointment of a Chief of Research Security, the development of an online resources to inform institutions and researchers of security risks, support for the establishment of a risk assessment center, and support for research on misconduct in the research environment. Authorizes NSF to request proposal supporting documentation, including talent recruitment program contracts and directs NSF to require and support the development of research security training. Supports an update to the National Academies Guide to Responsible Conduct in Research. Establishes a prohibition on participation by NSF-funded researchers in malign foreign talent recruitment programs sponsored by foreign countries of concern.

(d) Research Ethics—Expresses the sense of Congress with respect to potential ethical, social, safety, and security implications

of research in emerging technologies. Establishes a requirement for the inclusion of an ethics statement in award proposals. Supports research on the ethical and social implications of Foundation-supported research and the development of approaches for risk mitigation.

(e) Research Reproducibility and Replicability—Establishes a requirement for the inclusion of a machine-readable data management plan in award proposals. Requires the development of a set of criteria for trusted open repositories and provides support for the development of open data repositories to address any gaps. Requires the establishment of a single web-based point of access for data, software, and code resulting from Foundation funded projects. Directs the Foundation to ensure that data resulting from Foundation-funded projects is made available in trusted open repositories. Supports research and development of tools and infrastructure to support research reproducibility.

(f) Climate Change Research—Supports research to improve understanding and predictability of the climate system and climate-change risk, resilience, and mitigation and to educate and train climate researchers.

(g) Violence Research—Supports research related to violence.

(h) Social, Behavioral, and Economic Sciences—Directs the Foundation to take steps to ensure the participation of social, behavioral, and economic science researchers in cross-cutting agency programs.

(i) Measuring Impacts of Federally Funded R&D—Supports research related to the impacts of Federally funded research and development on society, the economy, and the workforce.

(j) Food-Energy-Water Research—Supports research related to the food-energy-water system.

(k) Biological Field Stations and Marine Laboratories—Supports research instrumentation and other infrastructure at biological field stations and marine laboratories.

(l) Sustainable Chemistry Research and Education—Establishes a program to support research related to sustainable chemistry.

(m) Risk and Resilience Research—Supports research related to risk assessment and predictability and development of tools and technologies for increased resilience.

(n) UAV Technologies—Supports research and development related to unmanned aerial vehicle technologies.

(o) Leverage International Expertise in Research—Directs NSF to explore opportunities to support international research collaboration.

(p) Biological Research Collections—Supports databases and tools to secure and improve biological research collections. Establishes a requirement for the inclusion of a specimen management plan in award proposals. Supports the establishment of a center to facilitate coordination and data sharing.

(q) Clean Water Research and Technology Acceleration—Supports water system research and technology development.

(r) Technology and Behavioral Science Research—Supports social and behavioral science research on consumer technology and mental health.

(s) Manufacturing Research Amendment—Updates the list of technology areas eligible for funding through the NSF's advanced

manufacturing research program to include additive and continuous manufacturing.

(t) Critical Minerals Mining Research and Development—Supports research to advance critical minerals mining strategies and technologies.

(u) Study of AI Research Capacity—Directs the Foundation to conduct or support a study on artificial intelligence research capacity at U.S. universities.

(v) Advancing IoT for Precision Agriculture—Supports research to improve the use of advanced sensing systems in rural and agricultural areas, highlights improving productivity in agriculture as a goal for activities funded under the Advanced Technological Education program, and supports a Government Accountability Office technology assessment of precision agriculture technologies.

(w) Astronomy and Satellite Constellations—Supports research on the impact of satellite constellations on ground-based astronomy and the development of mitigation strategies.

Sec. 8. Research infrastructure

(a) Facility Operations and Maintenance—Requires the continuation of the Facility Operation Transition pilot program in the Facilities Construction (MREFC) account to provide cost sharing with the managing directorate during the first five years of operation.

(b) Reviews—Directs periodic assessment of the cost and benefits of extending the operation of research facilities beyond their planned operational lifespan.

(c) Helium Conservation—Expands eligibility for the Major Research Instrumentation program to include the purchase, installation, operation, and maintenance of equipment and instrumentation to conserve helium.

(d) Advanced Computing—Directs the Foundation to collect information and regularly publish a report on the computational needs for Foundation-funded projects. Directs the Foundation to develop and regularly update an advanced computing roadmap.

(e) National Secure Data Service—Establishes a National Secure Data Service demonstration project.

Sec. 9. Directorate for Science and Engineering Solutions

(a) Establishment—Establishes a new directorate to accelerate use-inspired and translational research and development to advance solutions to pressing societal challenges.

(b) Purposes—Describes the purposes of the directorate.

(c) Activities—Describes activities to be supported by the directorate, including support for use-inspired research and translation, the development of innovative approaches to connect research with societal outcomes, the development of partnerships and collaborations that include traditional and nontraditional players, support for translational research infrastructure and capacity building, and support for education and training of students.

(d) Assistant Director—Establishes an Assistant Director position to head the directorate.

(e) Advisory Committee—Establishes an advisory committee to assess the activities carried out by the directorate and propose new strategies for fulfilling the purpose of the directorate.

(f) Existing Programs—Authorizes the Foundation to place existing programs under the management of the directorate.

(g) Focus Areas—Directs the Foundation to identify focus areas to guide directorate activities and to consider focus areas that contribute to a list of societal challenge—climate change and environmental sustainability, global competitiveness, cybersecurity, national security, STEM education and workforce, and social and economic inequality.

(h) Technology Research Institutes—Supports Technology Research Institutes to advance transdisciplinary research, development, and commercialization in key technology areas, including through support for multi-user testbeds and instrumentation, accessible repositories for research data and computational models, workshops, and graduate student traineeships.

(i) Planning and Capacity Building Grants—Supports technology transfer capacity building for smaller research institutions, including support for technology transfer expert staff, private sector partnerships, and education and training of students and researchers.

(j) Entrepreneurial Fellowships—Establishes a fellowship program to provide scientists with entrepreneurial training.

(k) Low-Income Scholarship Program—Authorizes appropriations for the Scholarships in STEM program.

(l) Transfer of Funds—Authorizes the transfer of funds to other Foundation offices, directorates, or divisions and prohibits the reverse transfer of funds.

(m) Authorities—Provides flexible funding and hiring authorities.

(n) Ethical, Legal, and Societal Considerations—Directs the Foundation to take steps to ensure that ethical, legal, and societal considerations are integrated into the activities of the directorate.

(o) Reports and Roadmaps—Directs the Foundation to provide an annual report describing the activities of the directorate and a roadmap describing the strategic vision that will guide future investment decisions.

(p) Evaluation—Directs an evaluation of the success of the directorate in achieving its purpose to advance solutions to pressing societal challenges through use-inspired and translational research.

(q) Limitation—Prohibits the appropriation of funds for the directorate unless sufficient funding is appropriated to support the directorate without drawing funding from other Foundation activities.

Sec. 10. Administrative amendments

(a) Supporting Veterans in STEM Careers—Provides a technical fix.

(b) Sunshine Act Compliance—Relaxes the requirement for an annual review and report related to Sunshine Act Compliance of the National Science Board and authorizes a risk- based approach to scheduling compliance reviews.

(c) Science and Engineering Indicators Report Submission—Changes the deadline for a biennial report on science and engineering indicators from January 15 to March 15.

VIII. Committee Views

Earth System Science—The Committee notes the approach of federal agencies to climate science is increasingly interdisciplinary

because understanding the interplay of atmospheric, oceanic, hydrologic, and cryospheric processes is critical to understanding our planet as a coupled earth system. As such, while there are discrete functions and programs best managed within the Foundation's existing earth, ocean and atmospheric divisions, the Committee believes earth system science priorities may be best managed at the Geosciences Directorate level. Such structure could enable the earth system science community to achieve critical cross cutting outcomes, including interdisciplinary observation campaigns, cross-disciplinary analysis of data, and improved computational models to advance science and inform decision makers. The Committee also believes that NOAA, NASA, the Department of Energy and NIST play a key role in studying climate science and it is critical that all agencies coordinate activities to avoid duplication and leverage each agency's unique research capabilities. The Committee looks forward to the upcoming release of the National Academies study sponsored by NSF to develop a clear vision for a systems approach to studying the Earth. The Committee expects the Foundation will provide to Congress, concurrent with its fiscal year 2023 budget submission, a description of what steps it is taking at the intersection of the atmospheric, oceanic, hydrologic, and cryospheric sciences to align key functions and activities at the directorate level, including how the Foundation is implementing or plans to implement the NASEM study committee's specific recommendations.

Collaboration with Tribal Nations—The Committee supports the Foundation's efforts to bring together scientists and other stakeholders from diverse backgrounds, disciplines, geographic locations, and institution types to advance research in areas of societal and national interest. The Committee encourages NSF to promote and facilitate meaningful and culturally sensitive collaborations between academic scientists and American Indian, Alaska Native and Native Hawaiian Tribal Nations and organizations in Foundation-supported activities.

Students in U.S. Territories—Within the STEM programs the National Science Foundation supports, the Committee encourages NSF to support research focused on understanding the unique challenges in STEM education and learning within the U.S. Territories.

Mentoring Plans—The Committee intends for NSF to develop a template document to aid researchers in fulfilling the requirement for the inclusion in a grant proposal of a plan for mentoring graduate students and postdoctoral researchers supported by the grant.

Continuous Manufacturing—The Committee intends for continuous manufacturing of biological products to include research on pharmaceutical ingredients and small synthetic molecules.

Malign Talent Recruitment Program—It is the Committee's intent that the National Science Foundation should use its discretion in enforcing this section to ensure it is preventing only those interactions that are "malign." The goal of this section is not to prevent productive partnerships and research collaborations with universities or faculty in a foreign country of concern. A productive research collaboration involves a two-way mutually beneficial exchange of information on a discrete, defined research project, or provides funding for an unencumbered discrete, defined research project in the U.S. that is open to publication and in which intellec-

tual property is controlled by a U.S. institution and is with a partner that has made a commitment to adhere to the highest standards for ethical conduct of research. Its goal must not be solely to increase the scientific capacity of the foreign country. Furthermore, the Committee does not intend for joint scholarly publications, presentations, and other science diplomacy and science policy activities to be considered malign foreign programs. The Committee affirms that international partnerships and collaborations are a key aspect of U.S. innovation and growth, and that the R&D ecosystem should remain as open as possible to encourage such productive partnerships and collaborations.

The Committee understands that malign talent programs and activities continue to evolve, and that the Foundation will need to work with the national security and intelligence communities to continue to define and identify malign foreign programs and activities and communicate those characteristics to the research community. The Committee generally understands the hallmarks of programs that are malign, include requirements to provide information to the foreign country beyond any collaborative research project, requirements to recruit other researchers to assist the foreign country, and requirements to devote disproportionate amounts of time to the needs of the foreign country, creating a conflict of interest or commitment. Other hallmarks may include requiring the U.S. researcher to spend time in the other country, or requiring individuals from the foreign country to spend time on the U.S. campus beyond what would seem relevant to a specific research project, or requiring intellectual property to be dealt with in a manner that favors the foreign country. Any talent program that seeks to prevent the disclosure of information about the participation of a U.S. researcher should be considered inherently malign.

Technology Transfer—The Committee believes that the National Science Foundation should allow public and private nonprofit technology transfer organizations that facilitate or accelerate commercialization of technologies developed by one or more institutions of higher education to apply as principal investigators for grants that are focused on commercialization of technology.

Industry Engagement—The Committee encourages NSF to utilize its full authority to further its progress in partnering with industry to support research and development activities related to industries of the future. It is especially important that the Foundation look at utilizing these partnerships as it establishes the Science and Engineering Solutions Directorate.

IX. Cost Estimate

Pursuant to clause 3(c)(2) of rule XIII of the Rules of the House of Representatives, the Committee adopts as its own the estimate of new budget authority, entitlement authority, or tax expenditures or revenues contained in the cost estimate prepared by the Director of the Congressional Budget Office pursuant to section 402 of the Congressional Budget Act of 1974.

X. Congressional Budget Office Cost Estimate

No Congressional Budget Office Cost Estimate for H.R. 2225 at time of filing.

XI. Federal Mandates Statement

H.R. 2225 contains no unfunded mandates.

XII. Committee Oversight Findings and Recommendations

The Committee's oversight findings and recommendations are reflected in the body of this report.

XIII. Statement on General Performance Goals and Objectives

The goals and objectives of H.R. 2225 are to authorize funding for NSF for FY 2022, 2023, 2024, 2025 and 2026, to provide policy and programmatic direction related to STEM education and broadening participation activities, research infrastructure, and science and engineering research supported by the Foundation, and to establish a new Directorate for Science and Engineering Solutions.

XIV. Federal Advisory Committee Statement

The functions of the advisory committee authorized in H.R. 2225 are not currently being nor could they be performed by one or more agencies or by enlarging the mandate of another existing advisory committee.

XV. Duplication of Federal Programs

Pursuant to clause 3(c)(5) of rule XIII of the Rules of the House of Representatives, the Committee finds that no provision of H.R. 2225 establishes or reauthorizes a program of the federal government known to be duplicative of another federal program, including any program that was included in a report to Congress pursuant to section 21 of Public Law 111–139 or the most recent Catalog of Federal Domestic Assistance.

XVI. Earmark Identification

Pursuant to clause 9(e), 9(f), and 9(g) of rule XXI, the Committee finds that H.R. 2225 contains no earmarks, limited tax benefits, or limited tariff benefits.

XVII. Applicability to the Legislative Branch

The Committee finds that H.R. 2225 does not relate to the terms and conditions of employment or access to public services or accommodations within the meaning of section 102(b)(3) of the Congressional Accountability Act (Public Law 104–1).

XVIII. Statement on Preemption of State, Local, or Tribal Law

This bill is not intended to preempt any state, local, or tribal law.

XIX. Changes in Existing Law Made by the Bill, as Reported

In compliance with clause 3(e) of rule XIII of the Rules of the House of Representatives, changes in existing law made by the bill, as reported, are shown as follows (existing law proposed to be omitted is enclosed in black brackets, new matter is printed in italics,

and existing law in which no change is proposed is shown in roman):

STEM EDUCATION ACT OF 2015

* * * * * * *

SEC. 3. INFORMAL STEM EDUCATION.

(a) GRANTS.—The Director of the National Science Foundation, through the Directorate for Education and Human Resources, shall continue to award competitive, merit-reviewed grants to support—

(1) research and development of innovative out-of-school STEM learning and emerging STEM learning environments in order to improve STEM learning outcomes and engagement in STEM;

(2) research that advances the field of informal STEM education; and

(3) a national partnership of institutions involved in informal STEM learning.

(b) USES OF FUNDS.—Activities supported by grants under this section may encompass a single STEM discipline, multiple STEM disciplines, or integrative STEM initiatives and shall include—

(1) research and development that improves our understanding of learning and engagement in informal environments, including the role of informal environments in broadening participation in STEM;

(2) design and testing of innovative STEM learning models, programs, and other resources for informal learning environments to improve STEM learning outcomes and increase engagement for K-12 students, K-12 teachers, and the general public, including design and testing of the scalability of models, programs, and other resources;

(3) fostering on-going partnerships between institutions involved in informal STEM learning, institutions of higher education, and education research centers; and

(4) developing, and making available informal STEM education activities and educational materials.

(c) PRE-K–8 INFORMAL STEM PROGRAM.—

(1) IN GENERAL.—The Director of the National Science Foundation shall provide grants to institutions of higher education or a non-profit organizations (or a consortia of such intuitions or organization) on a merit-reviewed, competitive basis for research on programming that engages students in grades PREK-8, including underrepresented and rural students, in STEM in order to prepare such students to pursue degrees or careers in STEM.

(2) USE OF FUNDS.—

(A) IN GENERAL.—Grants awarded under this section shall be used toward research to advance the engagement of students, including underrepresented and rural students, in grades PREK-8 in STEM through providing before-school, after-school, out-of-school, or summer activities, including in single-gender environments or programming, that are designed to encourage interest, engagement, and skills development for students in STEM.

(B) PERMITTED ACTIVITIES.—The activities described in subparagraph (A) may include—

(i) the provision of programming described in such subparagraph for the purpose of research described in such subparagraph;

(ii) the use of a variety of engagement methods, including cooperative and hands-on learning;

(iii) exposure of students to role models in the fields of STEM and near-peer mentors;

(iv) training of informal learning educators, youth-serving professionals, and volunteers who lead informal STEM programs in using evidence-based methods consistent with the target student population being served;

(v) education of students on the relevance and significance of STEM careers, provision of academic advice and assistance, and activities designed to help students make real-world connections to STEM content;

(vi) the attendance of students at events, competitions, and academic programs to provide content expertise and encourage career exposure in STEM, which may include the purchase of parts and supplies needed to participate in such competitions;

(vii) activities designed to engage parents and families of students in grades PREK-8 in STEM;

(viii) innovative strategies to engage students, such as using leadership skills and outcome measures to impart youth with the confidence to pursue STEM coursework and academic study;

(ix) coordination with STEM-rich environments, including other nonprofit, nongovernmental organizations, out-of-classroom settings, single-gender environments, institutions of higher education, vocational facilities, corporations, museums, or science centers; and

(x) the acquisition of instructional materials or technology-based tools to conduct applicable grant activity.

(3) APPLICATION.—An applicant seeking funding under the section shall submit an application at such time, in such manner, and containing such information as may be required. Applications that include or partner with a nonprofit, nongovernmental organization that has extensive experience and expertise in increasing the participation of students in PREK-8 in STEM are encouraged. The application may include the following:

(A) A description of the target audience to be served by the research activity or activities for which such funding is sought.

(B) A description of the process for recruitment and selection of students to participate in such activities.

(C) A description of how such activity or activities may inform programming that engages students in grades PREK-8 in STEM.

(D) A description of how such activity or activities may inform programming that promotes student academic achievement in STEM.

(E) An evaluation plan that includes, at a minimum, the use of outcome-oriented measures to determine the impact and efficacy of programming being researched.

(4) EVALUATIONS.—Each recipient of a grant under this section shall provide, at the conclusion of every year during which the grant funds are received, an evaluation in a form prescribed by the Director.

(5) ACCOUNTABILITY AND DISSEMINATION.—

(A) EVALUATION REQUIRED.—The Director shall evaluate the activities established under this section. Such evaluation shall—

(i) use a common set of benchmarks and tools to assess the results of research conducted under such grants; and

(ii) to the extent practicable, integrate the findings of the research resulting from the activity or activities funded through the grant with the current research on serving students with respect to the pursuit of degrees or careers in STEM, including underrepresented and rural students, in grades PREK-8.

(B) REPORT ON EVALUATIONS.—Not later than 180 days after the completion of the evaluation under subparagraph (A), the Director shall submit to Congress and make widely available to the public a report that includes—

(i) the results of the evaluation; and

(ii) any recommendations for administrative and legislative action that could optimize the effectiveness of the program under this section.

(6) COORDINATION.—In carrying out this section, the Director shall, for purposes of enhancing program effectiveness and avoiding duplication of activities, consult, cooperate, and coordinate with the programs and policies of other relevant Federal agencies.

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SCIENTIFIC AND ADVANCED-TECHNOLOGY ACT OF 1992

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SEC. 2. FINDINGS AND PURPOSES.

(a) FINDINGS.—The Congress finds that—

(1) the position of the United States in the world economy faces great challenges from highly trained foreign competition;

(2) the workforce of the United States must be better prepared for the technologically advanced, competitive, global economy;

(3) the improvement of our work force's productivity and our international economic position depend upon the strengthening of our educational efforts in [science, mathematics, and technology] *science, technology, engineering, and mathematics or STEM*, especially at the associate-degree level;

(4) shortages of scientifically and technically *educated* trained workers in a wide variety of fields will best be addressed by collaboration among the Nation's associate-degree-

granting colleges and private industry to produce skilled, advanced technicians; and

(5) the National Science Foundation's traditional role in developing model curricula, disseminating instructional materials, enhancing faculty development, and stimulating partnerships between educational institutions and industry, makes an enlarged role for the Foundation in [scientific and technical education and training] *STEM education and training* particularly appropriate.

(b) PURPOSES.—It is the purpose of this Act to—

(1) improve science and technical education at associate-degree-granting colleges;

(2) improve secondary school and postsecondary curricula in [mathematics and science] *STEM fields*;

(3) improve the educational opportunities of postsecondary students by creating comprehensive articulation agreements and planning between 2-year and 4-year institutions; and

(4) promote outreach to secondary schools to improve [mathematics and science instruction] *STEM instruction*.

SEC. 3. [SCIENTIFIC AND TECHNICAL EDUCATION] *STEM EDUCATION*.

(a) NATIONAL ADVANCED [SCIENTIFIC AND TECHNICAL EDUCATION] *STEM EDUCATION* PROGRAM.—The Director of the National Science Foundation (hereafter in this Act referred to as the "Director") shall award grants to associate-degree-granting colleges, and consortia thereof, to assist them in providing education in advanced-technology fields *and education to prepare the skilled technical workforce to meet workforce demands*, and to improve the quality of their [core education courses in science and mathematics] *core education courses in STEM fields*. The grant program shall place emphasis on the needs of students who have been in the workforce (including *veterans and individuals engaged in* work in the home) *and on building a pathway from secondary schools, to associate-degree-granting institutions, to careers that require technical training*, and shall be designed to strengthen and expand the scientific and technical education and training capabilities of associate-degree-granting colleges through such methods as—

(1) the development *and study* of model instructional programs in advanced-technology fields and in [core science and mathematics courses] *core STEM courses*;

(2) the professional development of faculty and instructors, both full- and part-time, who provide instruction in [science, mathematics, and advanced-technology fields] *STEM and advanced-technology fields*;

(3) the establishment of innovative partnership arrangements that—

(A) involve associate-degree-granting colleges and other appropriate public and private sector entities *to support the advanced-technology industries that drive the competitiveness of the United States in the global economy*;

(B) provide for private sector donations, faculty opportunities to have short-term assignments with industry, sharing of program costs, equipment loans, and the cooperative use of laboratories, plants, and other facilities, and provision for state-of-the-art work experience opportunities for students enrolled in such programs; and

(C) encourage participation of individuals identified in section 33 or 34 of the Science and Engineering Equal Opportunities Act (42 U.S.C. 1885a or 1885b);

(4) the acquisition of state-of-the-art instrumentation essential to programs designed to prepare and upgrade students in [scientific and advanced-technology fields] *STEM and advanced-technology fields*; and

(5) the development and dissemination of instructional materials in support of improving the [advanced scientific and technical education] *advanced STEM and advanced-technology* and training capabilities of associate-degree-granting colleges, including programs for students who are not pursuing a science degree.

[(b) NATIONAL CENTERS OF SCIENTIFIC AND TECHNICAL EDUCATION.— The Director shall award grants for the establishment of centers of excellence, not to exceed 12 in number, among associate-degree-granting colleges. Centers shall meet one or both of the following criteria:

[(1) Exceptional instructional programs in advanced-technology fields.

[(2) Excellence in undergraduate education in mathematics and science.

The centers shall serve as national and regional clearinghouses and models for the benefit of both colleges and secondary schools, and shall provide seminars and programs to disseminate model curricula and model teaching methods and instructional materials to other associate-degree-granting colleges in the geographic region served by the center.]

(b) NATIONAL COORDINATION NETWORK FOR SCIENCE AND TECHNICAL EDUCATION.—The Director shall award grants to institutions of higher education, non-profit organizations, and associate-degree granting colleges (or consortia of such institutions or organizations) to establish a network of centers for science and technical education. The centers shall—

(1) coordinate research, training, and education activities funded by awards under subsection (a) and share information and best practices across the network of awardees;

(2) serve as a national and regional clearinghouse and resource to communicate and coordinate research, training, and educational activities across disciplinary, organizational, geographic, and international boundaries and disseminate best practices; and

(3) develop national and regional partnerships between PreK–12 schools, two-year colleges, institutions of higher education, workforce development programs, labor organizations, and industry to meet workforce needs.

(c) ARTICULATION PARTNERSHIPS.—

(1) PARTNERSHIP GRANTS.—(A) The Director shall make grants to eligible partnerships [to encourage students to pursue bachelor degrees in mathematics, science, engineering, or technology, and to assist students pursuing bachelor degrees in mathematics, science, engineering, or technology to make the transition from associate-degree-granting colleges to bachelor-degree-granting institutions, through such means as—] *to encourage the development of career and educational pathways*

with multiple entry and exit points leading to credentials and degrees, and to assist students pursuing pathways in STEM fields to transition from associate-degree-granting colleges to bachelor-degree-granting institutions, through such means as—

(i) examining curricula [to ensure] *to develop articulation agreements that ensure* that academic credit earned at the associate-degree-granting college is transferable to bachelor-degree-granting institutions;

(ii) informing teachers from the associate-degree-granting college on the specific requirements of [courses at the bachelor-degree-granting institution] *the career and educational pathways supported by the articulation agreements*; and

(iii) providing summer educational programs for students from the associate-degree-granting college to encourage such students' subsequent matriculation at bachelor-degree-granting institutions.

(B) Each eligible partnership receiving a grant under this paragraph shall, at a minimum—

(i) counsel students, including students who have been in the workforce (including *veterans and individuals engaged in* work in the home), about the requirements and course offerings of the bachelor-degree-granting institution;

(ii) conduct workshops and orientation sessions to ensure that students are familiar with programs, including laboratories and financial aid programs, at the bachelor-degree-granting institution;

(iii) provide students with research experiences at [bachelor's-degree-granting institutions] *institutions or work sites* participating in the partnership, including stipend support for students participating in summer programs *or industry internships*; and

(iv) provide faculty mentors for students participating in activities under clause (iii), including summer salary support for faculty mentors.

[Funds used by eligible partnerships to carry out clauses (i) and (ii) shall be from non-Federal sources. In-cash and in-kind resources used by eligible partnerships to carry out clauses (i) and (ii) shall not be considered to be contributions for purposes of applying subsection (f)(3).]

[(C) Any institution participating in a partnership that receives a grant under this paragraph shall be ineligible to receive assistance under part B of title I of the Higher Education Act of 1965 for the duration of the grant received under this paragraph.]

(2) OUTREACH GRANTS.—The Director shall make grants to associate-degree-granting colleges with outstanding [mathematics and science programs] *STEM programs* to strengthen relationships with secondary schools *and, as appropriate, elementary schools,* in the community served by the college by improving [mathematics and science education] *STEM education* and encouraging the interest and aptitude of [secondary school students] *students at these schools* for careers in [science and advanced-technology fields] *STEM and advanced-technology*

fields through such means as developing [agreements with local educational agencies] *articulation agreements or dual credit courses with local secondary schools, or other means as the Director determines appropriate,* to enable students to satisfy entrance and course requirements at the associate-degree-granting college.

(3) MENTOR TRAINING GRANTS.—The Director [shall—]

[(A) establish a] *shall establish a* program to encourage and make grants available to institutions of higher education that award associate degrees to recruit and train individuals from [the fields of science, technology, engineering, and mathematics] *STEM fields* to mentor students who are described in section 33 or 34 of the Science and Engineering Equal Opportunities Act (42 U.S.C. 1885a or 1885b) in order to assist those students in identifying, qualifying for, and entering higher-paying technical jobs in those fields[; and]*, including jobs at Federal and academic laboratories.*

[(B) make grants available to associate-degree-granting colleges to carry out the program identified in subsection (A).]

(d) GRANTS FOR ASSOCIATE DEGREE PROGRAMS IN STEM FIELDS.—

(1) IN-DEMAND WORKFORCE GRANTS.—The Director shall award grants to junior or community colleges to develop or improve associate degree or certificate programs in STEM fields, with respect to the region in which the respective college is located, and an in-demand industry sector or occupation.

(2) APPLICATIONS.—In considering applications for grants under paragraph (1), the Director shall prioritize—

(A) applications that consist of a partnership between the applying junior or community college and individual employers or an employer consortia, or industry or sector partnerships, and may include a university or other organization with demonstrated expertise in academic program development;

(B) applications that demonstrate current and future workforce demand in occupations directly related to the proposed associate degree or certificate program;

(C) applications that include commitments by the partnering employers or employer consortia, or industry or sector partnerships, to offer apprenticeships, internships, or other applied learning opportunities to students enrolled in the proposed associate degree or certificate program;

(D) applications that include outreach plans and goals for recruiting and enrolling women and other underrepresented populations in STEM fields in the proposed associate degree or certificate program; [and]

(E) applications that describe how the applying junior or community college will support the collection of information and data for purposes of evaluation of the proposed associate degree or certificate program[.]*; and*

(F) as appropriate, applications that apply the best practices for STEM education and technical skills education

through distance learning or in a simulated work environment, as determined by research described in subsection (f); and

(e) GRANTS FOR STEM DEGREE APPLIED LEARNING OPPORTUNITIES.—

(1) IN GENERAL.—The Director shall award grants to institutions of higher education partnering with private sector employers or private sector employer consortia, or industry or sector partnerships, that commit to offering apprenticeships, internships, research opportunities, or applied learning experiences to enrolled students in identified STEM baccalaureate degree programs.

(2) PURPOSES.—Awards under this subsection may be used—

(A) to develop curricula and programs for apprenticeship, internships, research opportunities, or applied learning experiences; or

(B) to provide matching funds to incentivize partnership and participation by private sector employers and industry.

(3) APPLICATIONS.—In considering applications for grants under paragraph (1), the Director shall prioritize—

(A) applicants that consist of a partnership between—

(i) the applying institution of higher education; and

(ii) individual employers or an employer consortia, or industry or sector partnerships;

(B) applications that demonstrate current and future workforce demand in occupations directly related to the identified STEM fields;

(C) applications that include outreach plans and goals for recruiting and enrolling women and other underrepresented populations in STEM fields; [and]

(D) applications that describe how the institution of higher education will support the collection and information of data for purposes of the evaluation of identified STEM degree programs[.]*; and*

(E) applications that incorporate distance learning tools and approaches.

(f) GRANTS FOR COMPUTER-BASED AND ONLINE STEM EDUCATION COURSES.—

(1) IN GENERAL.—The Director of the National Science Foundation shall award competitive grants to institutions of higher education or nonprofit organizations to conduct research on student outcomes and determine best practices for STEM education and technical skills education through distance learning or in a simulated work environment.

(2) RESEARCH AREAS.—The research areas eligible for funding under this subsection may include—

(A) post-secondary courses for technical skills development for STEM occupations;

(B) improving high-school level career and technical education in STEM subjects;

(C) encouraging and sustaining interest and achievement levels in STEM subjects among women and other populations historically underrepresented in STEM studies and careers; and

(D) combining computer-based and online STEM education and skills development with traditional mentoring and other mentoring arrangements, apprenticeships, internships, and other applied learning opportunities.

(g) COORDINATION WITH OTHER FEDERAL DEPARTMENTS.—In carrying out this section, the Director shall consult, cooperate, and coordinate, to enhance program effectiveness and to avoid duplication, with the programs and policies of other relevant Federal agencies. **[**In carrying out subsection (c), the Director shall coordinate activities with programs receiving assistance under part B of title I of the Higher Education Act of 1965.**]**

(h) FUNDING.—

(1) FUNDING.—The Director shall allocate out of amounts made available for the Education and Human Resources Directorate—

(A) up to $5,000,000 to carry out the activities under subsection (d) for each of fiscal years 2019 through **[**2022**]** *2026*, subject to the availability of appropriations;

(B) up to $2,500,000 to carry out the activities under subsection (e) for each of fiscal years 2019 through **[**2022**]** *2026*, subject to the availability of appropriations; and

(C) **[**up to $2,500,000**]** *not less than $3,000,000* to carry out the activities under subsection (f) for each of fiscal years 2019 through **[**2022**]** *2026*, subject to the availability of appropriations.

(2) LIMITATION ON FUNDING.—Amounts made available to carry out subsections (d), (e), and (f) shall be derived from amounts appropriated or otherwise made available to the National Science Foundation.(3) LIMITATION ON FUNDING.—To qualify for a grant under this section, an associate-degree-granting college, or consortium thereof, shall provide assurances adequate to the Director that it will not decrease its level of spending of funds from non-Federal sources on advanced scientific and technical education and training programs.

(i) FUNCTIONS OF THE DIRECTOR.—In carrying out this Act, the Director shall—

(1) award grants on a competitive, merit basis;

(2) ensure an equitable geographic distribution of grant awards;

[(3) ensure that an applicant for a grant awarded under subsection (a), (b), or (c)(1) will make an in-cash or in-kind contribution in an amount equal to at least 25 percent of the cost of the program, and for a grant awarded under subsection (c)(2) will make an in-cash or in-kind contribution in an amount at least equal to the amount of the grant award;**]**

[(4)**]** *(3)* establish and maintain a readily accessible inventory of the programs assisted under this Act; and

[(5)**]** *(4)* designate an officer of the National Science Foundation to serve as a liaison with associate-degree-granting institutions for the purpose of enhancing the role of such institutions in the activities of the Foundation.

(j) DEFINITIONS.—As used in this section—

[(1) the term "advanced-technology" includes advanced technical activities such as the modernization, miniaturization, in-

tegration, and computerization of electronic, hydraulic, pneumatic, laser, nuclear, chemical, telecommunication, fiber optic, robotic, and other technological applications to enhance productivity improvements in manufacturing, communication, transportation, commercial, and similar economic and national security activities;]

(1) the term advanced-technology includes technological fields such as advanced manufacturing, agricultural-, biological- and chemical-technologies, energy and environmental technologies, engineering technologies, information technologies, micro and nano-technologies, cybersecurity technologies, geospatial technologies, and new, emerging technology areas;

(2) the term "associate-degree-granting college" means an institution of higher education (as determined under section 101 of the Higher Education Act of 1965) that—

(A) is a nonprofit institution that offers a 2-year associate-degree program or a 2-year certificate program; or

(B) is a proprietary institution that offers a 2-year associate-degree program;

(3) the term "bachelor-degree-granting institution" means an institution of higher education (as determined under section 101 of the Higher Education Act of 1965) that offers a baccalaureate degree program;

(4) the term "eligible partnership" means one or more associate-degree-granting colleges in partnership with one or more [separate bachelor-degree-granting institutions] *other entities*;

(5) the term "in-demand industry sector or occupation" has the meaning given the term in section 3 of the Workforce Innovation and Opportunity Act (29 U.S.C. 3102);

(6) the term "junior or community college" has the meaning given the term in section 312 of the Higher Education Act of 1965 (20 U.S.C. 1058);

[(7) the term "local educational agency" has the meaning given such term in section 1471(12) of the Elementary and Secondary Education Act of 1965 (20 U.S.C. 2891(12)).]

[(8)] *(7)* the term "region" means a labor market area, as that term is defined in section 3 of the Workforce Innovation and Opportunity Act (29 U.S.C. 3102); [and]

[(9)] *(8)* the terms "[mathematics, science, engineering, or technology] *science, technology, engineering, or mathematics*" or "STEM" mean science, technology, engineering, and mathematics, including computer science[.]*; and*

(9) the term skilled technical workforce means workers—

(A) in occupations that use significant levels of science and engineering expertise and technical knowledge; and

(B) whose level of educational attainment is less than a bachelor degree.

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[SEC. 5. AUTHORIZATION OF APPROPRIATIONS.

[There are authorized to be appropriated, from sums otherwise authorized to be appropriated, to the Director for carrying out this Act—

[(1) $35,000,000 for fiscal year 1992; and

[(2) $35,000,000 for fiscal year 1993.]

SEC. 5. AUTHORIZATION OF APPROPRIATIONS.

There are authorized to be appropriated to the Director for carrying out sections 2 through 4, $150,000,000 for fiscal years 2022 through 2026.

AMERICA CREATING OPPORTUNITIES TO MEANINGFULLY PROMOTE EXCELLENCE IN TECHNOLOGY, EDUCATION, AND SCIENCE ACT

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TITLE VII—NATIONAL SCIENCE FOUNDATION

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SEC. 7008. POSTDOCTORAL RESEARCH FELLOWS.

(a) MENTORING.—The Director shall require that all grant applications that include funding to support postdoctoral *and graduate student* researchers include a description of the mentoring activities that will be provided for such individuals, and shall ensure that this part of the application is evaluated under the Foundation's broader impacts merit review criterion. *The requirement may be satisfied by providing such individuals with access to mentors, including individuals not listed on the grant.* Mentoring activities may include career counseling, training in preparing grant applications, guidance on ways to improve teaching skills, and training in research ethics.

(b) REPORTS.—The Director shall require that annual reports and the final report for research grants that include funding to support postdoctoral researchers include a description of the mentoring activities provided to such researchers.

SEC. 7009. RESPONSIBLE CONDUCT OF RESEARCH.

The Director shall require that each institution that applies for financial assistance from the Foundation for science and engineering research or education describe in its grant proposal a plan to provide appropriate training and oversight in the responsible and ethical conduct of research to undergraduate students, graduate students, ❚and postdoctoral researchers❚ *postdoctoral researchers, faculty, and other senior personnel* participating in the proposed research project*, including mentor training*.

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NATIONAL SCIENCE FOUNDATION ACT OF 1950

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NATIONAL SCIENCE BOARD

SEC. 4. (a) The Board shall consist of twenty-four members to be appointed by the President and of the Director ex officio. In making nominations under this section, the President shall give due regard to equitable representation of scientists who are women or who represent minority groups. In addition to any powers and functions

otherwise granted to it by this Act, the Board shall establish the policies of the Foundation.

(b) The Board shall have an Executive Committee as provided in section 7, and may delegate to it or to the Director or both such of the powers and functions granted to the Board by this Act as it deems appropriate.

(c) The persons nominated for appointment as members of the Board (1) shall be eminent in the fields of the basic, medical, or social sciences, engineering, agriculture, education, research management or public affairs; (2) shall be selected solely on the basis of established records of distinguished service and (3) shall be so selected as to provide representation of the views of scientific and engineering leaders in all areas of the Nation. In making nominations under this section, the President shall give due regard to equitable representation of scientists and engineering who are women or who represent minority groups. The President is requested, in the making of nominations of persons for appointment as members, to give due consideration to any recommendations for nomination which may be submitted to him by the National Academy of Sciences, the National Academy of Engineering, the National Association of State Universities and Land Grant Colleges, the Association of American Universities, the Association of American Colleges, the Association of State Colleges and Universities, or by other scientific, engineering, or educational organizations.

(d) The term of office of each member of the Board shall be six years; except that any member appointed to fill a vacancy occurring prior to the expiration of the term for which his predecessor was appointed shall be appointed for the remainder of such term. Any person, other than the Director, who has been a member of the Board for twelve consecutive years shall thereafter be ineligible for appointment during the two-year period following the expiration of such twelfth year.

(e) The Board shall meet annually on the third Monday in May unless, prior to May 10 in any year, the Chairman has set the annual meeting for a day in May other than the third Monday and at such other times as the Chairman may determine, but he shall also call a meeting whenever one-third of the members so request in writing. The Board shall adopt procedures governing the conduct of its meetings, including delivery of notice and a definition of a quorum, which in no case shall be less than one-half plus one of the confirmed members of the Board.

(f) The election of the Chairman and Vice Chairman of the Board shall take place at each annual meeting occurring in an even-numbered year. The Vice Chairman shall perform the duties of the Chairman in his absence. In case a vacancy occurs in the chairmanship or vice chairmanship, the Board shall elect a member to fill such vacancy.

(g) The Board may, with the concurrence of a majority of its members, permit the appointment of a staff consisting of professional staff members, technical and professional personnel on leave of absence from academic, industrial, or research institutions for a limited term, and such operations and support staff members as may be necessary. Such staff shall be appointed by the Chairman and assigned at the direction of the Board. The professional members and limited term technical and professional personnel of such

staff may be appointed without regard to the provisions of title 5, United States Code, governing appointments in the competitive service, and the provisions of chapter 51 of such title relating to classification, and shall be compensated at a rate not exceeding the maximum rate payable under section 5376 of such title, as may be necessary to provide for the performance of such duties as may be prescribed by the Board in connection with the exercise of its powers and functions under this Act. Section 14(a)(3) shall apply to each limited term appointment of technical and professional personnel under this subsection. Each appointment under this subsection shall be subject to the same security requirements as those required for personnel of the Foundation appointed under section 14(a).

(h) The Board is authorized to establish such special commissions as it may from time to time deem necessary for the purposes of this Act.

(i) The Board is also authorized to appoint from among its members such committees as it deems necessary, and to assign to committees so appointed such survey and advisory functions as the Board deems appropriate to assist it in exercising its powers and functions under this Act.

(j)(1) The Board shall render to the President and the Congress no later than [January 15] *March 15* of each even numbered year, a report on indicators of the state of science and engineering in the United States.

(2) The Board shall render to the President and the Congress reports on specific, individual policy matters within the authority of the Foundation (or otherwise as requested by the Congress or the President) related to science and engineering and education in science and engineering, as the Board, the President, or the Congress determines the need for such reports.

(k) Portions of Board meetings in which the Board considers proposed Foundation budgets for a particular fiscal year may be closed to the public until the President's budget for that fiscal year has been submitted to the Congress.

(l) Members of the Board shall be required to file a financial disclosure report under title II of the Ethics in Government Act of 1978 (5 U.S.C. App. 92 Stat. 1836), except that such reports shall be held confidential and exempt from any law otherwise requiring their public disclosure.

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SCHOLARSHIPS AND GRADUATE FELLOWSHIPS

SEC. 10. (a) IN GENERAL.—The Foundation is authorized to award scholarships and graduate fellowships for study and research in the sciences or in engineering at appropriate nonprofit American or nonprofit foreign institutions selected by the recipient of such aid, for stated periods of time. Persons shall be selected for such scholarships and fellowships from among citizens, nationals or lawfully admitted permanent resident aliens of the United States, and such selections shall be made solely on the basis of ability; but in any case in which two or more applicants for scholarships or fellowships, as the case may be, are deemed by the Foundation to be possessed of substantially equal ability, and there are not sufficient

scholarships or fellowships, as the case may be, available to grant one to each of such applicants, the available scholarship or scholarships, fellowship or fellowships shall be awarded to the applicants in such manner as will tend to result in a wide distribution of scholarships and fellowships throughout the United States *and as will address national workforce demand in critical STEM fields*. Nothing contained in this Act shall prohibit the Foundation from refusing or revoking a scholarship or fellowship award, in whole or in part, in the case of any applicant or recipient, if the Board is of the opinion that such award is not in the best interests of the United States.

(b) AMOUNT.—The Director shall establish for each year the amount to be awarded for scholarships and fellowships under this section for that year. Each such scholarship and fellowship shall include a cost of education allowance [of $12,000] *of at least $16,000*, subject to any restrictions on the use of cost of education allowance as determined by the Director.

(c) OUTREACH.—The Director shall ensure program outreach to recruit fellowship applicants from fields of study that are in areas of critical national need, from all regions of the country, and from historically underrepresented populations in STEM.

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CYBERSECURITY ENHANCEMENT ACT OF 2014

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TITLE III—EDUCATION AND WORKFORCE DEVELOPMENT

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SEC. 302. FEDERAL CYBER SCHOLARSHIP-FOR-SERVICE PROGRAM.

(a) IN GENERAL.—The Director of the National Science Foundation, in coordination with the Director of the Office of Personnel Management and Secretary of Homeland Security, shall continue a Federal cyber scholarship-for-service program to recruit and train the next generation of information technology professionals, industrial control system security professionals, and security managers to meet the needs of the cybersecurity mission for Federal, State, local, and tribal governments.

(b) PROGRAM DESCRIPTION AND COMPONENTS.—The Federal Cyber Scholarship-for-Service Program shall—

(1) provide scholarships through qualified institutions of higher education, including community colleges, to students who are enrolled in programs of study at institutions of higher education leading to degrees or specialized program certifications in the cybersecurity field[;] *and cybersecurity-related aspects of other related fields as appropriate, including artificial intelligence, quantum computing and aerospace.*

(2) provide the scholarship recipients with summer internship opportunities or other meaningful temporary appointments in the Federal information technology and cybersecurity workforce;

(3) prioritize the placement of scholarship recipients fulfilling the post-award employment obligation under this section to ensure that—

(A) not less than 70 percent of such recipients are placed in an executive agency (as defined in section 105 of title 5, United States Code);

(B) not more than 10 percent of such recipients are placed as educators in the field of cybersecurity at qualified institutions of higher education that provide scholarships under this section; and

(C) not more than 20 percent of such recipients are placed in positions described in paragraphs (2) through (5) of subsection (d); and

(4) provide awards to improve cybersecurity education, including by seeking to provide awards in coordination with other relevant agencies for summer cybersecurity camp or other experiences, including teacher training, in each of the 50 States, at the kindergarten through grade 12 level—

(A) to increase interest in cybersecurity careers;

(B) to help students practice correct and safe online behavior and understand the foundational principles of cybersecurity;

(C) to improve teaching methods for delivering cybersecurity content for kindergarten through grade 12 computer science curricula; and

(D) to promote teacher recruitment in the field of cybersecurity.

(c) SCHOLARSHIP AMOUNTS.—Each scholarship under subsection (b) shall be in an amount that covers the student's tuition and fees at the institution under subsection (b)(1) for not more than 3 years and provides the student with an additional stipend.

(d) POST-AWARD EMPLOYMENT OBLIGATIONS.—Each scholarship recipient, as a condition of receiving a scholarship under the program, shall enter into an agreement under which the recipient agrees to work for a period equal to the length of the scholarship, following receipt of the student's degree, in the cybersecurity mission of—

(1) an executive agency (as defined in section 105 of title 5, United States Code);

(2) Congress, including any agency, entity, office, or commission established in the legislative branch;

(3) an interstate agency;

(4) a State, local, or Tribal government;

(5) a State, local, or Tribal government-affiliated non-profit that is considered to be critical infrastructure (as defined in section 1016(e) of the USA Patriot Act (42 U.S.C. 5195c(e)); or

(6) as provided by subsection (b)(3)(B), a qualified institution of higher education.

(e) HIRING AUTHORITY.—

(1) APPOINTMENT IN EXCEPTED SERVICE.—Notwithstanding any provision of chapter 33 of title 5, United States Code, governing appointments in the competitive service, an agency shall appoint in the excepted service an individual who has completed the eligible degree program for which a scholarship was awarded.

(2) NONCOMPETITIVE CONVERSION.—Except as provided in paragraph (4), upon fulfillment of the service term, an employee appointed under paragraph (1) may be converted noncompetitively to term, career-conditional or career appointment.

(3) TIMING OF CONVERSION.—An agency may noncompetitively convert a term employee appointed under paragraph (2) to a career-conditional or career appointment before the term appointment expires.

(4) AUTHORITY TO DECLINE CONVERSION.—An agency may decline to make the noncompetitive conversion or appointment under paragraph (2) for cause.

(f) ELIGIBILITY.—To be eligible to receive a scholarship under this section, an individual shall—

(1) be a citizen or lawful permanent resident of the United States;

(2) demonstrate a commitment to a career in improving the security of information technology;

(3) have demonstrated a high level of competency in relevant knowledge, skills, and abilities, as defined by the national cybersecurity awareness and education program under section 303;

(4) be a full-time student in an eligible degree program at a qualified institution of higher education, as determined by the Director of the National Science Foundation, except that in the case of a student who is enrolled in a community college, be a student pursuing a degree on a less than full-time basis, but not less than half-time basis;

(5) enter into an agreement accepting and acknowledging the post award employment obligations, pursuant to section (d);

(6) accept and acknowledge the conditions of support under section (g); and

(7) accept all terms and conditions of a scholarship under this section.

(g) CONDITIONS OF SUPPORT.—

(1) IN GENERAL.—As a condition of receiving a scholarship under this section, a recipient shall agree to provide the Office of Personnel Management (in coordination with the National Science Foundation) and the qualified institution of higher education with annual verifiable documentation of post-award employment and up-to-date contact information.

(2) TERMS.—A scholarship recipient under this section shall be liable to the United States as provided in subsection (i) if the individual—

(A) fails to maintain an acceptable level of academic standing at the applicable institution of higher education, as determined by the Director of the National Science Foundation;

(B) is dismissed from the applicable institution of higher education for disciplinary reasons;

(C) withdraws from the eligible degree program before completing the program;

(D) declares that the individual does not intend to fulfill the post-award employment obligation under this section;

(E) fails to maintain or fulfill any of the post-graduation or post-award obligations or requirements of the individual; or

(F) fails to fulfill the requirements of paragraph (1).

(h) MONITORING COMPLIANCE.—As a condition of participating in the program, a qualified institution of higher education shall—

(1) enter into an agreement with the Director of the National Science Foundation, to monitor the compliance of scholarship recipients with respect to their post-award employment obligations; and

(2) provide to the Director of the National Science Foundation and the Director of the Office of Personnel Management, on an annual basis, the post-award employment documentation required under subsection (g)(1) for scholarship recipients through the completion of their post-award employment obligations.

(i) AMOUNT OF REPAYMENT.—

(1) LESS THAN 1 YEAR OF SERVICE.—If a circumstance described in subsection (g)(2) occurs before the completion of 1 year of a post-award employment obligation under this section, the total amount of scholarship awards received by the individual under this section shall—

(A) be repaid; or

(B) be treated as a loan to be repaid in accordance with subsection (j).

(2) 1 OR MORE YEARS OF SERVICE.—If a circumstance described in subparagraph (D) or (E) of subsection (g)(2) occurs after the completion of 1 or more years of a post-award employment obligation under this section, the total amount of scholarship awards received by the individual under this section, reduced by the ratio of the number of years of service completed divided by the number of years of service required, shall—

(A) be repaid; or

(B) be treated as a loan to be repaid in accordance with subsection (j).

(j) REPAYMENTS.—A loan described subsection (i) shall—

(1) be treated as a Federal Direct Unsubsidized Stafford Loan under part D of title IV of the Higher Education Act of 1965 (20 U.S.C. 1087a et seq.); and

(2) be subject to repayment, together with interest thereon accruing from the date of the scholarship award, in accordance with terms and conditions specified by the Director of the National Science Foundation (in consultation with the Secretary of Education) in regulations promulgated to carry out this subsection.

(k) COLLECTION OF REPAYMENT.—

(1) IN GENERAL.—In the event that a scholarship recipient is required to repay the scholarship award under this section, the qualified institution of higher education providing the scholarship shall—

(A) determine the repayment amounts and notify the recipient, the Director of the National Science Foundation, and the Director of the Office of Personnel Management of the amounts owed; and

(B) collect the repayment amounts within a period of time as determined by the Director of the National Science Foundation, or the repayment amounts shall be treated as a loan in accordance with subsection (j).

(2) RETURNED TO TREASURY.—Except as provided in paragraph (3), any repayment under this subsection shall be returned to the Treasury of the United States.

(3) RETAIN PERCENTAGE.—A qualified institution of higher education may retain a percentage of any repayment the institution collects under this subsection to defray administrative costs associated with the collection. The Director of the National Science Foundation shall establish a single, fixed percentage that will apply to all eligible entities.

(l) EXCEPTIONS.—The Director of the National Science Foundation may provide for the partial or total waiver or suspension of any service or payment obligation by an individual under this section whenever compliance by the individual with the obligation is impossible or would involve extreme hardship to the individual, or if enforcement of such obligation with respect to the individual would be unconscionable.

(m) PUBLIC INFORMATION.—

(1) EVALUATION.—The Director of the National Science Foundation, in coordination with the Director of the Office of Personnel Management, shall periodically evaluate and make public, in a manner that protects the personally identifiable information of scholarship recipients, information on the success of recruiting individuals for scholarships under this section and on hiring and retaining those individuals in the public sector cybersecurity workforce, including information on—

(A) placement rates;

(B) where students are placed, including job titles and descriptions;

(C) salary ranges for students not released from obligations under this section;

(D) how long after graduation students are placed;

(E) how long students stay in the positions they enter upon graduation;

(F) how many students are released from obligations; and

(G) what, if any, remedial training is required.

(2) REPORTS.—The Director of the National Science Foundation, in coordination with the Office of Personnel Management, shall submit, not less frequently than once every two years, to the Committee on Commerce, Science, and Transportation and the Committee on Homeland Security and Governmental Affairs of the Senate and the Committee on Science, Space, and Technology and the Committee on Oversight and Reform of the House of Representatives a report, including—

(A) the results of the evaluation under paragraph (1);

(B) the disparity in any reporting between scholarship recipients and their respective institutions of higher education; and

(C) any recent statistics regarding the size, composition, and educational requirements of the Federal cyber workforce..

(3) RESOURCES.—The Director of the National Science Foundation, in coordination with the Director of the Office of Personnel Management, shall provide consolidated and user-friendly online resources for prospective scholarship recipients, including, to the extent practicable—

(A) searchable, up-to-date, and accurate information about participating institutions of higher education and job opportunities related to the field of cybersecurity; and

(B) a modernized description of cybersecurity careers.

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SECTION 117 OF THE NATIONAL SCIENCE FOUNDATION AUTHORIZATION ACT OF 1988

PRESIDENTIAL AWARDS FOR TEACHING EXCELLENCE

SEC. 117. (a)(1)(A) The President is authorized to make Presidential Awards for Excellence in Mathematics and Science Teaching to kindergarten through grade 12 school teachers of mathematics and science who have demonstrated outstanding teaching ability in the field of teaching mathematics or science.

(B) Each year the President is authorized to make no fewer than **[**108**]** *110* awards under subparagraph (A). **[**In selecting teachers for an award authorized by this subsection, the President shall select at least two teachers—**]**

(C)In selecting teachers for an award authorized by this subsection, the President shall 8 select—

(i)at least two teachers—

[(i)**]** *(I)* from each of the several States;

[(ii)**]** *(II)* from the District of Columbia;

[(iii)**]** *(III)* from the Commonwealth of Puerto Rico;

[(iv) from among the Trust Territory of the Pacific Islands, the Commonwealth of the Northern Mariana Islands, and other commonwealths, territories, and possessions of the United States; and**]**

[(v)**]** *(IV)* from schools established outside the several States and the District of Columbia by any agency of the Federal Government for dependents of the employees of such agency**[**.**]***; and*

(ii) at least one teacher—

(I) from the Commonwealth of the Northern Mariana Islands;

(II) from American Samoa;

(III) from the Virgin Islands of the United States; and

(IV) from Guam.

(2) The President shall carry out this subsection, including the establishment of the selection procedures, after consultation with the Director and other appropriate officials of Federal agencies.

(3)(A) Funds to carry out this subsection for any fiscal year shall be made available from amounts appropriated pursuant to annual authorization of appropriations for the Foundation for Education and Human Resources.

(B) Amounts made available pursuant to subparagraph (A) shall be available for making awards under this subsection, for adminis-

trative expenses, for necessary travel by teachers selected under this subsection, and for special activities related to carrying out this subsection.

(b) (Omitted amends other acts)

AMERICA COMPETES REAUTHORIZATION ACT OF 2010

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TITLE V—SCIENCE, TECHNOLOGY, ENGINEERING, AND MATHEMATICS SUPPORT PROGRAMS SUBTITLE A—NATIONAL SCIENCE FOUNDATION

Subtitle A—NATIONAL SCIENCE FOUNDATION

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SEC. 506. NATIONAL SCIENCE FOUNDATION MANUFACTURING RESEARCH AND EDUCATION.

(a) MANUFACTURING RESEARCH.—The Director shall carry out a program to award merit-reviewed, competitive grants to institutions of higher education to support fundamental research leading to transformative advances in manufacturing technologies, processes, and enterprises that will support United States manufacturing through improved performance, productivity, sustainability, and competitiveness. Research areas may include—

(1) nanomanufacturing;

(2) manufacturing and construction machines and equipment, including robotics, automation, and other intelligent systems;

(3) manufacturing enterprise systems;

(4) advanced sensing and control techniques;

(5) materials processing; [and]

(6) information technologies for manufacturing, including predictive and real-time models and simulations, [and] virtual manufacturing[.]*; and artificial intelligence and machine learning;*

(7) additive manufacturing, including new material designs, complex materials, rapid printing techniques, and real-time process controls; and

(8) continuous manufacturing of biological products and similar innovating monitoring and control techniques.

(b) MANUFACTURING EDUCATION.—In order to help ensure a well-trained manufacturing workforce, the Director shall award grants to strengthen and expand scientific and technical education and training in advanced manufacturing, including through the Foundation's Advanced Technological Education program.

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SEC. 517. EXPERIMENTAL PROGRAM TO STIMULATE COMPETITIVE RESEARCH.

(a) FINDINGS.—The Congress finds that—

(1) the National Science Foundation Act of 1950 stated, "it shall be an objective of the Foundation to strengthen research and education in the sciences and engineering, including independent research by individuals, throughout the United States, and to avoid undue concentration of such research and education";

(2) National Science Foundation funding remains highly concentrated, with 28 States and jurisdictions, taken together, receiving only about 12 percent of all National Science Foundation research funding;

(3) each of the States described in paragraph (2) receives only a fraction of 1 percent of the Foundation's research dollars each year;

(4) first established at the National Science Foundation in 1979, the Experimental Program to Stimulate Competitive Research (referred to in this section as "EPSCoR") assists States and jurisdictions historically underserved by Federal research and development funding in strengthening their research and innovation capabilities;

(5) the EPSCoR structure requires each participating State to develop a science and technology plan suited to State and local research, education, and economic interests and objectives;

(6) EPSCoR has been credited with advancing the research competitiveness of participating States, improving awareness of science, promoting policies that link scientific investment and economic growth, and encouraging partnerships between government, industry, and academia;

(7) EPSCoR proposals are evaluated through a rigorous and competitive merit-review process to ensure that awarded research and development efforts meet high scientific standards; and

(8) according to the National Academy of Sciences, EPSCoR has strengthened the national research infrastructure and enhanced the educational opportunities needed to develop the science and engineering workforce.

(b) CONTINUATION OF PROGRAM.—The Director shall continue to carry out EPSCoR, with the objective of helping the eligible States to develop the research infrastructure that will make them more competitive for Foundation and other Federal research funding. The program shall continue to increase as the National Science Foundation funding increases.

(c) COORDINATION OF EPSCoR AND SIMILAR FEDERAL PROGRAMS.—

(1) ANOTHER FINDING.—The Congress finds that a number of Federal agencies have programs, such as EPSCoR and the National Institutes of Health Institutional Development Award program, designed to increase the capacity for and quality of science and technology research and training at academic institutions in States that historically have received relatively little Federal research and development funding.

(2) COORDINATION REQUIRED.—The EPSCoR Interagency Coordinating Committee, chaired by the National Science Foundation, shall—

(A) coordinate each EPSCoR to maximize the impact of Federal support for building competitive research infrastructure, and in order to achieve an integrated Federal effort;

(B) coordinate agency objectives with State and institutional goals, to obtain continued non-Federal support of science and technology research and training;

(C) develop metrics to assess gains in academic research quality and competitiveness, and in science and technology human resource development;

(D) conduct a cross-agency evaluation of each EPSCoR and accomplishments, including management, investment, and metric-measuring strategies implemented by the different agencies aimed to increase the number of new investigators receiving peer-reviewed funding, broaden participation, and empower knowledge generation, dissemination, application, and national research and development competitiveness;

(E) coordinate the development and implementation of new, novel workshops, outreach activities, and follow-up mentoring activities among EPSCoR or EPSCoR-like programs for colleges and universities in EPSCoR States and territories in order to increase the number of proposals submitted and successfully funded and to enhance statewide coordination of each EPSCoR;

(F) coordinate the development of new, innovative solicitations and programs to facilitate collaborations, partnerships, and mentoring activities among faculty at all levels in non-EPSCoR and EPSCoR States and jurisdictions;

(G) conduct an evaluation of the roles, responsibilities and degree of autonomy that program officers or managers (or the equivalent position) have in executing each EPSCoR at the different Federal agencies and the impacts these differences have on the number of EPSCoR State and jurisdiction faculty participating in the peer review process and the percentage of successful awards by individual EPSCoR State jurisdiction and individual researcher; and

(H) conduct a survey of colleges and university faculty at all levels regarding their knowledge and understanding of EPSCoR, and their level of interaction with and knowledge about their respective State or Jurisdictional EPSCoR Committee.

(3) MEETINGS AND REPORTS.—The Committee shall meet at least twice each fiscal year and shall submit an annual report to the appropriate committees of Congress describing progress made in carrying out paragraph (2).

(d) FEDERAL AGENCY REPORTS.—Each Federal agency that administers an EPSCoR shall submit to Congress, as part of its Federal budget submission—

(1) a description of the program strategy and objectives;

(2) a description of the awards made in the previous fiscal year, including—

(A) the total amount made available, by State, under EPSCoR;

(B) the total amount of agency funding made available to all institutions and entities within each EPSCoR State;

(C) the efforts and accomplishments to more fully integrate the EPSCoR States in major agency activities and initiatives;

(D) the percentage of EPSCoR reviewers from EPSCoR States; and

(E) the number of programs or large collaborator awards involving a partnership of organizations and institutions from EPSCoR and non-EPSCoR States; and

(3) an analysis of the gains in academic research quality and competitiveness, and in science and technology human resource development, achieved by the program over the last 5 fiscal years.

(e) NATIONAL ACADEMY OF SCIENCES STUDY.—

(1) IN GENERAL.—The Director shall contract with the National Academy of Sciences to conduct a study on all Federal agencies that administer an EPSCoR.

(2) MATTERS TO BE ADDRESSED.—The study conducted under paragraph (1) shall include the following:

(A) A delineation of the policies of each Federal agency with respect to the awarding of grants to EPSCoR States.

(B) The effectiveness of each program.

(C) Recommendations for improvements for each agency to achieve EPSCoR goals.

(D) An assessment of the effectiveness of EPSCoR States in using awards to develop science and engineering research and education, and science and engineering infrastructure within their States.

(E) Such other issues that address the effectiveness of EPSCoR as the National Academy of Sciences considers appropriate.

(f) AWARD STRUCTURE UPDATES.—In implementing the mandate to maximize the impact of Federal EPSCoR support on building competitive research infrastructure, and based on the inputs and recommendations of previous EPSCoR reviews, the head of each Federal agency administering an EPSCoR program shall—

(1) consider modifications to EPSCoR proposal solicitation, award type, and project evaluation—

(A) to more closely align with current agency priorities and initiatives;

(B) to focus EPSCoR funding on achieving critical scientific, infrastructure, and educational needs of that agency;

(C) to encourage collaboration between EPSCoR-eligible institutions and researchers, including with institutions and researchers in other States and jurisdictions;

(D) to improve communication between State and Federal agency proposal reviewers; and

(E) to continue to reduce administrative burdens associated with EPSCoR;

(2) consider modifications to EPSCoR award structures—

(A) to emphasize long-term investments in building research capacity, potentially through the use of larger, renewable funding opportunities; [and]

(B) to allow the agency, States, and jurisdictions to experiment with new research and development funding models; and

(C) to increase the capacity of rural communities to provide quality STEM education and STEM workforce development programming to students, and teachers; and

(3) consider modifications to the mechanisms used to monitor and evaluate EPSCoR awards—

(A) to increase collaboration between EPSCoR-funded researchers and agency staff, including by providing opportunities for mentoring young researchers and for the use of Federal facilities;

(B) to identify and disseminate best practices; and

(C) to harmonize metrics across participating Federal agencies, as appropriate.

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SEC. 525. TRIBAL COLLEGES AND UNIVERSITIES PROGRAM.

(a) IN GENERAL.—The Director shall continue to support a program to award grants on a competitive, merit-reviewed basis to tribal colleges and universities (as defined in section 316 of the Higher Education Act of 1965 (20 U.S.C. 1059c), including institutions described in section 317 of such Act (20 U.S.C. 1059d), to enhance the quality of undergraduate STEM education at such institutions and to increase the retention and graduation rates of [Native American] *American Indian, Alaska Native, and Native Hawaiian* students pursuing *post-secondary credentials and* associate's [or baccalaureate degrees]*, baccalaureate, and graduate degrees* in STEM.

(b) PROGRAM COMPONENTS.—Grants awarded under this section shall support—

(1) activities to improve courses and curriculum in STEM;

(2) faculty development;

(3) stipends for [undergraduate] students participating in research; and

(4) other activities consistent with subsection (a), as determined by the Director.

(c) INSTRUMENTATION.—Funding provided under this section may be used for laboratory *and STEM* equipment and materials.

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HIGH-PERFORMANCE COMPUTING ACT OF 1991

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TITLE I—NETWORKING AND INFORMATION TECHNOLOGY RESEARCH AND DEVELOPMENT

SEC. 101. NETWORKING AND INFORMATION TECHNOLOGY RESEARCH AND DEVELOPMENT PROGRAM.

(a) NETWORKING AND INFORMATION TECHNOLOGY RESEARCH AND DEVELOPMENT.—(1) The President shall implement a Networking and Information Technology Research and Development Program, which shall—

(A) provide for long-term basic and applied research on networking and information technology;

(B) provide for research and development on, and demonstration of, technologies to advance the capacity and capabilities of high-end computing and networking systems, and related software;

(C) provide for sustained access by the research community throughout the United States to high-end computing, distributed, and networking systems that are among the most advanced in the world in terms of performance in solving scientific and engineering problems, including provision for technical support for users of such systems;

(D) provide for efforts to increase software security and reliability;

(E) provide for high-performance networks, including experimental testbed networks, to enable research and development on, and demonstration of, advanced applications enabled by such networks;

(F) provide for computational science and engineering research on mathematical modeling and algorithms for applications in all fields of science and engineering;

(G) provide for the technical support of, and research and development on, high-end computing systems and software required to address Grand Challenges;

(H) provide support and guidance for educating and training additional undergraduate and graduate students in software engineering, computer science, computer and network security, applied mathematics, library and information science, and computational science;

(I) provide for improving the security, reliability, and resilience of computing and networking systems, including Federal systems, including providing for research required to establish security standards and practices for these systems;

(J) provide for improving the security, reliability, and resiliency of computing and networking systems used by institutions of higher education and other nonprofit research institutions for the processing, storage and transmission of sensitive federally funded research and associated data;

[(J)**]** *(K)* provide for increased understanding of the scientific principles of cyber-physical systems and improve the methods available for the design, development, and operation of cyber-physical systems that are characterized by high reliability, safety, and security;

[(K)**]** *(L)* provide for research and development on human-computer interactions, visualization, and big data;

[(L)] *(M)* provide for research and development on the enhancement of cybersecurity, including the human facets of cyber threats and secure cyber systems;

[(M)] *(N)* provide for the understanding of the science, engineering, policy, and privacy protection related to networking and information technology;

[(N)] *(O)* provide for the transition of high-end computing hardware, system software, development tools, and applications into development and operations; and

[(O)] *(P)* foster public-private collaboration among government, industry research laboratories, academia, and nonprofit organizations to maximize research and development efforts and the benefits of networking and information technology, including high-end computing.

(2) The Director shall—

(A) establish the goals and priorities for Federal networking and information technology research, development, education, and other activities;

(B) establish Program Component Areas that implement the goals established under subparagraph (A), and identify the Grand Challenges that the Program should address;

(C) provide for interagency coordination of Federal networking and information technology research, development, education, and other activities undertaken pursuant to the Program—

(i) among the participating agencies; and

(ii) to the extent practicable, with other Federal agencies not described in paragraph (3)(C), other Federal and private research laboratories, industry, research entities, institutions of higher education, relevant nonprofit organizations, and international partners of the United States;

(D) submit to the Congress an annual report, along with the President's annual budget request, describing the implementation of the Program;

(E) encourage and monitor the efforts of the agencies participating in the Program to allocate the level of resources and management attention necessary to ensure that the strategic plans under subsection (e) are developed and executed effectively and that the objectives of the Program are met; and

(F) consult with academic, State, industry, and other appropriate groups conducting research on and using high-end computing.

(3) The annual report submitted under paragraph (2)(D) shall—

(A) provide a detailed description of the Program Component Areas, including a description of any changes in the definition of or activities under the Program Component Areas from the preceding report, and the reasons for such changes, and a description of Grand Challenges addressed under the Program;

(B) provide a detailed description of the nature and scope of research infrastructure designated as such under the Program;

(C) set forth the relevant programs and activities, for the fiscal year with respect to which the budget submission applies, of each Federal agency and department, including—

(i) the Department of Justice;

(ii) the Department of Commerce;

(iii) the Department of Defense;
(iv) the Department of Education;
(v) the Department of Energy;
(vi) the Department of Health and Human Services;
(vii) the Department of Homeland Security;
(viii) the National Archives and Records Administration;
(ix) the Environmental Protection Agency;
(x) the National Aeronautics and Space Administration;
(xi) the National Science Foundation; and
(xii) such other agencies and departments as the President or the Director considers appropriate;

(D) describe the levels of Federal funding for the fiscal year during which such report is submitted, the levels for the previous fiscal year, and the levels proposed for the fiscal year with respect to which the budget submission applies, for each Program Component Area and research area supported in accordance with section 102;

(E) describe the levels of Federal funding for each participating agency, and for each Program Component Area, for the fiscal year during which such report is submitted, the levels for the previous fiscal year, and the levels proposed for the fiscal year with respect to which the budget submission applies;

(F) include a description of how the objectives for each Program Component Area, and the objectives for activities that involve multiple Program Component Areas, relate to the objectives of the Program identified in the strategic plans required under subsection (e); and

(G) include an analysis of the progress made toward achieving the goals and priorities established for the Program and the extent to which the Program incorporates the recommendations of the advisory committee established under subsection (b).

(b) ADVISORY COMMITTEE.—(1) The President shall establish an advisory committee on networking and information technology, consisting of geographically dispersed non-Federal members, including representatives of the research, education, and library communities, network and related software providers, and industry representatives in the Program Component Areas, who are specially qualified to provide the Director with advice and information on networking and information technology. Each chair of the advisory committee shall meet the qualifications of committee membership and may be a member of the President's Council of Advisors on Science and Technology. The recommendations of the advisory committee shall be considered in reviewing and revising the Program. The advisory committee shall provide the Director with an independent assessment of—

(A) progress made in implementing the Program;

(B) the need to revise the Program;

(C) the balance between the components of the Program, including funding levels for the Program Component Areas;

(D) whether the research and development undertaken pursuant to the Program is helping to maintain United States leadership in networking and information technology; and

(E) other issues identified by the Director.

(2) In addition to the duties outlined in paragraph (1), the advisory committee shall conduct periodic evaluations of the funding, management, coordination, implementation, and activities of the Program. The advisory committee shall report not less frequently than once every 3 fiscal years to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate on its findings and recommendations.

(3) Section 14 of the Federal Advisory Committee Act shall not apply to the advisory committee established under this subsection.

(c) OFFICE OF MANAGEMENT AND BUDGET.—(1) Each Federal agency and department participating in the Program shall, as part of its annual request for appropriations to the Office of Management and Budget, submit a report to the Office of Management and Budget which—

(A) identifies each element of its networking and information technology activities which contributes directly to the Program Component Areas or benefits from the Program; and

(B) states the portion of its request for appropriations that is allocated to each such element.

(2) The Office of Management and Budget shall review each such report in light of the goals, priorities, and agency and departmental responsibilities set forth in the annual report submitted under subsection (a)(2)(D), and shall include, in the President's annual budget estimate, a statement of the portion of each appropriate agency's or department's annual budget estimate relating to its activities undertaken pursuant to the Program.

(d) PERIODIC REVIEWS.—The heads of the participating agencies, working through the National Science and Technology Council and the Program, shall—

(1) periodically assess and update, as appropriate, the structure of the Program, including the Program Component Areas and associated contents, scope, and funding levels, taking into consideration any relevant recommendations of the advisory committee established under subsection (b); and

(2) ensure that such agency's implementation of the Program includes foundational, large-scale, long-term, and interdisciplinary information technology research and development activities, including activities described in section 102.

(e) STRATEGIC PLANS.—

(1) IN GENERAL.—The heads of the participating agencies, working through the National Science and Technology Council and the Program, shall develop and implement strategic plans to guide—

(A) emerging activities of Federal networking and information technology research and development; and

(B) the activities described in subsection (a)(1).

(2) UPDATES.—The heads of the participating agencies shall update the strategic plans as appropriate.

(3) CONTENTS.—Each strategic plan shall—

(A) specify near-term and long-term objectives for the portions of the Program relevant to the strategic plan, the anticipated schedule for achieving the near-term and long-term objectives, and the metrics to be used for assessing progress toward the near-term and long-term objectives;

(B) specify how the near-term and long-term objectives complement research and development areas in which academia and the private sector are actively engaged;

(C) describe how the heads of the participating agencies will support mechanisms for foundational, large-scale, long-term, and interdisciplinary information technology research and development and for Grand Challenges, including through collaborations—

(i) across Federal agencies;

(ii) across Program Component Areas; and

(iii) with industry, Federal and private research laboratories, research entities, institutions of higher education, relevant nonprofit organizations, and international partners of the United States;

(D) describe how the heads of the participating agencies will foster the rapid transfer of research and development results into new technologies and applications in the national interest, including through cooperation and collaborations with networking and information technology research, development, and technology transition initiatives supported by the States; and

(E) describe how the portions of the Program relevant to the strategic plan will address long-term challenges for which solutions require foundational, large-scale, long-term, and interdisciplinary information technology research and development.

(4) PRIVATE SECTOR EFFORTS.—In developing, implementing, and updating strategic plans, the heads of the participating agencies, working through the National Science and Technology Council and the Program, shall coordinate with industry, academia, and other interested stakeholders to ensure, to the extent practicable, that the Federal networking and information technology research and development activities carried out under this section do not duplicate the efforts of the private sector.

(5) RECOMMENDATIONS.—In developing and updating strategic plans, the heads of the participating agencies shall solicit recommendations and advice from—

(A) the advisory committee under subsection (b);

(B) the Committee on Science and relevant subcommittees of the National Science and Technology Council; and

(C) a wide range of stakeholders, including industry, academia, National Laboratories, and other relevant organizations and institutions.

(f) REPORTS.—The heads of the participating agencies, working through the National Science and Technology Council and the Program, shall submit to the advisory committee, the Committee on Commerce, Science, and Transportation of the Senate, and the Committee on Science, Space, and Technology of the House of Representatives—

(1) the strategic plans developed under subsection (e)(1); and

(2) each update under subsection (e)(2).

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SUPPORTING VETERANS IN STEM CAREERS ACT

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SEC. 3. SUPPORTING VETERANS IN STEM EDUCATION AND COMPUTER SCIENCE.

(a) SUPPORTING VETERAN INVOLVEMENT IN SCIENTIFIC RESEARCH AND STEM EDUCATION.—The Director shall, through the research and education activities of the Foundation, encourage veterans to study and pursue careers in STEM and computer science, in coordination with other Federal agencies that serve veterans.

(b) VETERAN OUTREACH PLAN.—Not later than 180 days after the date of enactment of this Act, the Director shall submit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a plan for how the Foundation can enhance its outreach efforts to veterans. Such plan shall—

(1) report on the Foundation's existing outreach activities;

(2) identify the best method for the Foundation to leverage existing authorities and programs to facilitate and support veterans in STEM careers and studies, including teaching programs; and

(3) include options for how the Foundation could track veteran participation in research and education programs of the Foundation, and describe any barriers to collecting such information.

(c) NATIONAL SCIENCE BOARD INDICATORS REPORT.—The National Science Board shall provide in its [annual] *biennial* report on indicators of the state of science and engineering in the United States any available and relevant data on veterans in science and engineering careers or education programs.

(d) ROBERT NOYCE TEACHER SCHOLARSHIP PROGRAM UPDATE.—Section 10 of the National Science Foundation Authorization Act of 2002 (42 U.S.C. 1862n-1) is amended—

(1) in subsection (a)(5)—

(A) in subparagraph (A), by striking "and" at the end;

(B) in subparagraph (B), by striking the period at the end and inserting "; and"; and

(C) by adding at the end the following:

"(C) higher education programs that serve or support veterans.";

(2) in subsection (b)(2)(F)—

(A) by striking "and students" and inserting ", students"; and

(B) by inserting ", and veterans" before the period at the end;

(3) in subsection (c)(2), by inserting "and veterans" before the period at the end; and

(4) in subsection (d)(2), by inserting "and veterans" before the period at the end.

(e) NATIONAL SCIENCE FOUNDATION TEACHING FELLOWSHIPS AND MASTER TEACHING FELLOWSHIPS UPDATE.—Section 10A(d) of the National Science Foundation Authorization Act of 2002 (42 U.S.C. 1862n-1a(d)) is amended—

(1) in paragraph (3)(F)—

(A) by striking "and individuals" and inserting ", individuals"; and

(B) by inserting ", and veterans" before the period at the end; and

(2) in paragraph (4)(B), by inserting "and veterans" before the period at the end.

(f) NATIONAL SCIENCE FOUNDATION COMPUTER AND NETWORK SECURITY CAPACITY BUILDING GRANTS UPDATE.—Section 5(a) of the Cyber Security Research and Development Act (15 U.S.C. 7404(a)) is amended—

(1) in paragraph (1), by inserting "and students who are veterans" after "these fields"; and

(2) in paragraph (3)—

(A) in subparagraph (I), by striking "and" at the end;

(B) by redesignating subparagraph (J) as subparagraph (K); and

(C) by inserting after subparagraph (I) the following:

"(J) creating opportunities for veterans to transition to careers in computer and network security; and".

(g) GRADUATE TRAINEESHIPS IN COMPUTER AND NETWORK SECURITY RESEARCH UPDATE.—Section 5(c)(6)(C) of the Cyber Security Research and Development Act (15 U.S.C. 7404(c)(6)(C)) is amended by inserting "or veterans" after "disciplines".

(h) VETERANS AND MILITARY FAMILIES STEM EDUCATION INTERAGENCY WORKING GROUP.—

(1) IN GENERAL.—The Director of the Office of Science and Technology Policy shall establish, or designate, an interagency working group to improve veteran and military spouse equity and representation in STEM fields.

(2) DUTIES OF INTERAGENCY WORKING GROUP.—An interagency working group established under paragraph (1) shall develop and facilitate the implementation by participating agencies of a strategic plan, which shall—

(A) specify and prioritize short- and long-term objectives;

(B) specify the common metrics that will be used by Federal agencies to assess progress toward achieving such objectives;

(C) identify barriers veterans face in reentering the workforce, including a lack of formal STEM education, career guidance, and the process of transferring military credits and skills to college credits;

(D) identify barriers military spouses face in establishing careers in STEM fields;

(E) describe the approaches that each participating agency will take to address administratively the barriers described in subparagraphs (C) and (D); and

(F) identify any barriers that require Federal or State legislative or regulatory changes in order to be addressed.

(3) REPORT.—The Director of the Office of Science and Technology Policy shall—

(A) not later than 1 year after the date of enactment of this Act, submit to Congress the strategic plan required under paragraph (2); and

(B) include in the annual report required by section 101(d) of the America COMPETES Reauthorization Act of

2010 (42 U.S.C. 6621(d)) a description of any progress made in carrying out the activities described in paragraph (2) of this subsection.

(4) SUNSET.—An interagency working group established under paragraph (1) shall terminate on the date that is 3 years after the date that it is established.

* * * * * * *

NATIONAL SCIENCE FOUNDATION AUTHORIZATION ACT OF 2002

* * * * * * *

SEC. 15. ADMINISTRATIVE AMENDMENTS.

(a) BOARD MEETINGS.—

(1) IN GENERAL.—

(2) OPEN MEETINGS.—To ensure transparency of the Board's entire decision-making process, including deliberations on Board business occurring within its various subdivisions, the Board and all of its committees, subcommittees, and task forces (and any other entity consisting of members of the Board and reporting to the Board) shall be subject to section 552b of title 5, United States Code. The preceding requirement will apply to meetings of the full Board, whenever a quorum is present; and to meetings of its subdivisions, whenever a quorum of the subdivision is present.

[(3) COMPLIANCE AUDIT.—The Inspector General of the Foundation shall conduct an audit every three years of the compliance by the Board with the requirements described in paragraph (2). The audit shall examine the proposed and actual content of closed meetings and determine whether the closure of the meetings was consistent with section 552b of title 5, United States Code.

[(4) REPORT.—Not later than February 15 of every third year, the Inspector General of the Foundation shall transmit to the Committee on Science of the House of Representatives, the Committee on Commerce, Science, and Transportation of the Senate, and the Committee on Health, Education, Labor, and Pensions of the Senate the audit required under paragraph (3) along with recommendations for corrective actions that need to be taken to achieve fuller compliance with the requirements described in paragraph (2), and recommendations on how to ensure public access to the Board's deliberations.

[(5) MATERIALS RELATING TO CLOSED PORTIONS OF MEETINGS.—To facilitate the audit required under paragraph (3) of this subsection, the Office of the National Science Board shall maintain the General Counsel's certificate, the presiding officer's statement, and a transcript or recording of any closed meeting, for at least 3 years after such meeting.**]**

(3) COMPLIANCE REVIEW.—The Inspector General of the Foundation shall conduct a review of the compliance by the Board with the requirements described in paragraph (2) as necessary based on a triennial risk assessment. Any review deemed necessary shall examine the proposed and actual content of closed

meetings and determine whether the closure of the meetings was consistent with section 552b of title 5, United States Code.

(4) MATERIALS RELATING TO CLOSED PORTIONS OF MEETING.—To facilitate the risk assessment required under paragraph (3) of this subsection, and any subsequent review conducted by the Inspector General, the Office of the National Science Board shall maintain the General Counsel's certificate, the presiding officer's statement, and a transcript or recording of any closed meeting, for at least 3 years after such meeting.

(b) CONFIDENTIALITY OF CERTAIN INFORMATION.—

(c) APPOINTMENT.—

(d) SCHOLARSHIP ELIGIBILITY.—The Director shall not exclude part-time students from eligibility for scholarships under the Computer Science, Engineering, and Mathematics Scholarship program.

* * * * * * *

AMERICAN INNOVATION AND COMPETITIVENESS ACT

* * * * * * *

TITLE VI—INNOVATION AND TECHNOLOGY TRANSFER

* * * * * * *

SEC. 602. TRANSLATIONAL RESEARCH GRANTS.

(a) SENSE OF CONGRESS.—It is the sense of Congress that—

(1) commercialization of federally funded research may benefit society and the economy; and

(2) not-for-profit organizations support the commercialization of federally funded research by providing useful business and technical expertise to researchers.

(b) COMMERCIALIZATION PROMOTION.—The Director of the Foundation shall continue to award grants on a competitive, merit-reviewed basis to eligible entities to promote the commercialization of federally funded research results.

(c) USE OF FUNDS.—Activities supported by grants under this section may include—

(1) identifying Foundation-sponsored research and technologies that have the potential for accelerated commercialization;

(2) supporting prior or current Foundation-sponsored investigators, institutions of higher education, and non-profit organizations that partner with an institution of higher education in undertaking proof-of-concept work, including development of prototypes of technologies that are derived from Foundation-sponsored research and have potential market value;

(3) promoting sustainable partnerships between Foundation-funded institutions, industry, and other organizations within academia and the private sector with the purpose of accelerating the transfer of technology;

(4) developing multi-disciplinary innovation ecosystems which involve and are responsive to specific needs of academia and industry; and

(5) providing professional development, mentoring, and advice in entrepreneurship, project management, and technology and business development to innovators.

(d) ELIGIBILITY.—

(1) IN GENERAL.—The following organizations may be eligible for grants under this section:

(A) Institutions of higher education.

(B) Public or nonprofit technology transfer organizations.

(C) A nonprofit organization that partners with an institution of higher education.

(D) A consortia of 2 or more of the organizations described under subparagraphs (A) through (C).

(2) LEAD ORGANIZATIONS.—Any eligible organization under paragraph (1) may apply as a lead organization.

(e) PLANNING AND CAPACITY BUILDING GRANTS.—

(1) IN GENERAL.—Under the program established in section 508 of the America COMPETES Reauthorization Act of 2010 (42 U.S.C. 1862p–2) and the activities authorized under this section, the Director shall award grants to eligible entities for planning and capacity building at institutions of higher education.

(2) ELIGIBLE ENTITY DEFINED.—In this subsection, the term "eligible entity" means an institution of higher education (or a consortium of such institutions) that, according to the data published by the National Center for Science and Engineering Statistics, is not, on average, among the top 100 institutions in Federal R&D expenditures during the 3 year period prior to the year of the award.

(3) USE OF FUNDS.—In addition to activities listed under subsection (c), an eligible entity receiving a grant under this subsection may use funds to—

(A) ensure the availability of staff, including technology transfer professionals, entrepreneurs in residence, and other mentors as required to accomplish the purpose of this subsection;

(B) revise institution policies, including policies related to intellectual property and faculty entrepreneurship, and taking other necessary steps to implement relevant best practices for academic technology transfer;

(C) develop new local and regional partnerships among institutions of higher education and between institutions of higher education and private sector entities and other relevant organizations with the purpose of building networks, expertise, and other capacity to identify promising research that may have potential market value and enable researchers to pursue further development and transfer of their ideas into possible commercial or other use;

(D) develop seminars, courses, and other educational opportunities for students, post-doctoral researchers, faculty, and other relevant staff at institutions of higher education to increase awareness and understanding of entrepreneurship, patenting, business planning, and other areas relevant to technology transfer, and connect students and researchers to relevant resources, including mentors in the private sector; and

(E) create and fund competitions to allow entrepreneurial students and faculty to illustrate the commercialization potential of their ideas.

(4) MINIMUM DURATION AND SIZE OF AWARD.—Grants awarded under this subsection shall be at least 3 years in duration and $500,000 in total amount.

(5) APPLICATION.—An eligible entity seeking funding under this subsection shall submit an application to the Director of the Foundation at such time, in such manner, and containing such information and assurances as such Director may require. The application shall include, at a minimum, a description of how the eligible entity submitting an application plans to sustain the proposed activities beyond the duration of the grant.

(6) AUTHORIZATION OF APPROPRIATIONS.—From within funds authorized under section 9, there are authorized to carry out the activities under this subsection $40 million for each of fiscal years 2022 through 2026.

[(e)**]** *(f)* APPLICATIONS.—An eligible entity seeking a grant under this section shall submit an application to the Director at such time, in such manner, and containing such information as the Director may require.

* * * * * * *

XX. PROCEEDINGS OF THE SUBCOMMITTEE MARKUP

MARKUP: H.R. 2225, NATIONAL SCIENCE FOUNDATION FOR THE FUTURE ACT

MARKUP

BEFORE THE

SUBCOMMITTEE ON RESEARCH AND TECHNOLOGY

OF THE

COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY
HOUSE OF REPRESENTATIVES

ONE HUNDRED SEVENTEENTH CONGRESS

FIRST SESSION

MAY 13, 2021

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C O N T E N T S

Thursday, May 13, 2021

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MARKUP ON H.R. 2225, NATIONAL SCIENCE FOUNDATION FOR THE FUTURE ACT

THURSDAY, MAY 13, 2021

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON RESEARCH AND TECHNOLOGY
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY
Washington, D.C.

The Subcommittee met, pursuant to notice, at 10:01 a.m., via Webex, Hon. Haley Stevens [Chairwoman of the Subcommittee] presiding.

Chairwoman STEVENS. OK. Well, good morning. The Committee will come to order. Without objection, the Chair is authorized to declare recess at any time. Pursuant to Committee Rule 2E, House Rule 11, the Chair announces that she may postpone roll call votes. Pursuant to *House Resolution 8*, today the Committee is meeting virtually. I want to announce a couple of reminders to our Members about the conduct of this remote meeting. First, Members should keep their video feed on as long as they are present in the meeting. Members are responsible for their own microphones. Please also keep your microphones muted unless you are speaking. Finally, if Members have documents they wish to submit to the record, please e-mail them to the Committee Clerk, whose e-mail address was circulated prior to this meeting.

Pursuant to notice, the Subcommittee on Research and Technology meets to consider H.R. 2225, the *National Science Foundation (NSF) for the Future Act*. The Clerk will report the bill.

The CLERK. H.R. 2225, a bill to authorize appropriations for Fiscal Years 2022, 2023, 2024, 2025, and 2026 for the National Science Foundation, and for other purposes.

[The bill follows:]

.....

(Original Signature of Member)

117TH CONGRESS
1ST SESSION

H. R. _____

To authorize appropriations for fiscal years 2022, 2023, 2024, 2025, and 2026 for the National Science Foundation, and for other purposes.

IN THE HOUSE OF REPRESENTATIVES

Ms. JOHNSON of Texas introduced the following bill; which was referred to the Committee on _____

A BILL

To authorize appropriations for fiscal years 2022, 2023, 2024, 2025, and 2026 for the National Science Foundation, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE.

This Act may be cited as the "National Science Foundation for the Future Act".

SEC. 2. FINDINGS.

Congress finds the following:

1 (1) Over the past seven decades, the National
2 Science Foundation has played a critical role in ad-
3 vancing the United States academic research enter-
4 prise by supporting fundamental research and edu-
5 cation across science and engineering disciplines.
6 (2) Discoveries enabled by sustained investment
7 in fundamental research and the education of the
8 United States science and engineering workforce
9 have led to transformational innovations and
10 spawned new industries.
11 (3) While the traditional approach to invest-
12 ment in research has delivered myriad benefits to so-
13 ciety, a concerted effort is needed to ensure the ben-
14 efits of federally funded science and engineering are
15 enjoyed by all Americans.
16 (4) As countries around the world increase in-
17 vestments in research and STEM education, United
18 States global leadership in science and engineering is
19 eroding, posing significant risks to economic com-
20 petitiveness, national security, and public well-being.
21 (5) To address major societal challenges and
22 sustain United States leadership in innovation, the
23 Federal Government must increase investments in
24 research, broaden participation in the STEM work-
25 force, and bolster collaborations among universities,

1 National Laboratories, companies, non-profit
2 funders of research, local policymakers, civil societies
3 and stakeholder communities, and international
4 partners.

5 **SEC. 3. DEFINITIONS.**

6 In this Act:

7 (1) ACADEMIES.—The term "Academies"
8 means the National Academies of Sciences, Engi-
9 neering, and Medicine.

10 (2) AWARDEE.—The term "awardee" means
11 the legal entity to which Federal assistance is
12 awarded and that is accountable to the Federal Gov-
13 ernment for the use of the funds provided.

14 (3) BOARD.—The term "Board" means the Na-
15 tional Science Board.

16 (4) DIRECTOR.—The term "Director" means
17 the Director of the National Science Foundation.

18 (5) EMERGING RESEARCH INSTITUTION.—The
19 term "emerging research institution" means an in-
20 stitution of higher education with an established un-
21 dergraduate student program that has, on average
22 for 3 years prior to the time of application for an
23 award, received less than $35,000,000 in Federal re-
24 search funding.

1 (6) FEDERAL SCIENCE AGENCY.—The term
2 "Federal science agency" means any Federal agency
3 with an annual extramural research expenditure of
4 over $100,000,000.
5 (7) FOUNDATION.—The term "Foundation"
6 means the National Science Foundation.
7 (8) INSTITUTION OF HIGHER EDUCATION.—The
8 term "institution of higher education" has the
9 meaning given the term in section 101(a) of the
10 Higher Education Act of 1965 (20 U.S.C. 1001(a)).
11 (9) NON-PROFIT ORGANIZATION.—The term
12 "non-profit organization" means an organization
13 which is described in section 501(c)(3) of the Inter-
14 nal Revenue Code of 1986 and exempt from tax
15 under section 501(a) of such code.
16 (10) NSF INCLUDES.—The term "NSF in-
17 cludes" means the initiative carried out under sec-
18 tion 6(c).
19 (11) PREK-12.—The term "preK-12" means
20 pre-kindergarten through grade 12.
21 (12) SKILLED TECHNICAL WORK.—The term
22 "skilled technical work" means an occupation that
23 requires a high level of knowledge in a technical do-
24 main and does not require a bachelor's degree for
25 entry.

(13) STEM.—The term "STEM" has the meaning given the term in section 2 of the America COMPETES Reauthorization Act of 2010 (42 U.S.C. 6621 note).

SEC. 4. AUTHORIZATION OF APPROPRIATIONS.

(a) FISCAL YEAR 2022.—

(1) IN GENERAL.—There are authorized to be appropriated to the Foundation $11,469,200,000 for fiscal year 2022.

(2) SPECIFIC ALLOCATIONS.—Of the amount authorized under paragraph (1)—

(A) $9,444,100,000 shall be made available to carry out research and related activities, of which—

(i) $208,150,000 shall be for the Graduate Research Fellowship Program;

(ii) $55,000,000 shall be for the Mid-Scale Research Infrastructure Program; and

(iii) $1,000,000,000 shall be for the Directorate for Science and Engineering Solutions;

(B) $1,333,860,000 shall be made available for education and human resources, of which—

(i) $73,700,000 shall be for the Robert Noyce Teacher Scholarship Program;

(ii) $59,500,000 shall be for the NSF Research Traineeship Program;

(iii) $208,150,000 shall be for the Graduate Research Fellowship Program; and

(iv) $66,000,000 shall be for the Cybercorps Scholarship for Service Program;

(C) $190,000,000 shall be made available for major research equipment and facilities construction, of which $65,000,000 shall be for the Mid-Scale Research Infrastructure Program;

(D) $473,500,000 shall be made available for agency operations and award management;

(E) $4,620,000 shall be made available for the Office of the National Science Board; and

(F) $23,120,000 shall be made available for the Office of the Inspector General.

(b) FISCAL YEAR 2023.—

(1) IN GENERAL.—There are authorized to be appropriated to the Foundation $12,668,000,000 for fiscal year 2023.

1 (2) SPECIFIC ALLOCATIONS.—Of the amount
2 authorized under paragraph (1)—
3 (A) $10,367,460,000 shall be made avail-
4 able to carry out research and related activities,
5 of which—
6 (i) $227,070,000 shall be for the
7 Graduate Research Fellowship Program;
8 (ii) $60,000,000 shall be for the Mid-
9 Scale Research Infrastructure Program;
10 and
11 (iii) $1,500,000,000 shall be for the
12 Directorate for Science and Engineering
13 Solutions;
14 (B) $1,391,320,000 shall be made avail-
15 able for education and human resources, of
16 which—
17 (i) $80,400,000 shall be for the Rob-
18 ert Noyce Teacher Scholarship Program;
19 (ii) $64,910,000 shall be for the NSF
20 Research Traineeship Program;
21 (iii) $227,070,000 shall be for the
22 Graduate Research Fellowship Program;
23 and

1 (iv) $72,000,000 shall be for the
2 Cybercorps Scholarship for Service Pro-
3 gram;
4 (C) $355,000,000 shall be made available
5 for major research equipment and facilities con-
6 struction, of which $75,000,000 shall be for the
7 Mid-Scale Research Infrastructure Program;
8 (D) $522,940,000 shall be made available
9 for agency operations and award management;
10 (E) $4,660,000 shall be made available for
11 the Office of the National Science Board; and
12 (F) $26,610,000 shall be made available
13 for the Office of the Inspector General.
14 (c) FISCAL YEAR 2024.—
15 (1) IN GENERAL.—There are authorized to be
16 appropriated to the Foundation $14,148,200,000 for
17 fiscal year 2024.
18 (2) SPECIFIC ALLOCATIONS.—Of the amount
19 authorized under paragraph (1)—
20 (A) $11,702,420,000 shall be made avail-
21 able to carry out research and related activities,
22 of which—
23 (i) $245,990,000 shall be for the
24 Graduate Research Fellowship Program;

1 (ii) $70,000,000 shall be for the Mid-
2 Scale Research Infrastructure Program;
3 and
4 (iii) $2,250,000,000 shall be for the
5 Directorate for Science and Engineering
6 Solutions;
7 (B) $1,457,590,000 shall be made avail-
8 able for education and human resources, of
9 which—
10 (i) $87,100,000 shall be for the Rob-
11 ert Noyce Teacher Scholarship Program;
12 (ii) $70,320,000 shall be for the NSF
13 Research Traineeship Program;
14 (iii) $245,990,000 shall be for the
15 Graduate Research Fellowship Program;
16 and
17 (iv) $78,000,000 shall be for the
18 Cybercorps Scholarship for Service Pro-
19 gram;
20 (C) $370,000,000 shall be made available
21 for major research equipment and facilities con-
22 struction, of which $85,000,000 shall be for the
23 Mid-Scale Research Infrastructure Program;
24 (D) $582,380,000 shall be made available
25 for agency operations and award management;

1 (E) $4,700,000 shall be made available for
2 the Office of the National Science Board; and
3 (F) $31,110,000 shall be made available
4 for the Office of the Inspector General.
5 (d) FISCAL YEAR 2025.—
6 (1) IN GENERAL.—There are authorized to be
7 appropriated to the Foundation $16,036,900,000 for
8 fiscal year 2025.
9 (2) SPECIFIC ALLOCATIONS.—Of the amount
10 authorized under paragraph (1)—
11 (A) $13,440,840,000 shall be made avail-
12 able to carry out research and related activities,
13 of which—
14 (i) $264,920,000 shall be for the
15 Graduate Research Fellowship Program;
16 (ii) $75,000,000 shall be for the Mid-
17 Scale Research Infrastructure Program;
18 and
19 (iii) $3,375,000,000 shall be for the
20 Directorate for Science and Engineering
21 Solutions;
22 (B) $1,522,890,000 shall be made avail-
23 able for education and human resources, of
24 which—

(i) $93,800,000 shall be for the Robert Noyce Teacher Scholarship Program;

(ii) $75,730,000 shall be for the NSF Research Traineeship Program;

(iii) $264,920,000 shall be for the Graduate Research Fellowship Program; and

(iv) $84,000,000 shall be for the Cybercorps Scholarship for Service Program;

(C) $372,000,000 shall be made available for major research equipment and facilities construction, of which $90,000,000 shall be for the Mid-Scale Research Infrastructure Program;

(D) $661,830,000 shall be made available for agency operations and award management;

(E) $4,740,000 shall be made available for the Office of the National Science Board; and

(F) $34,610,000 shall be made available for the Office of the Inspector General.

(e) FISCAL YEAR 2026.—

(1) IN GENERAL.—There are authorized to be appropriated to the Foundation $18,325,020,000 for fiscal year 2026.

1 (2) SPECIFIC ALLOCATIONS.—Of the amount
2 authorized under paragraph (1)—
3 (A) $15,549,390,000 shall be made avail-
4 able to carry out research and related activities,
5 of which—
6 (i) $283,840,000 shall be for the
7 Graduate Research Fellowship Program;
8 (ii) $80,000,000 shall be for the Mid-
9 Scale Research Infrastructure Program;
10 and
11 (iii) $5,062,500,000 shall be for the
12 Directorate for Science and Engineering
13 Solutions;
14 (B) $1,601,470,000 shall be made avail-
15 able for education and human resources, of
16 which—
17 (i) $100,500,000 shall be for the Rob-
18 ert Noyce Teacher Scholarship Program;
19 (ii) $81,140,000 shall be for the NSF
20 Research Traineeship Program;
21 (iii) $283,840,000 shall be for the
22 Graduate Research Fellowship Program;
23 and

1 (iv) $90,000,000 shall be for the
2 Cybercorps Scholarship for Service Pro-
3 gram;
4 (C) $375,000,000 shall be made available
5 for major research equipment and facilities con-
6 struction, of which $100,000,000 shall be for
7 the Mid-Scale Research Infrastructure Pro-
8 gram;
9 (D) $756,270,000 shall be made available
10 for agency operations and award management;
11 (E) $4,780,000 shall be made available for
12 the Office of the National Science Board; and
13 (F) $38,110,000 shall be made available
14 for the Office of the Inspector General.
15 **SEC. 5. STEM EDUCATION.**
16 (a) PREK-12 STEM EDUCATION.—
17 (1) DECADAL SURVEY OF STEM EDUCATION RE-
18 SEARCH.—Not later than 45 days after the date of
19 enactment of this Act, the Director shall enter into
20 a contract with the Academies to review and assess
21 the status and opportunities for PreK–12 STEM
22 education research and make recommendations for
23 research priorities over the next decade.
24 (2) SCALING INNOVATIONS IN PREK-12 STEM
25 EDUCATION.—

1 (A) IN GENERAL.—The Director shall es-
2 tablish a program to award grants, on a com-
3 petitive basis, to institutions of higher edu-
4 cation or non-profit organizations (or consortia
5 of such institutions or organizations) to estab-
6 lish no fewer than 3 multidisciplinary Centers
7 for Tranformative Education Research and
8 Translation (in this section referred to as "Cen-
9 ters") to support research and development on
10 widespread and sustained implementation of
11 STEM education innovations.
12 (B) APPLICATION.—An institution of high-
13 er education or non-profit organization (or a
14 consortium of such institutions or organiza-
15 tions) seeking funding under subparagraph (A)
16 shall submit an application to the Director at
17 such time, in such manner, and containing such
18 information as the Director may require. The
19 application shall include, at a minimum, a de-
20 scription of how the proposed Center will—
21 (i) establish partnerships among aca-
22 demic institutions, local or State education
23 agencies, and other relevant stakeholders
24 in supporting programs and activities to
25 facilitate the widespread and sustained im-

1 plementation of promising, evidence-based
2 STEM education practices, models, pro-
3 grams, and technologies;
4 (ii) support enhanced STEM edu-
5 cation infrastructure, including
6 cyberlearning technologies, to facilitate the
7 widespread adoption of promising, evi-
8 dence-based practices;
9 (iii) support research and development
10 on scaling practices, partnerships, and al-
11 ternative models to current approaches, in-
12 cluding approaches sensitive to the unique
13 combinations of capabilities, resources, and
14 needs of varying localities, educators, and
15 learners;
16 (iv) include a focus on the learning
17 needs of under resourced schools and
18 learners in low-resource or underachieving
19 local education agencies in urban and rural
20 communities; and
21 (v) support research and development
22 on scaling practices and models to support
23 and sustain highly-qualified STEM edu-
24 cators in urban and rural communities.

1 (C) ADDITIONAL CONSIDERATIONS.—In
2 awarding a grant under this paragraph, the Di-
3 rector may also consider the extent to which the
4 proposed Center will—
5 (i) leverage existing collaborations,
6 tools, and strategies supported by the
7 Foundation, including NSF INCLUDES
8 and the Convergence Accelerators;
9 (ii) support research on and the devel-
10 opment and scaling of innovative ap-
11 proaches to distance learning and edu-
12 cation for various student populations;
13 (iii) support education innovations
14 that leverage new technologies or deepen
15 understanding of the impact of technology
16 on educational systems; and
17 (iv) include a commitment from local
18 or State education administrators to mak-
19 ing the proposed reforms and activities a
20 priority.
21 (D) PARTNERSHIP.—In carrying out the
22 program under subparagraph (A), the Director
23 shall explore opportunities to partner with the
24 Department of Education, including through
25 jointly funding activities under this paragraph.

1 (E) ANNUAL MEETING.—The Director
2 shall encourage and facilitate an annual meet-
3 ing of the Centers to foster collaboration among
4 the Centers and to further disseminate the re-
5 sults of the Centers' activities.
6 (F) REPORT.—Not later than 5 years after
7 the date of enactment of this Act, the Director
8 shall submit to Congress a report describing the
9 activities carried out pursuant to this para-
10 graph that includes—
11 (i) a description of the focus and pro-
12 posed goals of each Center; and
13 (ii) an assessment of the program's
14 success in helping to promote scalable solu-
15 tions in PreK-12 STEM education.
16 (3) NATIONAL ACADEMIES STUDY.—Not later
17 than 45 days after the date of enactment of this
18 Act, the Director shall enter into an agreement with
19 the Academies to conduct a study to—
20 (A) review the research literature and iden-
21 tify research gaps regarding the interconnected
22 factors that foster and hinder successful imple-
23 mentation of promising, evidence-based PreK-
24 12 STEM education innovations at the local,
25 regional, and national level;

1 (B) present a compendium of promising,
2 evidence-based PreK-12 STEM education prac-
3 tices, models, programs, and technologies;
4 (C) identify barriers to widespread and
5 sustained implementation of such innovations;
6 and
7 (D) make recommendations to the Founda-
8 tion, the Department of Education, the Na-
9 tional Science and Technology Council's Com-
10 mittee on Science, Technology, Engineering,
11 and Mathematics Education, State and local
12 educational agencies, and other relevant stake-
13 holders on measures to address such barriers.
14 (b) UNDERGRADUATE STEM EDUCATION.—
15 (1) RESEARCH ON STEM EDUCATION AND
16 WORKFORCE NEEDS.—The Director shall award
17 grants, on a competitive basis, to four-year institu-
18 tions of higher education or non-profit organizations
19 (or consortia of such institutions or organizations) to
20 support research and development activities to—
21 (A) encourage greater collaboration and
22 coordination between institutions of higher edu-
23 cation and industry to enhance education and
24 improve alignment with workforce needs;

1 (B) understand the current composition of
2 the STEM workforce and the factors that influ-
3 ence growth, retention, and development of that
4 workforce; and
5 (C) increase the size, diversity, capability,
6 and flexibility of the STEM workforce.
7 (2) ADVANCED TECHNOLOGICAL EDUCATION
8 PROGRAM UPDATE.—Section 3(b) of the Scientific
9 and Advanced Technology Act of 1992 (42 U.S.C.
10 1862i(b)) is amended to read as follows:
11 "(b) NATIONAL COORDINATION NETWORK FOR
12 SCIENCE AND TECHNICAL EDUCATION.—The Director
13 shall award grants to institutions of higher education,
14 non-profit organizations, and associate-degree granting
15 colleges (or consortia of such institutions or organizations)
16 to establish a network of centers for science and technical
17 education. The centers shall—
18 "(1) coordinate research, training, and edu-
19 cation activities funded by awards under subsection
20 (a) and share information and best practices across
21 the network of awardees;
22 "(2) serve as a national and regional clearing-
23 house and resource to communicate and coordinate
24 research, training, and educational activities across
25 disciplinary, organizational, geographic, and inter-

1 national boundaries and disseminate best practices;
2 and
3 "(3) develop national and regional partnerships
4 between PreK–12 schools, two-year colleges, institu-
5 tions of higher education, workforce development
6 programs, and industry to meet workforce needs.".
7 (c) GRADUATE STEM EDUCATION.—
8 (1) MENTORING AND PROFESSIONAL DEVELOP-
9 MENT.—
10 (A) MENTORING PLANS.—
11 (i) UPDATE.—Section 7008 of the
12 America Creating Opportunities to Mean-
13 ingfully Promote Excellence in Technology,
14 Education, and Science Act (42 U.S.C.
15 1862o) is amended by—
16 (I) inserting "and graduate stu-
17 dent" after "postdoctoral"; and
18 (II) inserting "The requirement
19 may be satisfied by providing such in-
20 dividuals with access to mentors, in-
21 cluding individuals not listed on the
22 grant." after "review criterion.".
23 (ii) EVALUATION.—Not later than 45
24 days after the date of enactment of this
25 Act, the Director shall enter into an agree-

1 ment with a qualified independent organi-
2 zation to evaluate the effectiveness of the
3 postdoctoral mentoring plan requirement
4 for improving mentoring for Foundation-
5 supported postdoctoral researchers.
6 (B) CAREER EXPLORATION.—
7 (i) IN GENERAL.—The Director shall
8 award grants, on a competitive basis, to in-
9 stitutions of higher education and non-
10 profit organizations (or consortia of such
11 institutions or organizations) to develop in-
12 novative approaches for facilitating career
13 exploration of academic and non-academic
14 career options and for providing oppor-
15 tunity-broadening experiences for graduate
16 students and postdoctoral scholars that
17 can then be considered, adopted, or adapt-
18 ed by other institutions and to carry out
19 research on the impact and outcomes of
20 such activities.
21 (ii) REVIEW OF PROPOSALS.—In se-
22 lecting grant recipients under this subpara-
23 graph, the Director shall consider, at a
24 minimum—

1 (I) the extent to which the ad-
2 ministrators of the institution are
3 committed to making the proposed ac-
4 tivity a priority; and
5 (II) the likelihood that the insti-
6 tution or organization will sustain or
7 expand the proposed activity effort be-
8 yond the period of the grant.
9 (C) DEVELOPMENT PLANS.—The Director
10 shall require that annual project reports for
11 awards that support graduate students and
12 postdoctoral scholars include certification by the
13 principal investigator that each graduate stu-
14 dent and postdoctoral scholar receiving substan-
15 tial support from such award, as determined by
16 the Director, in consultation with faculty advi-
17 sors, has developed and annually updated an in-
18 dividual development plan to map educational
19 goals, career exploration, and professional de-
20 velopment.
21 (D) PROFESSIONAL DEVELOPMENT SUP-
22 PLEMENT.—The Director shall carry out a five-
23 year pilot initiative to award up to 2,500 ad-
24 ministrative supplements of up to $2,000 to ex-
25 isting research grants annually, on a competi-

1 tive basis, to support graduate student profes-
2 sional development experiences for graduate
3 students who receive a substantial portion of
4 their support under such grants, as determined
5 by the Director.
6 (E) GRADUATE EDUCATION RESEARCH.—
7 The Director shall award grants, on a competi-
8 tive basis, to institutions of higher education or
9 non-profit organizations (or consortia of such
10 institutions or organizations) to support re-
11 search on the graduate education system and
12 outcomes of various interventions and policies,
13 including—
14 (i) the effects of traineeships, fellow-
15 ships, internships, and teaching and re-
16 search assistantships on outcomes for
17 graduate students;
18 (ii) the effects of graduate education
19 and mentoring policies and procedures on
20 degree completion, including differences
21 across gender, race and ethnicity, and citi-
22 zenship; and
23 (iii) the development and assessment
24 of new or adapted interventions, including
25 approaches that improve mentoring rela-

1 tionships, develop conflict management
2 skills, and promote healthy research teams.
3 (2) GRADUATE RESEARCH FELLOWSHIP PRO-
4 GRAM UPDATE.—
5 (A) SENSE OF CONGRESS.—It is the sense
6 of Congress that the Foundation should in-
7 crease the number of new graduate research fel-
8 lows supported annually over the next 5 years
9 to no fewer than 3,000 fellows.
10 (B) PROGRAM UPDATE.—Section 10 of the
11 National Science Foundation Act of 1950 (42
12 U.S.C. 1869) is amended—
13 (i) in subsection (a), by inserting
14 "and as will address national workforce de-
15 mand in critical STEM fields" after
16 "throughout the United States";
17 (ii) in subsection (b), by striking "of
18 $12,000" and inserting "up to $16,000";
19 and
20 (iii) by adding at the end the fol-
21 lowing:
22 "(c) OUTREACH.—The Director shall ensure program
23 outreach to recruit fellowship applicants from fields of
24 study that are in areas of critical national need, from all

1 regions of the country, and from historically underrep-
2 resented populations in STEM.".
3 (3) STUDY ON GRADUATE STUDENT FUND-
4 ING.—
5 (A) IN GENERAL.—Not later than 45 days
6 after the date of enactment of this Act, the Di-
7 rector shall enter into an agreement with a
8 qualified independent organization to evalu-
9 ate—
10 (i) the role of the Foundation in sup-
11 porting graduate student education and
12 training through fellowships, traineeships,
13 and other funding models; and
14 (ii) the impact of different funding
15 mechanisms on graduate student experi-
16 ences and outcomes, including whether
17 such mechanisms have differential impacts
18 on subsets of the student population.
19 (B) REPORT.—Not later than 1 year after
20 the date of enactment of this Act, the organiza-
21 tion charged with carrying out the study under
22 subparagraph (A) shall publish the results of its
23 evaluation, including a recommendation for the
24 appropriate balance between fellowships,
25 traineeships, and other funding models.

1 (d) STEM WORKFORCE DATA.—

2 (1) SKILLED TECHNICAL WORKFORCE PORT-
3 FOLIO REVIEW.—

4 (A) IN GENERAL.—Not later than 1 year
5 after the date of enactment of this Act, the Di-
6 rector shall conduct a full portfolio analysis of
7 the Foundation's skilled technical workforce in-
8 vestments across all Directorates in the areas of
9 education, research, infrastructure, data collec-
10 tion, and analysis.

11 (B) REPORT.—Not later than 180 days
12 after the date of the review under subparagraph
13 (A) is complete, the Director shall submit to
14 Congress and make widely available to the pub-
15 lic a summary report of the portfolio review.

16 (2) SURVEY DATA.—

17 (A) ROTATING TOPIC MODULES.—To meet
18 evolving needs for data on the state of the
19 science and engineering workforce, the Director
20 shall assess, through coordination with other
21 Federal statistical agencies and drawing on
22 input from relevant stakeholders, the feasibility
23 and benefits of incorporating questions or topic
24 modules to existing National Center for Science

1 and Engineering Statistics surveys that would
2 vary from cycle to cycle.
3 (B) NEW DATA.—Not later than 1 year
4 after the date of enactment of this Act, the Di-
5 rector shall submit to Congress and the Board
6 the results of an assessment, carried out in co-
7 ordination with other Federal agencies and with
8 input from relevant stakeholders, of the feasi-
9 bility and benefits of incorporating new ques-
10 tions or topic modules to existing National Cen-
11 ter for Science and Engineering Statistics sur-
12 veys on—
13 (i) the skilled technical workforce;
14 (ii) working conditions and work-life
15 balance;
16 (iii) harassment and discrimination;
17 (iv) sexual orientation and gender
18 identity;
19 (v) immigration and emigration; and
20 (vi) any other topics at the discretion
21 of the Director.
22 (C) LONGITUDINAL DESIGN.—The Direc-
23 tor shall continue and accelerate efforts to en-
24 hance the usefulness of National Center for

1 Science and Engineering Statistics survey data
2 for longitudinal research and analysis.
3 (D) GOVERNMENT ACCOUNTABILITY OF-
4 FICE REVIEW.—Not later than 1 year after the
5 date of enactment of this Act, the Comptroller
6 General of the United States shall submit a re-
7 port to Congress that—
8 (i) evaluates Foundation processes for
9 ensuring the data and analysis produced
10 by the National Center for Science and
11 Engineering Statistics meets current and
12 future needs; and
13 (ii) includes such recommendations as
14 the Comptroller General determines are
15 appropriate to improve such processes.
16 **SEC. 6. BROADENING PARTICIPATION.**
17 (a) PRESIDENTIAL AWARDS FOR EXCELLENCE IN
18 MATHEMATICS AND SCIENCE TEACHING.—
19 (1) IN GENERAL.—Section 117(a) of the Na-
20 tional Science Foundation Authorization Act of 1988
21 (42 U.S.C.1881b(a)) is amended—
22 (A) in subparagraph (B)—
23 (i) by striking "108" and inserting
24 "110";
25 (ii) by striking clause (iv);

1 (iii) in clause (v), by striking the pe-
2 riod at the end and inserting "; and";
3 (iv) by redesignating clauses (i), (ii),
4 (iii), and (v) as subclauses (I), (II), (III),
5 and (IV), respectively, and moving the
6 margins of such subclauses (as so redesig-
7 nated) two ems to the right; and
8 (v) by striking "In selecting teachers"
9 and all that follows through "two teach-
10 ers—" and inserting the following:
11 "(C) In selecting teachers for an award au-
12 thorized by this subsection, the President shall
13 select—
14 "(i) at least two teachers—"; and
15 (B) in subparagraph (C), as designated by
16 paragraph (1)(A)(v), by adding at the end the
17 following:
18 "(ii) at least one teacher—
19 "(I) from the Commonwealth of
20 the Northern Mariana Islands;
21 "(II) from American Samoa;
22 "(III) from the Virgin Islands of
23 the United States; and
24 "(IV) from Guam.".

1 (2) EFFECTIVE DATE.—The amendments made
2 by paragraph (1) shall apply with respect to awards
3 made on or after the date of the enactment of this
4 Act.
5 (b) ROBERT NOYCE TEACHER SCHOLARSHIP PRO-
6 GRAM UPDATE.—
7 (1) SENSE OF CONGRESS.—It is the sense of
8 Congress that over the next five years the Founda-
9 tion should increase the number of scholarships
10 awarded under the Robert Noyce Teacher Scholar-
11 ship program established under section 10 of the
12 National Science Foundation Authorization Act of
13 2002 (42 U.S.C. 1862n–1) by 50 percent.
14 (2) OUTREACH.—To increase the diversity of
15 participants, the Director shall support symposia, fo-
16 rums, conferences, and other activities to expand
17 and enhance outreach to—
18 (A) historically Black colleges and univer-
19 sities that are part B institutions, as defined in
20 section 322(2) of the Higher Education Act of
21 1965 (20 U.S.C. 1061(2));
22 (B) minority institutions, as defined in sec-
23 tion 365(3) of the Higher Education Act of
24 1965 (20 U.S.C. 1067k(3));

1 (C) institutions of higher education that
2 are located near or serve rural communities;
3 (D) emerging research institutions; and
4 (E) higher education programs that serve
5 or support veterans.
6 (c) NSF INCLUDES INITIATIVE.—The Director
7 shall award grants and cooperative agreements, on a com-
8 petitive basis, to institutions of higher education or non-
9 profit organizations (or consortia of such institutions or
10 organizations) to carry out a comprehensive national ini-
11 tiative to facilitate the development of networks and part-
12 nerships to build on and scale up effective practices in
13 broadening participation in STEM studies and careers of
14 groups historically underrepresented in such studies and
15 careers.
16 (d) BROADENING PARTICIPATION ON MAJOR FACILI-
17 TIES AWARDS.—The Director shall require organizations
18 seeking a cooperative agreement for the management of
19 the operations and maintenance of a Foundation project
20 to demonstrate prior experience and current capabilities
21 in employing best practices in broadening participation in
22 science and engineering and ensure implementation of
23 such practices is considered in oversight of the award.
24 (e) PARTNERSHIPS WITH EMERGING RESEARCH IN-
25 STITUTIONS.—The Director shall establish a five-year

1 pilot program to enhance partnerships between emerging
2 research institutions and institutions classified as very
3 high research activity by the Carnegie Classification of In-
4 stitutions of Higher Education at the time of application.
5 In carrying out this program, the Director shall—
6 (1) require that each proposal submitted by a
7 multi-institution collaboration for an award, includ-
8 ing those under section 9, that exceeds $1,000,000,
9 as appropriate, specify how the applicants will sup-
10 port substantive, meaningful, and mutually-bene-
11 ficial partnerships with one or more emerging re-
12 search institutions;
13 (2) require awardees funded under paragraph
14 (1) to direct no less than 25 percent of the total
15 award to one or more emerging research institutions
16 to build research capacity, including through support
17 for faculty salaries and training, research experi-
18 ences for undergraduate and graduate students, and
19 maintenance and repair of research equipment and
20 instrumentation;
21 (3) require awardees funded under paragraph
22 (1) to report on the partnership activities as part of
23 the annual reporting requirements of the Founda-
24 tion;

1 (4) solicit feedback on the partnership directly
2 from partner emerging research institutions, in such
3 form as the Director deems appropriate; and
4 (5) submit a report to Congress after the third
5 year of the pilot program that includes—
6 (A) an assessment, drawing on feedback
7 from the research community and other sources
8 of information, of the effectiveness of the pilot
9 program for improving the quality of partner-
10 ships with emerging research institutions; and
11 (B) if deemed effective, a plan for perma-
12 nent implementation of the pilot program.
13 (f) TRIBAL COLLEGES AND UNIVERSITIES PROGRAM
14 UPDATE.—
15 (1) IN GENERAL.—Section 525 of the America
16 COMPETES Reauthorization Act of 2010 (42
17 U.S.C. 1862p–13) is amended—
18 (A) in subsection (a) by—
19 (i) striking "Native American" and
20 inserting "American Indian, Alaska Na-
21 tive, and Native Hawaiian"; and
22 (ii) inserting "post-secondary creden-
23 tials and" before "associate's"; and

1 (iii) striking "or baccalaureate de-
2 grees" and inserting ", baccalaureate, and
3 graduate degrees"; and
4 (B) in subsection (b) by striking "under-
5 graduate"; and
6 (C) in subsection (c) by inserting "and
7 STEM" after "laboratory".
8 (2) AUTHORIZATION OF APPROPRIATIONS.—
9 There is authorized to be appropriated to the Direc-
10 tor to carry out this program $107,250,000 for fis-
11 cal year 2022 through fiscal year 2026.
12 (g) DIVERSITY IN TECH RESEARCH.—The Director
13 shall award grants, on a competitive basis, to institutions
14 of higher education or non-profit organizations (or con-
15 sortia of such institutions or organizations) to support
16 basic and applied research that yields a scientific evidence
17 base for improving the design and emergence, development
18 and deployment, and management and ultimate effective-
19 ness of organizations of all kinds, including research re-
20 lated to diversity, equity, and inclusion in the technology
21 sector.
22 **SEC. 7. FUNDAMENTAL RESEARCH.**
23 (a) BROADER IMPACTS.—
24 (1) ASSESSMENT.—Not later than 45 days
25 after the date of enactment of this Act, the Director

1 shall enter into an agreement with a qualified inde-
2 pendent organization to assess how the Broader Im-
3 pacts review criterion is applied across the Founda-
4 tion and make recommendations for improving the
5 effectiveness for meeting the goals established in sec-
6 tion 526 of the America Creating Opportunities to
7 Meaningfully Promote Excellence in Technology,
8 Education, and Science Reauthorization Act of 2010
9 (42 U.S.C. 1862p-14).
10 (2) ACTIVITIES.—The Director shall award
11 grants on a competitive basis, to institutions of high-
12 er education or non-profit organizations (or con-
13 sortia of such institutions or organizations) to sup-
14 port activities to increase the efficiency, effective-
15 ness, and availability of resources for implementing
16 the Broader Impacts review criterion, including—
17 (A) training and workshops for program
18 officers, merit review panelists, grant office ad-
19 ministrators, faculty, and students to improve
20 understanding of the goals and the full range of
21 potential broader impacts available to research-
22 ers to satisfy this criterion;
23 (B) repositories and clearinghouses for
24 sharing best practices and facilitating collabora-
25 tion; and

1 (C) tools for evaluating and documenting
2 societal impacts of research.
3 (b) SENSE OF CONGRESS.—It is the sense of Con-
4 gress that the Director should continue to identify oppor-
5 tunities to reduce the administrative burden on research-
6 ers.
7 (c) RESEARCH INTEGRITY AND SECURITY.—
8 (1) OFFICE OF RESEARCH SECURITY AND POL-
9 ICY.—The Director shall maintain a Research Secu-
10 rity and Policy office within the Office of the Direc-
11 tor with no fewer than 4 full time equivalent posi-
12 tions. The functions of the Research Security and
13 Policy office shall be to coordinate all research secu-
14 rity policy issues across the Foundation, including
15 by—
16 (A) consulting and coordinating with the
17 Foundation Office of Inspector General and
18 with other Federal science agencies and intel-
19 ligence and law enforcement agencies, as appro-
20 priate, through the National Science and Tech-
21 nology Council in accordance with the authority
22 provided under section 1746 of the National
23 Defense Authorization Act for Fiscal Year 2020
24 (Public Law 116–92; 42 U.S.C. 6601 note), to
25 identify and address potential security risks

1 that threaten research integrity and other risks
2 to the research enterprise;
3 (B) serving as the Foundation's primary
4 resource for all issues related to the security
5 and integrity of the conduct of Foundation-sup-
6 ported research;
7 (C) conducting outreach and education ac-
8 tivities for awardees on research policies and
9 potential security risks;
10 (D) educating Foundation program man-
11 agers and other directorate staff on evaluating
12 Foundation awards and awardees for potential
13 security risks; and
14 (E) communicating reporting and disclo-
15 sure requirements to awardees and applicants
16 for funding.
17 (2) CHIEF OF RESEARCH SECURITY.—The Di-
18 rector shall appoint a senior agency official within
19 the Office of the Director as a Chief of Research Se-
20 curity, whose primary responsibility is to manage the
21 office established under paragraph (1).
22 (3) REPORT TO CONGRESS.—No later than 180
23 days after the date of enactment of this Act, the Di-
24 rector shall provide a report to the Committee on
25 Science, Space, and Technology of the House of

1 Representatives, the Committee on Commerce,
2 Science, and Transportation of the Senate, the Com-
3 mittee on Appropriations of the House of Represent-
4 atives, and the Committee on Appropriations of the
5 Senate on the resources and the number of full time
6 employees needed to carry out the functions of the
7 Office established in paragraph (1).
8 (4) ONLINE RESOURCE.—The Director shall de-
9 velop an online resource hosted on the Foundation's
10 website containing up-to-date information, tailored
11 for institutions and individual researchers, includ-
12 ing—
13 (A) an explanation of Foundation research
14 security policies;
15 (B) unclassified guidance on potential se-
16 curity risks that threaten scientific integrity
17 and other risks to the research enterprise;
18 (C) examples of beneficial international
19 collaborations and how such collaborations dif-
20 fer from foreign government interference efforts
21 that threaten research integrity;
22 (D) promising practices for mitigating se-
23 curity risks that threaten research integrity;
24 and

1 (E) additional reference materials, includ-
2 ing tools that assist organizations seeking
3 Foundation funding and awardees in informa-
4 tion disclosure to the Foundation.
5 (5) RISK ASSESSMENT CENTER.—The Director
6 shall enter into an agreement with a qualified inde-
7 pendent organization to create a new risk assess-
8 ment center to—
9 (A) help the Foundation develop the online
10 resources under paragraph (4); and
11 (B) help awardees in assessing and identi-
12 fying issues related to nondisclosure of current
13 and pending research funding, risks to the
14 Foundation merit review process, and other
15 issues that may negatively affect the Founda-
16 tion proposal and award process due to undue
17 foreign interference.
18 (6) RESEARCH GRANTS.—The Director shall
19 continue to award grants, on a competitive basis, to
20 institutions of higher education or non-profit organi-
21 zations (or consortia of such institutions or organi-
22 zations) to support research on the conduct of re-
23 search and the research environment, including re-
24 search on research misconduct or breaches of re-
25 search integrity and detrimental research practices.

1 (7) RESPONSIBLE CONDUCT IN RESEARCH
2 TRAINING.—Section 7009 of the America Creating
3 Opportunities to Meaningfully Promote Excellence in
4 Technology, Education, and Science Act (42 U.S.C.
5 1862o-1) is amended by—
6 (A) striking "and postdoctoral research-
7 ers" and inserting "postdoctoral researchers,
8 faculty, and other senior personnel"; and
9 (B) inserting the following at the end: ",
10 including mentor training, and training to raise
11 awareness of potential security threats and
12 Federal export control, disclosure, and report-
13 ing requirements".
14 (8) NATIONAL ACADEMIES GUIDE TO RESPON-
15 SIBLE CONDUCT IN RESEARCH.—
16 (A) IN GENERAL.—Not later than 180
17 days after the date of enactment of this Act,
18 the Director shall enter into an agreement with
19 the Academies to update the report entitled
20 "On Being a Scientist: A Guide to Responsible
21 Conduct in Research" issued by the Academies.
22 The report, as so updated, shall include—
23 (i) updated professional standards of
24 conduct in research;

1 (ii) promising practices for preventing,
2 addressing, and mitigating the negative
3 impact of harassment, including sexual
4 harassment and gender harassment as de-
5 fined in the 2018 Academies report enti-
6 tled "Sexual Harassment of Women: Cli-
7 mate, Culture, and Consequences in Aca-
8 demic Sciences, Engineering, and Medi-
9 cine"; and
10 (iii) promising practices for mitigating
11 potential security risks that threaten re-
12 search integrity.
13 (B) REPORT.—Not later than 18 months
14 after the effective date of the agreement under
15 subparagraph (A), the Academies, as part of
16 such agreement, shall submit to the Director
17 and the Committee on Science, Space, and
18 Technology of the House of Representatives
19 and the Committee on Commerce, Science, and
20 Transportation of the Senate the report re-
21 ferred to in such subparagraph, as updated pur-
22 suant to such subparagraph.
23 (d) RESEARCH ETHICS.—
24 (1) SENSE OF CONGRESS.—It is the sense of
25 Congress that—

1 (A) a number of emerging areas of re-
2 search have potential ethical, social, safety, and
3 security implications that might be apparent as
4 early as the basic research stage;
5 (B) the incorporation of ethical, social,
6 safety, and security considerations into the re-
7 search design and review process for Federal
8 awards, may help mitigate potential harms be-
9 fore they happen;
10 (C) the Foundation's agreement with the
11 Academies to conduct a study and make rec-
12 ommendations with respect to governance of re-
13 search in emerging technologies is a positive
14 step toward accomplishing this goal; and
15 (D) the Foundation should continue to
16 work with stakeholders to understand and
17 adopt policies that promote best practices for
18 governance of research in emerging technologies
19 at every stage of research.
20 (2) ETHICS STATEMENTS.—Drawing on stake-
21 holder input, not later than 18 months after the
22 date of enactment of this Act, the Director shall
23 amend award proposal instructions to include a re-
24 quirement for an ethics statement to be included as
25 part of any proposal for funding prior to making the

1 award. Such statement shall be considered by the
2 Director in the review of proposals, taking into con-
3 sideration any relevant input from the peer-reviewers
4 for the proposal, and shall factor into award deci-
5 sions as deemed necessary by the Director. Such
6 statements may include, as appropriate—
7 (A) any foreseeable or quantifiable risks to
8 society, including how the research could enable
9 products, technologies, or other outcomes that
10 could intentionally or unintentionally cause sig-
11 nificant societal harm;
12 (B) how technical or social solutions can
13 mitigate such risks and, as appropriate, a plan
14 to implement such mitigation measures; and
15 (C) how partnerships and collaborations in
16 the research can help mitigate potential harm
17 and amplify potential societal benefits.
18 (3) GUIDANCE.—The Director shall solicit
19 stakeholder input to develop clear guidance on what
20 constitutes a foreseeable or quantifiable risk as de-
21 scribed in paragraph (2)(A), and to the extent prac-
22 ticable harmonize this policy with existing ethical
23 policies or related requirements for human subjects.
24 (4) RESEARCH.—The Director shall award
25 grants, on a competitive basis, to institutions of

1 higher education or non-profit organizations (or con-
2 sortia of such institutions or organizations) to sup-
3 port—
4 (A) research to assess the potential ethical
5 and societal implications of Foundation-sup-
6 ported research and products or technologies
7 enabled by such research, including the benefits
8 and risks identified pursuant to paragraph
9 (2)(A); and
10 (B) the development and verification of ap-
11 proaches to proactively mitigate foreseeable
12 risks to society, including the technical and so-
13 cial solutions identified pursuant to paragraph
14 (2)(B).
15 (5) ANNUAL REPORT.—The Director shall en-
16 courage awardees to update their ethics statements
17 as appropriate as part of the annual reports re-
18 quired by all awardees under the award terms and
19 conditions.
20 (e) RESEARCH REPRODUCIBILITY AND
21 REPLICABILITY.—Consistent with existing Federal law for
22 privacy, intellectual property, and security, the Director
23 shall facilitate the public access to research products, in-
24 cluding data, software, and code, developed as part of
25 Foundation-supported projects.

1 (1) DATA MANAGEMENT PLANS.—

2 (A) The Director shall require that every
3 proposal for funding for research include a ma-
4 chine-readable data management plan that in-
5 cludes a description of how the awardee will ar-
6 chive and preserve public access to data, soft-
7 ware, and code developed as part of the pro-
8 posed project.

9 (B) In carrying out the requirement in
10 subparagraph (A), the Director shall—

11 (i) provide necessary resources, in-
12 cluding trainings and workshops, to edu-
13 cate researchers and students on how to
14 develop and review high quality data man-
15 agement plans;

16 (ii) ensure program officers and merit
17 review panels are equipped with the re-
18 sources and training necessary to review
19 the quality of data management plans; and

20 (iii) ensure program officers and
21 merit review panels treat data management
22 plans as essential elements of grant pro-
23 posals, where appropriate.

24 (2) OPEN REPOSITORIES.—The Director
25 shall—

1 (A) coordinate with the heads of other
2 Federal science agencies, and solicit input from
3 the scientific community, to develop and widely
4 disseminate a set of criteria for trusted open re-
5 positories, accounting for discipline-specific
6 needs and necessary protections for sensitive in-
7 formation, to be used by Federally funded re-
8 searchers for the sharing of data, software, and
9 code;
10 (B) work with stakeholders to identify sig-
11 nificant gaps in available repositories meeting
12 the criteria developed under subparagraph (A)
13 and options for supporting the development of
14 additional or enhanced repositories;
15 (C) award grants on a competitive basis to
16 institutions of higher education or non-profit
17 organizations (or consortia of such institutions
18 or organizations) for the development, up-
19 grades, and maintenance of open data reposi-
20 tories that meet the criteria developed under
21 subparagraph (A);
22 (D) work with stakeholders and build on
23 existing models, where appropriate, to establish
24 a single, public, web-based point of access to
25 help users locate repositories storing data, soft-

1 ware, and code resulting from or used in Foun-
2 dation-supported projects;
3 (E) work with stakeholders to establish the
4 necessary policies and procedures and allocate
5 the necessary resources to ensure, as prac-
6 ticable, data underlying published findings re-
7 sulting from Foundation-supported projects are
8 deposited in repositories meeting the criteria
9 developed under subparagraph (A) at the time
10 of publication;
11 (F) incentivize the deposition of data, soft-
12 ware, and code into repositories that meet the
13 criteria developed under subparagraph (A); and
14 (G) coordinate with the scientific pub-
15 lishing community to develop uniform consensus
16 standards around data archiving and sharing.
17 (3) RESEARCH, DEVELOPMENT, AND EDU-
18 CATION.—The Director shall award grants, on a
19 competitive basis to institutions of higher education
20 or non-profit organizations (or consortia of such in-
21 stitutions or organizations) to—
22 (A) support research and development of
23 open source, sustainable, usable tools and infra-
24 structure that support reproducibility for a

1 broad range of studies across different dis-
2 ciplines;
3 (B) support research on computational re-
4 producibility, including the limits of reproduc-
5 ibility and the consistency of computational re-
6 sults in the development of new computation
7 hardware, tools, and methods; and
8 (C) support the education and training of
9 students, faculty, and researchers on computa-
10 tional methods, tools, and techniques to improve
11 the quality and sharing of data, code, and sup-
12 porting metadata to produce reproducible re-
13 search.
14 (f) CLIMATE CHANGE RESEARCH.—
15 (1) IN GENERAL.—The Director shall award
16 grants, on a competitive basis, to institutions of
17 higher education or non-profit organizations (or con-
18 sortia of such institutions or organizations) to sup-
19 port research to improve our understanding of the
20 climate system and related human and environ-
21 mental systems.
22 (2) USE OF FUNDS.—Activities funded by a
23 grant under this subsection may include—

1 (A) fundamental research on climate
2 forcings, feedbacks, responses, and thresholds
3 in the earth system;
4 (B) research on climate-related human be-
5 haviors and institutions;
6 (C) research on climate-related risk, vul-
7 nerability, resilience, and adaptive capacity of
8 coupled human-environment systems, including
9 risks to ecosystem stability and risks to vulner-
10 able populations;
11 (D) research to support the development
12 and implementation of effective social strategies
13 and tools for mitigating and adapting to climate
14 change, including at the local level;
15 (E) improved modeling, projections, anal-
16 yses, and assessments of climate and other
17 Earth system changes;
18 (F) the development of effective strategies
19 for educating and training future climate
20 change researchers, and climate change re-
21 sponse and mitigation professionals, in both re-
22 search and development methods, as well as
23 community engagement and science commu-
24 nication; and

1 (G) the development of effective strategies
2 for public and community engagement in the all
3 stages of the research and development process.
4 (g) VIOLENCE RESEARCH.—
5 (1) IN GENERAL.—The Director shall award
6 grants, on a competitive basis, to institutions of
7 higher education or non-profit organizations (or con-
8 sortia of such institutions or organizations) to sup-
9 port research to improve our understanding of the
10 nature, scope, causes, consequences, prevention, and
11 response to all forms of violence.
12 (2) USE OF FUNDS.—Activities funded by a
13 grant under this subsection may include—
14 (A) research on the magnitude and dis-
15 tribution of fatal and nonfatal violence;
16 (B) research on risk and protective factors;
17 (C) research on the design, development,
18 implementation, and evaluation of interventions
19 for preventing and responding to violence;
20 (D) research on scaling up effective inter-
21 ventions; and
22 (E) one or more interdisciplinary research
23 centers to conduct violence research, foster new
24 and expanded collaborations, and support ca-
25 pacity building activities to increase the number

1 and diversity of new researchers trained in
2 cross-disciplinary violence research.
3 (h) SOCIAL, BEHAVIORAL, AND ECONOMIC
4 SCIENCES.—The Director shall—
5 (1) actively communicate opportunities and so-
6 licit proposals for social, behavioral, and economic
7 science researchers to participate in cross-cutting
8 and interdisciplinary programs, including the Con-
9 vergence Accelerator and Big Ideas activities, and
10 the Mid-Scale Research Infrastructure program; and
11 (2) ensure social, behavioral, and economic
12 science researchers are represented on relevant merit
13 review panels for such activities.
14 (i) FOOD-ENERGY-WATER RESEARCH.—The Director
15 shall award grants on a competitive basis to institutions
16 of higher education or non-profit organizations (or con-
17 sortia of such institutions or organizations) to—
18 (1) support research to significantly advance
19 our understanding of the food-energy-water system
20 through quantitative and computational modeling,
21 including support for relevant cyberinfrastructure;
22 (2) develop real-time, cyber-enabled interfaces
23 that improve understanding of the behavior of food-
24 energy-water systems and increase decision support
25 capability;

1 (3) support research that will lead to innovative
2 solutions to critical food-energy-water system prob-
3 lems; and
4 (4) grow the scientific workforce capable of
5 studying and managing the food-energy-water sys-
6 tem, through education and other professional devel-
7 opment.
8 (j) SUSTAINABLE CHEMISTRY RESEARCH AND EDU-
9 CATION.—In accordance with section 263 of the National
10 Defense Authorization Act for Fiscal Year 2021, the Di-
11 rector shall carry out activities in support of sustainable
12 chemistry, including—
13 (1) establishing a program to award grants, on
14 a competitive basis, to institutions of higher edu-
15 cation or non-profit organizations (or consortia of
16 such institutions or organizations) to support—
17 (A) individual investigators and teams of
18 investigators, including to the extent prac-
19 ticable, early career investigators for research
20 and development;
21 (B) collaborative research and development
22 partnerships among universities, industry, and
23 non-profit organizations; and
24 (C) integrating sustainable chemistry prin-
25 ciples into elementary, secondary, under-

1 graduate, and graduate chemistry and chemical
2 engineering curriculum and research training,
3 as appropriate to that level of education and
4 training; and
5 (2) incorporating sustainable chemistry into ex-
6 isting Foundation research and development pro-
7 grams.
8 (k) RISK AND RESILIENCE RESEARCH.—The Direc-
9 tor shall award grants on a competitive basis to institu-
10 tions of higher education or non-profit organizations (or
11 consortia of such institutions or organizations) to advance
12 knowledge of risk assessment and predictability and to
13 support the creation of tools and technologies for in-
14 creased resilience through—
15 (1) improvements in our ability to understand,
16 model, and predict extreme events and natural haz-
17 ards, including pandemics;
18 (2) the creation of novel engineered systems so-
19 lutions for resilient infrastructures, particularly
20 those that leverage the growing infusion of cyber-
21 physical-social components into the infrastructures;
22 and
23 (3) research on the behaviors individuals and
24 communities engage in to detect, predict, assess,

1 mitigate, and prevent risks and to improve and in-
2 crease resilience.
3 (l) LEVERAGING INTERNATIONAL EXPERTISE IN RE-
4 SEARCH.—The Director shall explore and advance oppor-
5 tunities for leveraging international capabilities and re-
6 sources that align with the Foundation and United States
7 research community priorities and have the potential to
8 benefit United States prosperity, security, health, and
9 well-being, including by sending teams of Foundation sci-
10 entific staff for site visits of scientific facilities and agen-
11 cies in other countries.
12 (m) BIOLOGICAL RESEARCH COLLECTIONS.—
13 (1) IN GENERAL.—The Director shall continue
14 to support databases, tools, methods, and other ac-
15 tivities that secure and improve existing physical and
16 digital biological research collections, improve the ac-
17 cessibility of collections and collection-related data
18 for research and educational purposes, develop ca-
19 pacity for curation and collection management, and
20 to transfer ownership of collections that are signifi-
21 cant to the biological research community, including
22 to museums and universities.
23 (2) SPECIMEN MANAGEMENT PLAN.—The Di-
24 rector shall require that every proposal for funding
25 for research that involves collecting or generating

1 specimens include a specimen management plan that
2 includes a description of how the specimens and as-
3 sociated data will be accessioned into and perma-
4 nently maintained in an established biological collec-
5 tion.

6 (3) ACTION CENTER FOR BIOLOGICAL COLLEC-
7 TIONS.—The Director shall award grants on a com-
8 petitive basis to institutions of higher education or
9 non-profit organizations (or consortia of such insti-
10 tutions or organizations) to establish an Action Cen-
11 ter for Biological Collections to facilitate coordina-
12 tion and data sharing among communities of prac-
13 tice for research, education, workforce training, eval-
14 uation, and business model development.

15 **SEC. 8. RESEARCH INFRASTRUCTURE.**

16 (a) FACILITY OPERATION AND MAINTENANCE.—

17 (1) IN GENERAL.—The Director shall continue
18 the Facility Operation Transition pilot program for
19 a total of five years.

20 (2) COST SHARING.—The Facility Operation
21 Transition program shall provide funding for 10–50
22 percent of the operations and maintenance costs for
23 major research facilities that are within the first five
24 years of operation, where the share is determined
25 based on—

1 (A) the operations and maintenance costs
2 of the major research facility; and
3 (B) the capacity of the managing direc-
4 torate or division to absorb such costs.
5 (3) REPORT.—After the fifth year of the pilot
6 program, the Director shall transmit a report to
7 Congress that includes—
8 (A) an assessment, that includes feedback
9 from the research community, of the effective-
10 ness of the pilot program for—
11 (i) supporting research directorates
12 and divisions in balancing investments in
13 research grants and funding for the initial
14 operation and maintenance of major facili-
15 ties;
16 (ii) incentivizing the development of
17 new world-class facilities;
18 (iii) facilitating interagency and inter-
19 national partnerships;
20 (iv) funding core elements of multi-
21 disciplinary facilities; and
22 (v) supporting facility divestment
23 costs; and
24 (B) if deemed effective, a plan for perma-
25 nent implementation of the pilot program.

1 (b) REVIEWS.—The Director shall periodically carry
2 out reviews within each of the directorates and divisions
3 to assess the cost and benefits of extending the operations
4 of research facilities that have exceeded their planned
5 operational lifespan.
6 (c) HELIUM CONSERVATION.—
7 (1) MAJOR RESEARCH INSTRUMENTATION SUP-
8 PORT.—
9 (A) IN GENERAL.—The Director shall sup-
10 port, through the Major Research Instrumenta-
11 tion program, proposal requests that include
12 the purchase, installation, operation, and main-
13 tenance of equipment and instrumentation to
14 reduce consumption of helium.
15 (B) COST SHARING.—The Director may
16 waive the cost-sharing requirement for helium
17 conservation measures for non-Ph.D.-granting
18 institutions of higher education and Ph.D.-
19 granting institutions of higher education that
20 are not ranked among the top 100 institutions
21 receiving Federal research and development
22 funding, as documented by the National Center
23 for Science and Engineering Statistics.
24 (2) ANNUAL REPORT.—No later than 1 year
25 after the date of enactment of this Act and annually

1 for the subsequent two years, the Director shall sub-
2 mit an annual report to Congress on the use of
3 funding awarded by the Foundation for the purchase
4 and conservation of helium. The report should in-
5 clude—
6 (A) the volume and price of helium pur-
7 chased;
8 (B) changes in pricing and availability of
9 helium; and
10 (C) any supply disruptions impacting a
11 substantial number of institutions.
12 (d) ADVANCED COMPUTING.—
13 (1) COMPUTING NEEDS.—To gather informa-
14 tion about the computational needs of grant pro-
15 posals submitted to the Foundation, the Director
16 shall encourage and provide access to tools to facili-
17 tate the inclusion of relevant measures of computa-
18 tional performance needs in proposals for projects
19 that require advanced computing, including the
20 measures identified in the 2016 Academies report
21 entitled "Future Directions for NSF Advanced Com-
22 puting Infrastructure to Support U.S. Science and
23 Engineering in 2017–2020".
24 (2) REPORTS.—The Director shall document
25 and publish on a regular basis a summary of the

1 amount and types of advanced computing capabili-
2 ties that are needed to respond to Foundation re-
3 search opportunities as identified under paragraph
4 (1).
5 (3) ROADMAP.—To set priorities and guide
6 strategic decisions regarding investments in ad-
7 vanced computing capabilities, the Director shall de-
8 velop, publish, and regularly update a 5-year ad-
9 vanced computing roadmap that—
10 (A) draws on community input, informa-
11 tion contained in research proposals, allocation
12 requests, and Foundation-wide information
13 gathering regarding community needs;
14 (B) reflects anticipated technology trends;
15 (C) informs users and potential partners
16 about future facilities and services; and
17 (D) addresses the needs of groups histori-
18 cally underrepresented in STEM and geo-
19 graphic regions with low availability and high
20 demand for advanced computing resources.
21 **SEC. 9. DIRECTORATE FOR SCIENCE AND ENGINEERING**
22 **SOLUTIONS.**
23 (a) ESTABLISHMENT.—Subject to the availability of
24 appropriated funds, there is established within the Foun-
25 dation the Directorate for Science and Engineering Solu-

1 tions to advance research and development solutions to ad-
2 dress societal and national challenges for the benefit of
3 all Americans.

4 (b) PURPOSE.—The purpose of the Directorate estab-
5 lished under subsection (a) is to accelerate the translation
6 of Foundation-supported fundamental research and to ad-
7 vance technologies, support use-inspired research, facili-
8 tate commercialization and use of Federally funded re-
9 search, and expand the pipeline of United States students
10 and researchers in areas of societal and national impor-
11 tance.

12 (c) ACTIVITIES.—The Director shall achieve the pur-
13 poses described in subsection (a) by awarding financial as-
14 sistance through the Directorate to—

15 (1) support transformational advances in use-
16 inspired and translational research through diverse
17 funding mechanisms and models, including conver-
18 gence accelerators;

19 (2) translate research into science and engineer-
20 ing innovations, including through developing inno-
21 vative approaches to connect research with societal
22 outcomes, education and training for students and
23 researchers on engaging with end users and the pub-
24 lic, partnerships that facilitate research uptake, ap-
25 plication, and scaling, prototype development, entre-

1 preneurial education, developing tech-to-market
2 strategies, and partnerships that connect research
3 products to businesses, accelerators, and incubators;
4 (3) develop and expand sustainable and mutu-
5 ally-beneficial use-inspired and translational research
6 and development partnerships and collaborations
7 among institutions of higher education, including
8 minority serving institutions and emerging research
9 institutions, non-profit organizations, businesses and
10 other for-profit entities, Federal or State agencies,
11 community organizations, other Foundation direc-
12 torates, national labs, international entities as ap-
13 propriate, and other organizations;
14 (4) build capacity for use-inspired and
15 translational research at institutions of higher edu-
16 cation, including necessary administrative support;
17 (5) expand opportunities for researchers to con-
18 tribute to use-inspired and translational research in-
19 cluding through support for workshops and con-
20 ferences, targeted incentives and training, and multi-
21 disciplinary research centers;
22 (6) support the education, mentoring, and
23 training of undergraduate students, graduate stu-
24 dents, and postdoctoral researchers in use-inspired
25 and translational approaches to research in key

1 focus areas identified under subsection (g) through
2 scholarships, fellowships, and traineeships;
3 (7) support translational research infrastruc-
4 ture, including platforms and testbeds, data manage-
5 ment and software tools, and networks and commu-
6 nication platforms for interactive and collective
7 learning and information sharing; and
8 (8) identify social, behavioral, and economic
9 drivers and consequences of technological innova-
10 tions.
11 (d) ASSISTANT DIRECTOR.—
12 (1) IN GENERAL.—The Director shall appoint
13 an Assistant Director responsible for the manage-
14 ment of the Directorate established under this sec-
15 tion.
16 (2) TERM LIMIT.—The Assistant Director ap-
17 pointed under paragraph (1) shall serve a term last-
18 ing no longer than 4 years.
19 (3) QUALIFICATIONS.—The Assistant Director
20 shall be an individual, who by reason of professional
21 background and experience, is specially qualified
22 to—
23 (A) advise the Director on all matters per-
24 taining to use-inspired and translational re-
25 search, development, and commercialization at

1 the Foundation, including partnership with the
2 private sector and other users of Foundation
3 funded research; and
4 (B) develop and implement the necessary
5 policies and procedures to promote a culture of
6 use-inspired and translational research within
7 the Directorate and across the Foundation and
8 carry out the responsibilities under paragraph
9 (4).
10 (4) RESPONSIBILITIES.—The responsibilities of
11 the Assistant Director shall include—
12 (A) advising the Director on all matters
13 pertaining to use-inspired and translational re-
14 search and development activities at the Foun-
15 dation, including effective practices for conver-
16 gence research;
17 (B) identifying opportunities for and facili-
18 tating coordination and collaboration, where ap-
19 propriate, on use-inspired and translational re-
20 search, development, commercialization, and so-
21 cietal application activities—
22 (i) among the offices, directorates,
23 and divisions within the Foundation; and
24 (ii) between the Foundation and
25 stakeholders in academia, the private sec-

1 tor, including non-profit entities, labor or-
2 ganizations, Federal or State agencies, and
3 international entities, as appropriate;
4 (C) ensuring that the activities carried out
5 under this section are not duplicative of activi-
6 ties supported by other parts of the Foundation
7 or other relevant Federal agencies;
8 (D) approving all new programs within the
9 Directorate;
10 (E) developing and testing diverse merit-
11 review models and mechanisms for selecting
12 and providing awards for use-inspired and
13 translational research and development at dif-
14 ferent scales, from individual investigator
15 awards to large multi-institution collaborations;
16 (F) assessing the success of programs;
17 (G) administering awards to achieve the
18 purposes described in subsection (b); and
19 (H) performing other such duties per-
20 taining to the purposes in subsection (b) as are
21 required by the Director.
22 (5) RELATIONSHIP TO THE DIRECTOR.—The
23 Assistant Director shall report to the Director.

1 (6) RELATIONSHIP TO OTHER PROGRAMS.—No
2 other directorate within the Foundation shall report
3 to the Assistant Director.
4 (e) ADVISORY COMMITTEE.—
5 (1) IN GENERAL.—In accordance with the Fed-
6 eral Advisory Committee Act (5 U.S.C. App.) the
7 Director shall establish an advisory committee to as-
8 sess, and make recommendations regarding, the ac-
9 tivities carried out under this section.
10 (2) MEMBERSHIP.—The advisory committee
11 members shall—
12 (A) be individuals with relevant experience
13 or expertise, including individuals from industry
14 and national labs, educators, academic subject
15 matter experts, technology transfer experts, and
16 representatives of civil society and other non-
17 governmental organizations; and
18 (B) consist of at least 10 members broadly
19 representative of stakeholders, including no less
20 than 3 members from the private sector, none
21 of whom shall be an employee of the Federal
22 Government.
23 (3) RESPONSIBILITIES.—The Committee shall
24 be responsible for—

1 (A) reviewing and evaluating activities car-
2 ried out under this section; and
3 (B) assessing the success of the Direc-
4 torate in and proposing new strategies for ful-
5 filling the purposes in subsection (b).
6 (f) EXISTING PROGRAMS.—The Convergence Accel-
7 erator, the Growing Convergence Research Big Idea, and
8 any other program, at the discretion of the Director, may
9 be managed by the Directorate.
10 (g) FOCUS AREAS.—In consultation with the Assist-
11 ant Director, the Board, and other Federal agencies and
12 taking into account advice under subsection (e), the Direc-
13 tor shall identify, and regularly update, up to 5 focus
14 areas to guide activities under this section. In selecting
15 such focus areas, the Director shall consider the following
16 societal challenges:
17 (1) Climate change and environmental sustain-
18 ability.
19 (2) Global competitiveness in critical tech-
20 nologies.
21 (3) Cybersecurity.
22 (4) National security.
23 (5) STEM education and workforce.
24 (6) Social and economic inequality.
25 (h) TRANSFER OF FUNDS.—

1 (1) IN GENERAL.—Funds made available to
2 carry out this section shall be available for transfer
3 to other offices, directorates, or divisions within the
4 Foundation for such use as is consistent with the
5 purposes for which such funds are provided.
6 (2) PROHIBITION ON TRANSFER FROM OTHER
7 OFFICES.—No funds shall be available for transfer
8 to the Directorate established under this section
9 from other offices, directorates, or divisions within
10 the Foundation.
11 (i) AUTHORITIES.—In addition to existing authorities
12 available to the Foundation, the Director may exercise the
13 following authorities in carrying out the activities under
14 this section:
15 (1) AWARDS.—In carrying out this section, the
16 Director may provide awards in the form of grants,
17 contracts, cooperative agreements, cash prizes, and
18 other transactions.
19 (2) APPOINTMENTS.—The Director shall have
20 the authority to—
21 (A) make appointments of scientific, engi-
22 neering, and professional personnel without re-
23 gard to the civil service laws as the Director de-
24 termines necessary for carrying out research
25 and development functions which require the

1 services of specially qualified personnel relating
2 to the focus areas identified under subsection
3 (g) and such other areas of national research
4 priorities as the Director may determine; and
5 (B) fix the basic pay of such personnel at
6 rates not in excess of the basic rate of pay of
7 the Vice President under section 104 of title 3,
8 United States Code, without regard to the civil
9 service laws.
10 (j) ETHICAL, LEGAL, AND SOCIETAL CONSIDER-
11 ATIONS.—The Director shall establish policies and set up
12 formal avenues for public input, as appropriate, to ensure
13 that ethical, legal, and societal considerations are explicitly
14 integrated into the priorities for the Directorate, including
15 the selection of focus areas under subsection (g), the
16 award-making process, and throughout all stages of sup-
17 ported projects.
18 (k) REPORTS AND ROADMAPS.—
19 (1) ANNUAL REPORT.—The Director shall pro-
20 vide to the relevant authorizing and appropriations
21 committees of Congress an annual report describing
22 projects supported by the Directorate during the
23 previous year.
24 (2) ROADMAP.—Not later than 1 year after the
25 date of enactment of this Act, the Director shall pro-

1 vide to the relevant authorizing and appropriations
2 committees of Congress a roadmap describing the
3 strategic vision that the Directorate will use to guide
4 investment decisions over the following 3 years.
5 (l) EVALUATION.—
6 (1) IN GENERAL.—After the Directorate has
7 been in operation for 6 years, the National Science
8 Board shall evaluate how well the Directorate is
9 achieving the purposes identified in subsection (b),
10 including an assessment of the impact of Directorate
11 activities on the Foundation's primary science mis-
12 sion.
13 (2) INCLUSIONS.—The evaluation shall in-
14 clude—
15 (A) a recommendation on whether the Di-
16 rectorate should be continued or terminated;
17 and
18 (B) a description of lessons learned from
19 operation of the Directorate.
20 (3) AVAILABILITY.—On completion of the eval-
21 uation, the evaluation shall be made available to
22 Congress and the public.
23 (m) LIMITATION.—No amounts may be appropriated
24 for the Directorate for each of fiscal years 2022, 2023,
25 2024, 2025, or 2026 unless—

1 (1) a specific appropriation is made for the Di-
2 rectorate; and
3 (2) the amount appropriated for the activities
4 of the Foundation, other than the activities author-
5 ized under this section, for each such fiscal year ex-
6 ceeds the amount appropriated for the Foundation
7 for fiscal year 2021, as adjusted for inflation in ac-
8 cordance with the Consumer Price Index published
9 by the Bureau of Labor Statistics of the Depart-
10 ment of Labor.

11 **SEC. 10. ADMINISTRATIVE AMENDMENTS.**

12 (a) SUPPORTING VETERANS IN STEM CAREERS.—
13 Section 3(c) of the Supporting Veterans in STEM Careers
14 Act is amended by striking "annual" and inserting "bien-
15 nial".
16 (b) SUNSHINE ACT COMPLIANCE.—Section 15 of the
17 National Science Foundation Authorization Act of 2002
18 is amended—
19 (1) so that paragraph (3) reads as follows:
20 "(3) COMPLIANCE REVIEW.—The Inspector
21 General of the Foundation shall conduct a review of
22 the compliance by the Board with the requirements
23 described in paragraph (2) as necessary based on a
24 triennial risk assessment. Any review deemed nec-
25 essary shall examine the proposed and actual con-

1 tent of closed meetings and determine whether the
2 closure of the meetings was consistent with section
3 552b of title 5, United States Code."; and
4 (2) by striking paragraphs (4) and (5) and in-
5 serting the following:
6 "(4) MATERIALS RELATING TO CLOSED POR-
7 TIONS OF MEETING.—To facilitate the risk assess-
8 ment required under paragraph (3) of this sub-
9 section, and any subsequent review conducted by the
10 Inspector General, the Office of the National Science
11 Board shall maintain the General Counsel's certifi-
12 cate, the presiding officer's statement, and a tran-
13 script or recording of any closed meeting, for at
14 least 3 years after such meeting.".
15 (c) SCIENCE AND ENGINEERING INDICATORS RE-
16 PORT SUBMISSION.—Section 4(j)(1) of the National
17 Science Foundation Act of 1950 (42 U.S.C. 1863(j)(1))
18 is amended by striking "January 15" and inserting
19 "March 15".

Chairwoman STEVENS. Without objection, the bill is considered as read, and open to amendment at any point. I recognize myself to present some remarks on the bill.

H.R. 225, the *National Science Foundation for the Future Act*. I want to start by thanking Chairwoman Johnson and Ranking Member Lucas for their leadership in developing this forward-looking legislation. Their commitment to bipartisan collaboration and engagement with a wide range of stakeholders has resulted in a carefully crafted bill that provides a much-needed infusion of funding, and addresses needs across the agency's portfolio. We have a suite of ambitious proposals to consider in the *NSF for the Future Act*, from scaling up Pre-K–12 STEM (science, technology, engineering, and mathematics) education research innovations, and modernizing undergraduate and graduate student training, bringing American students across the country into the scientific research enterprise, to making research data more flexible, funding more research, enabling infrastructure, and expanding opportunities to participate in NSF funded projects. The bill also ensures the agency is equipped to combat efforts by malignant actors to undermine the culture of openness, collaboration, and integrity that has long been the cornerstone of the U.S. academic research excellence. I know this is a particular focus for Ranking Member Waltz, and we thank his expertise and leadership in this endeavor, and I look forward to continuing to partner with him on this front.

Finally, the *NSF for the Future Act* empowers NSF to continue to evolve by ramping up support for use inspired and translational research through the creation of a partnership-driven, solutions-oriented directorate. It's an exciting time to be a Member of the Science Committee, and I am honored to be leading today's markup. I am proud to co-sponsor the *NSF for the Future Act*, and I take this task before us today very seriously. We must take our time and be thoughtful about the needs of the agency and the American people, the economic opportunity before us today. While I'm excited about the prospect of unleashing the agency to do more of what it does best, and to take on new challenges, I feel strongly that our top priority should be to do no harm, continue to do good.

While the National Science Foundation plays a pivotal role in our research ecosystem as the only Federal agency charged with supporting fundamental research across all scientific disciplines. We cannot risk undermining or diminishing this function. Our capacity to innovate will dry up if we choke off the flow of fundamental research and give way to the flexibility that allows the bright scientific mind conducting, and seeking to conduct, basic scientific research. As a Member of the Science Committee, we know all too well what is at stake, and we are doing our due diligence. We have chaired—I have two hearings to explore the challenges and opportunities for advancing NSF's mission through a comprehensive reauthorization bill.

We have heard from the NSF Director and Chair of the National Science Board that the agency is poised to take on an infusion of funding, and an expansion of the Commission to deliver benefits of research to the American people. We have heard from stakeholders in academia, and the private sector, and innovation policy experts that the National Science Foundation is an essential asset that has

been squeezed by flat budgets for far too long, but that increasing the budget is not enough alone. A new directorate, charged with accelerating use-inspired research, with a focus on expanding opportunities, forging new partnerships, and engagement with the public is needed to chart a course for the future of this agency and the involvement of peoples across this country, and stakeholders across America, including in areas that have been long overlooked, and peoples who have been long overlooked and left marginalized.

Chairwoman Johnson held a Full Committee hearing on innovation in which several of these same points were made by expert witnesses for the congressional record. At this time we must double down. It is the time to double down on an agency that has delivered enormous benefits to society. Over 7 decades of steadfast support for fundamental research. All of us have seen the fruits of that investment in our own lives. NSF funded research that has spurred innovations and launched new industries that advance our prosperity, and competitiveness, and improve our quality of life. Countries around the world have taken notice, and are investing aggressively to replicate our success by building their own research base. Let us continue to lead by example by restoring the National Science Foundation to its rightful place as our research enterprise, while giving it space to evolve into the future. I look forward to today's deliberation.

[The prepared statement of Chairwoman Stevens follows:]

Good morning and welcome to today's markup of H.R. 2225, the *National Science Foundation for the Future Act*.

I want to start by thanking Chairwoman Johnson and Ranking Member Lucas for their leadership in developing this forward-looking legislation. Their commitment to bipartisan collaboration and engagement with a wide range of stakeholders has resulted in a carefully crafted bill that provides a much-needed infusion of funding and addresses needs across the agency's portfolio.

We have a suite of ambitious proposals to consider in the *NSF for the Future Act*—from scaling up PreK-12 STEM education research innovations and modernizing undergraduate and graduate student training, to making research data more accessible, funding more research-enabling infrastructure, and expanding opportunities to participate in NSF-funded projects.

The bill also ensures the agency is equipped to combat efforts by malign actors to undermine the culture of openness, collaboration, and integrity that has long been the cornerstone of the U.S. academic research excellence. I know this is a particular focus for Ranking Member Waltz, and I look forward to continuing to partner with him on that front. Finally, the *NSF for the Future Act* empowers NSF to continue to evolve by ramping up support for use-inspired and translational research through the creation of a partnership-driven, solutions-oriented directorate.

It's an exciting time to be a Member of the Science Committee and I am honored to be leading today's markup. I am a proud cosponsor of the *NSF for the Future Act*, but I take the task before us very seriously. We must take our time and be thoughtful about the needs of the agency and of the American people. While I am excited about the prospect of unleashing the agency to do more of what it does best and to take on new challenges, I feel strongly that our top priority should be to do no harm.

The National Science Foundation plays a pivotal role in our research ecosystem. As the only Federal agency charged with supporting fundamental research across all scientific disciplines, we cannot risk undermining or diminishing this function. Our capacity to innovate will dry up if we choke off the flow of fundamental research.

As Members of the Science Committee, we know all too well what is at stake and we are doing our due diligence. I have chaired two hearings to explore the challenges and opportunities for advancing NSF's mission through a comprehensive reauthorization bill. We heard from the NSF Director and Chair of the National Science Board that the agency is poised to take on an infusion of funding and an expansion of its mission to deliver benefits of research to the American people. We

heard from stakeholders in academia and the private sector and innovation policy experts that the National Science Foundation is an essential asset that has been squeezed by flat budgets for far too long. But that increasing the budget is not enough. A new directorate charged with accelerating use-inspired research with a focus on expanding opportunities, forging new partnerships, and engagement with the public is needed to chart a course for the future of the agency. Chairwoman Johnson held a full committee hearing on innovation in which several of these same points were made by the expert witnesses.

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I look forward to today's deliberation.

Chairwoman STEVENS. And I now recognize Ranking Member Waltz for his statement.

Mr. WALTZ. Thank you. Good morning, Chairwoman Stevens, and genuinely thank you for holding today's Subcommittee markup of the *NSF for the Future Act*. This markup comes at a time when there really is broad support for making critical investments in our Nation's research enterprise. For decades America has led the world in science and technology, but as the pace of innovation is accelerating, global competition is increasing, and the United States risks losing its edge. The Chinese Communist Party (CCP) poses an especially formidable and growing strategic challenge. The *NSF for the Future Act* takes important steps in growing the mission of the National Science Foundation to ensure we maintain our edge against rising global competition, while protecting the Foundation's primary mission of supporting fundamental research.

Since its creation over 70 years ago, the NSF has served a unique role amongst Federal agencies, given its broad mission of "promoting the progress of science to advance the national health, prosperity, and welfare, and to secure the national defense." In bringing this mission to light, the NSF supports the basic research that fuels major technological innovations, including smartphones, GPS (Global Positioning System), the internet, new research disciplines, and supports and trains generations of scientists and engineers. This legislation has been thoughtfully developed to protect NSF's core mission, and more than doubles the amount of research the Foundation will support over 5 years. It includes long term planning to make strategic and sustainable investments in the STEM workforce to expand and enhance the American talent pipeline, supports the construction and maintenance of world class facilities, promotes the research needed to develop revolutionary technologies that are crucial to our national and economic security.

While making these important investments, we must focus on protecting taxpayer funded research and technologies from adversaries like the CCP. Our Federal agencies, like the NSF, need the tools, and they need the authorities, to reject grant applications with known participants in maligned foreign talent recruitment programs. I look forward to speaking further on this topic when I offer my amendment, which is focused on strengthening safeguards to improve security training, and to prevent research theft. With

the CCP threatening to leapfrog beyond the United States technologically, we are at an inflection point, and it's critical for the U.S. to scale up our R&D (research and development) enterprise. There is momentum on both sides of the aisle, I think a lot of people find that refreshing, to make these investments, but it must be done in a realistic and a sustainable way. By investing in NSF and basic research, American technology, American innovations, and the American workforce, we will continue to lead the world.

I'm proud to be an original co-sponsor of this legislation with Chairwoman Johnson, with Ranking Member Lucas, and with Chairwoman Stevens. I want to thank them, and their staff, for working together to develop such a strong piece of legislation. I encourage Members to support this bill, and I yield back the balance of my time.

[The prepared statement of Mr. Waltz follows:]

Good Morning Chairwoman Stevens and thank you for holding today's subcommittee markup of the *"NSF For the Future Act."*

Our markup comes at a time when there is broad support for making critical investments in our Nation's research enterprise. For decades, America has led the world in science and technology, but as the pace of innovation is accelerating, global competition has also increased, and the United States risks losing its edge. The Chinese Communist Party (CCP) poses an especially formidable and growing strategic challenge.

"NSF For the Future Act" takes important steps in growing the mission of the National Science Foundation (NSF) to ensure we maintain our edge against rising global competition, while protecting the Foundation's primary mission of supporting fundamental research.

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While making these investments, we must focus on protecting taxpayer-funded research and technologies from adversaries like the CCP. Our federal agencies, like the NSF, need the tools and authority to reject grant applications with known participants in malign foreign talent recruitment programs. I look forward to speaking further on this topic when I offer my amendment focused on strengthening safeguards to improve security training and prevent research theft.

With the CCP threatening to leap frog the United States technologically, we are at an inflection point and it is critical for the U.S. to scale up our R&D enterprise. There is momentum on both sides of the aisle to make these investments, but it must be done in a realistic and sustainable way. By investing in NSF and basic research, American technology, American innovations, and the American workforce will continue to lead the world.

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I yielded back the balance of my time.

Chairwoman STEVENS. Thank you, Ranking Member Waltz. I now recognize the Chairwoman of the Full Committee, Congresswoman Eddie Bernice Johnson, for her statement.

Chairwoman JOHNSON. Thank you very much, Chairwoman Stevens and Ranking Member Waltz, for holding this markup.

In March, I was joined by my colleagues Ranking Member Lucas, Chairwoman Stevens, and Ranking Member Waltz, in introducing the *National Science Foundation for the Future Act.* This bill is the culmination of over a year of close bipartisan collaboration and thoughtful deliberations with a wide range of stakeholders. We heard from over 100 universities, scientific societies, student groups, and individual policy experts and thought leaders, including Nobel laureates and past NSF directors and National Science Board chairs.

First and foremost, the research community has the capacity to pursue many more compelling research ideas than NSF can fund. We cannot afford to miss out on these good ideas, particularly in an increasingly competitive global environment. the *National Science Foundation for the Future Act* authorizes a $3 billion increase in one—year one, and a doubling of the NSF budget in 5 years. I have no doubt that we could authorize an even faster doubling and still spend that money well. We are also facing an urgent shortage of STEM workers and research talent that is constraining our innovative capacity. This bill has many provisions to address persistent STEM pipeline challenges at all education levels. federally funded research must be accessible to researchers and to the public. At the same time, threats to research security have the potential to undermine the integrity of the NSF funded research. The legislation builds on NSF's leadership in addressing both of these realities.

Finally, we need to think about the long-term trajectory of NSF. At this critical juncture in NSF's history, we must reexamine our assumptions about how research is translated into benefits for society, and who benefits. Federally funded research has to—has led to discoveries and innovations, excuse me, that have vastly improved our quality of life and boosted prosperity and security. But that is not the full picture. Many people have been left behind. Many critical challenges remain. And, in some cases, unfettered technology development has caused real harm. Racing ahead to beat China in developing cutting edge technologies with blinders on to the consequences for society is both shortsighted and misguided. U.S. global competitiveness is important, but it cannot be our singular goal. Rather than emulating China's model for accelerating technology development, we should lead by striving to do our best selves.

In the *NSF for the Future Act*, we push NSF to be its own best self, not to become an entirely different agency. The legislation creates a new Directorate for science and engineering solutions that promotes new opportunities for researchers to help drive lasting solutions to the challenges we face as a nation. In expanding our view of who is a stakeholder in our research enterprise, we promote new kinds of partnerships. Such partnerships will inspire new research questions and spur innovations and technologies that provide maximum benefit. The directorate will enable the Foundation to take big risks and experiment with new approaches while preserving its fundamental research mission.

This is the first comprehensive reorganization—reauthorization of the NSF in a decade. After years of stagnant budgets, this agency is bursting at the seams with untapped potential. We have a rare opportunity to think big. NSF has demonstrated that it has the capacity and the track record of excellence to rise to this challenge. I am proud of this bill, and the transparent, bipartisan, and inclusive process that will make it even better. I thank Ranking Member Lucas for his partnership in this effort, and I urge all of my colleagues to cosponsor and support this bill. I would also like to enter into the record the full list of 30 organizations that have endorsed this legislation. I thank you, Madam Chair, and yield back.

[The prepared statement of Chairwoman Johnson follows:]

Thank you, Chairwoman Stevens and Ranking Member Waltz, for holding this markup.

In March, I was joined by my colleagues Ranking Member Lucas, Chairwoman Stevens, and Ranking Member Waltz, in introducing the *"National Science Foundation for the Future Act."*

This bill is the culmination of over a year of close bipartisan collaboration and thoughtful deliberations with a wide range of stakeholders. We heard from over 100 universities, scientific societies, student groups, and individual policy experts and thought leaders, including Nobel laureates and past NSF directors and National Science Board chairs.

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I would also like to enter into the record the full list of 30 organizations that have endorsed this legislation.

Chairwoman STEVENS. Thank you. And the Chair now recognizes Ranking Member of the Full Committee, Mr. Lucas, for a statement.

Mr. LUCAS. I would like to start by thanking Chairwoman Johnson, Chairwoman Stevens, Ranking Member Waltz, and their staff for working so diligently, thoughtfully, and in a bipartisan manner on this important piece of legislation. For the last year our Committee has examined how we can grow and evolve the National Science Foundation to meet the challenges of the 21st century, while preserving what makes NSF great. After many discussions with stakeholders and experts, I'm proud to join Chairwoman Johnson, Chairwoman Stevens, and Ranking Member Waltz in introducing the *NSF for the Future Act*. Our bill doubles down on basic research funding in NSF, preserves NSF's important mission of basic research and science education. The bill also takes steps to enhance NSF's role in moving research from the lab to the market, building upon work NSF has undertaken in recent years to accelerate commercialization. Our bill takes a comprehensive and strategic approach to reauthorizing NSF, including supporting a domestic STEM workforce and investing in research infrastructure.

There's been a lot of discussion about NSF establishing a new directorate. In the *NSF for the Future Act* we put a great deal of care into crafting a new directorate that improves NSF's ability to advance fundamental research without duplicating or seeking to replace the missions of other research agencies. Our proposed director for science and engineering solutions takes the basic research funded by NSF and helps apply those discoveries to solving national challenges, from cybersecurity to climate change. We also proposed a funding profile for the new directorate that is practical, sustainable, and in balance with the rest of the Foundation. The *NSF for the Future Act* will help the United States retain its global leadership in science and technology. The basic research our government supports is fundamental to our economic success, and has allowed us to remain at the forefront of global science and technology innovation. Our bill doubles down on that recipe for success.

We face very real threats to our scientific leadership from the Chinese Communist Party, and we can't afford to fall behind. I have said several times in this Committee there is momentum on both sides of the aisle in the House and Senate for legislation to secure our global science and technology leadership, but it should be comprehensive, strategic, and sustainable. The Biden-Harris Administration's budget, for example, proposes a $50 billion fund for a top-down approach to developing technologies at the National Science Foundation, and the Senate is moving forward with a massive so-called China innovation package that is growing larger by the day, with every special interest priority you can imagine. These proposals are not responsible, and I'm afraid they're not sustainable. America's continued scientific leadership requires a comprehensive and strategic approach to research and development that provides long term increase investment and stability across the research ecosystem. It also requires inter-agency collaboration and public/private partnerships. It must focus on evolving tech-

nologies that are critical to our national and economic security, like semiconductors and quantum sciences.

I believe that the Nation that leads in science and technology will shape the world order for the next century. I'd like that nation to be ours, and I'd like for emerging technologies to be developed with our values of transparency and fairness. I believe the only way to reach consensus and produce meaningful legislation is to engage in robust debate and dialog, to proceed through regular legislative order, and leave the partisan provisions for the partisan measures. Today's Subcommittee markup demonstrate a commitment to that process from Chairwoman Johnson and the Members of the Committee. I'm pleased to see productive engagement by Members of this Subcommittee on both sides of the aisle, with many thoughtful amendments being proposed today.

I will respectfully say this, that I hope that the House and Senate leadership will give the Committees of jurisdiction the opportunity to pass thoughtful legislation that supports American innovation, addresses the generational threat of the Communist Chinese Party, and secures the future for our children and grandchildren. I look forward to continuing to work with Chairwoman Johnson, Chairwoman Stevens, Ranking Member Waltz, to move this bill to the finish line, and across it. Yield back, Madam Chair.

[The prepared statement of Mr. Lucas follows:]

I would like to start by thanking Chairwoman Johnson, Chairwoman Stevens, Ranking Member Waltz, and their staff, for working so diligently, thoughtfully and in a bipartisan manner on this important piece of legislation.

For the last year, our Committee has examined how we can grow and evolve the National Science Foundation to meet the challenges of the 21st Century, while preserving what makes NSF great. After many discussions with stakeholders and experts, I was proud to join Chairwoman Johnson, Chairwoman Stevens, and Ranking Member Waltz in introducing the *NSF for the Future Act*.

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opment that provides long-term increased investment and stability across the research ecosystem. It also requires inter-agency collaboration and public-private partnerships. And it must focus on evolving technologies that are crucial to our national and economic security, like semiconductors and quantum sciences.

I believe that the nation that leads in science and technology will shape the world order for the next century. I'd like that nation to be ours, and I'd like for emerging technologies to be developed with our values of transparency and fairness.

I believe that the only way to reach consensus and produce meaningful legislation is to engage in robust debate and dialogue, to proceed through regular legislative order, and to leave the partisan provisions for partisan measures. Today's Subcommittee markup demonstrates a commitment to that process from Chairwoman Johnson and the members of this Committee. I am pleased to see productive engagement by members of this Subcommittee on both sides of the aisle, with many thoughtful amendments being proposed today.

I will respectfully say that I hope the House and Senate leadership will give the Committees of jurisdiction the opportunity to pass thoughtful legislation that supports American innovation, addresses the generational threat of the Chinese Communist Party, and secures the future for our children and grandchildren.

I look forward to continuing to work with Chairwoman Johnson, Chairwoman Stevens, and Ranking Member Waltz to move this bill across the finish line.

Chairwoman STEVENS. Thank you. At this time, before we move to amendments, does any Member wish to be recognized to speak on the full bill?

Mr. FOSTER. Madam Chair?

Chairwoman STEVENS. Mr. Foster, you are recognized.

Mr. FOSTER. Yeah, I move to strike the last word.

Chairwoman STEVENS. So be it.

Mr. FOSTER. Thank you, Madam Chairwoman. I would like to thank our Ranking Members and Chairs of both the Full Committee and of this Subcommittee for their true and bipartisan commitment to expanding scientific research and education back to their historic and appropriate levels for the modern age. This commitment first became evidence to me well before COVID, when we saw, I think back at the end of 2019, dueling proposals from the Democrats and Republicans on this Committee to double the research and education budgets of our country. Both of these, remarkably, have reportedly received approval all the way up through the top levels of leadership in each party, and it's a tribute to the commitment of—to bipartisanship in this Committee that we are meeting today to mark up a bipartisan and unified piece of legislation authorizing historic and overdue increases in the budget, and achievable expansion plans to the scope of work for the National Science Foundation. This is the first of several science agencies where a significant and thoughtful budget increase must be authorized and appropriated to achieve a balanced and achievable return to the necessary and appropriate levels to ensure and expand STEM competitiveness in the United States.

Over the past few weeks and months, I've been contacted by, and had the opportunity to hear privately and informally from a great many stakeholders in the scientific community, university, and Federal communities about the National Science Foundation reauthorization. There, and through the excellent hearings that our Chairwoman and Ranking Member have held, as well as these individual meetings, I've received input from many people on what the reauthorization should look like. A recurring theme of these conversations is that it's crucial that the NSF must continue to do the job that it has always done, championing basic science, curi-

osity driven research through merit-based peer review proposals, and training the brightest minds of tomorrow.

Our greatest scientific, technological, and economic advancements have arisen from basic science research. Some of those took place with a clear application in mind, while other of our triumphs were completely serendipitous. And so we much be careful not to dilute or diminish this focus, and this proposed bill has important protections to ensure that that remains the case. In addition, there's a strong belief that Congress should not be micromanaging that—details of basic research in attempt—in an attempt, in our copious free time, to try to predict or control what the technological future looks like. We simply have to trust our scientists, and allow them the flexibility to direct their research in the areas that are the most promising or the most exciting. And with these principles, the NSF can continue to contribute the way it has in the past.

The second concern that's been raised about properly managing—is about properly managing overlapping research areas between different science agencies. A certain amount of redundancy in R&D and in technology transfer actually helps ensure that no research or commercial opportunities are allowed to slip through the cracks, and in recognition of this, virtually all of our science agencies perform a mixture of basic and applied research and commercial tech transfer. However, the Federal Government should have a coordinated plan in place to ensure that individual agencies focus on their strengths, and avoid excessively duplicative research projects. This is a normal part of the budgetary process in a properly functioning administration, and we look forward to the detailed planning that should be visible in the new administration's non-skinny budget when it comes out. So this NSF reauthorization is really only the start.

And the third, and possibly most important concern, is to do everything we can to make sure that the NSF, and all of our scientific investments, are appropriately and predictably funded in the long term. And so I return to where I start. The *NSF for the Future Act* is a wonderful embodiment of the bipartisan desire to support and expand our scientific community, and this represents our best hope of sustainably expanding support for the NSF, and for science broadly, well into the future. And I yield back.

Chairwoman STEVENS. Thank you. Does any other Member wish to be recognized to speak on the full bill at this time? OK. And, with that, we will proceed to amendments in order of the roster.

The first amendment on the roster is an amendment offered by the gentlelady from Wisconsin. She is recognized to offer an amendment.

Ms. MOORE. Thank you so much, Madam Chair, Ranking Members, Chair, and Ranking Member of the Full Committee. I am so excited today to be here——

Chairwoman STEVENS. Pardon me, Madam Congresswoman. We will suspend, and have an amendment reported by the Clerk—your amendment reported by the Clerk at this time.

Ms. MOORE. I—I'm sorry——

Chairwoman STEVENS. No, you're great, you're great.

The CLERK. Amendment Number One, Amendment to H.R. 2225 offered by Ms. Moore of Wisconsin and Ms. Ross of North Carolina.

[The amendment of Ms. Moore and Ms. Ross follows:]

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AMENDMENT TO H.R. 2225

OFFERED BY MS. MOORE OF WISCONSIN and Ms. Ross of North Carolina

At the end of section 5(b) insert the following:

1 (3) INNOVATIONS IN STEM EDUCATION AT COM-
2 MUNITY COLLEGES.—
3 (A) IN GENERAL.—The Director shall
4 award grants on a merit-reviewed, competitive
5 basis to institutions of higher education or non-
6 profit organizations (or consortia of such insti-
7 tutions or organizations) to advance research on
8 the nature of learning and teaching at commu-
9 nity colleges and to improve outcomes for stu-
10 dents who enter the workforce upon completion
11 of their STEM degree or credential or transfer
12 to 4-year institutions, including by—
13 (i) examining how to scale up success-
14 ful programs at Community Colleges that
15 are improving student outcomes in
16 foundational STEM courses;
17 (ii) supporting research on effective
18 STEM teaching practices in community
19 college settings;

1 (iii) designing and developing new
2 STEM curricula;
3 (iv) providing STEM students with
4 hands-on training and research experi-
5 ences, internships, and other experiential
6 learning opportunities;
7 (v) increasing access to high quality
8 STEM education through new tech-
9 nologies;
10 (vi) re-skilling or up-skilling incum-
11 bent workers for new STEM jobs;
12 (vii) building STEM career and seam-
13 less transfer pathways; and
14 (viii) developing novel mechanisms to
15 identify and recruit talent into STEM pro-
16 grams, in particular talent from groups
17 historically underrepresented in STEM.
18 (B) PARTNERSHIPS.—In carrying out ac-
19 tivities under this paragraph, the Director shall
20 encourage applications to develop, enhance, or
21 expand cooperative STEM education and train-
22 ing partnerships between institutions of higher
23 education, industry, and labor organizations.

Ms. MOORE. Thank you so much. And I am so happy to be joining Congresswoman Ross on this amendment. I think it's a really important step in equalizing access to STEM education, and this historic investment in minority serving institutions, and other institutions. And while this funding may be transformative for so many in my own Milwaukee district, we need to meet students all over our country, wherever they are. I believe that we start seeking STEM education students too late. It's just too late when they're freshmen in college to start trying to discern their interest and aptitude in science.

And with this amendment, we're going to seek out those students that, with rising student costs, different paths that students choose to attend local community colleges for 2 years to save money while receiving a quality education. This is a prime place, I think, to recruit our next generation of STEM workers, and that's why I've introduced an amendment that would allow community and technical colleges to receive access to NSF funding. This amendment would not only diversify the STEM workforce, but it would help to reach those who may not have access to otherwise wonderful schools like my own Milwaukee Area Technical College, who are already doing phenomenal work in the STEM field. And that's why I believe that we should be working with them, other—likewise institutions around the country to develop and expand their programs. I want to thank the Chairwoman and Ranking Member again, and I urge passage of the—of this amendment, and I yield back the balance of my time.

Chairwoman STEVENS. Is there any further discussion on this amendment?

Ms. ROSS. Madam Chair?

Chairwoman STEVENS. Congresswoman Ross will be recognized.

Ms. ROSS. Thank you very much, Madam Chair, and I am honored to join my colleague, Representative Moore, in this amendment. She was brilliant when she came up with it, and this is the first of many beautiful partnerships. I also want to thank you, Madam Chair, and the Chairs of this Committee, and the Ranking Members for prioritizing this very important bill.

The *National Science Foundation for the Futures Act* will enable NSF to fund more researchers, expand STEM education, and broaden participation by underrepresented groups. I represent the research triangle area in North Carolina, which is home to hundreds of STEM focused companies, nonprofits, and institutes that are looking for skilled workers. North Carolina State University, in my district, receives many National Science Foundation grants, and has been a leader in mentoring the next generation of STEM workers. The local economy depends on a pipeline of talented students and researchers who have received exceptional training and hands-on experience. We need to take advantage of the potential of all people across this country, no matter their background, and those are the folks who are in our community colleges. It's one of the most diverse student bodies we have, with all types of talents.

In that vein, I'm thrilled to support the amendment introduced by my colleague, Congresswoman Moore. The amendment supports STEM students as they transition from community colleges to 4-year institutions, and on to their careers. My home is—my district

is home to a number of HBCUs (historically Black colleges and universities), including St. Aug's and Shaw, and also Wake Tech, which is larger than any institution of higher education in the State of North Carolina, and their students will benefit so greatly from this support. Ultimately the entire community, State, and region help from having highly skilled STEM workers, and I am thrilled to support this amendment. Thank you, Madam Chair, and I yield back.

Chairwoman STEVENS. Thank you. And the Chair will recognize herself to speak on this amendment. I too want to thank Congresswoman Moore for her leadership, and her introduction of this amendment that is just an absolutely invaluable addition to the bill. It directs the National Science Foundation to support research to improve STEM education at community colleges, as has been said, and to improve outcomes for those entering the workforce with a STEM degree, or a credential, or transferring to a 4-year institution. And we all know that our community colleges are such a catalytic force and driver of stepping into a career, receiving a specialized skill, or going on into further education. We know that the hands-on research experiences addressed in this amendment are so important for STEM education at all levels. The amendment also focuses on developing new and innovative ways to address and diversify our STEM talent pipeline, an urgent priority for our Nation. I urge my colleagues to support this good amendment, and I too relate this back to what we have in Michigan with Oakland Community College and School Prep College [phonetic], where we have seen this in real action, and the impacts that this amendment will make on our overall efforts. Thank you, and I yield back.

Does any other Member wish to contribute to the discussion on this amendment at this time? If there is no further discussion, the vote occurs on the amendment. All in favor, say aye. Those opposed, say no. The ayes have it, and the amendment is agreed to.

We will continue with the amendments in the order of the roster. The next amendment is also offered by the gentlelady from Wisconsin. She will recognize the amendment, and then the Clerk will report the amendment, so it's just one sentence, "I have an amendment at the desk" from Ms. Moore, and then the Clerk will report it. Ms. Moore.

Ms. MOORE. Thank you so much, Madam Chair. I have an amendment at the desk.

Chairwoman STEVENS. The Clerk will report the amendment.

The CLERK. Amendment Number 2, amendment to H.R. 2225, offered by Ms. Moore of Wisconsin.

[The amendment of Ms. Moore follows:]

AMENDMENT TO H.R. 2225

OFFERED BY MS. MOORE OF WISCONSIN

Page 55, after line 14, insert the following:

1 (n) CLEAN WATER RESEARCH AND TECHNOLOGY
2 ACCELERATION.—The Director shall award grants on a
3 competitive, merit-reviewed basis to institutions of higher
4 education or non-profit organizations (or consortia of such
5 institutions or organizations) to—
6 (1) support transdisciplinary research to signifi-
7 cantly advance our understanding of water avail-
8 ability, quality, and dynamics and the impact of
9 human activity and a changing climate on urban and
10 rural water and wastewater systems;
11 (2) develop, pilot and deploy innovative tech-
12 nologies, systems, and other approaches to identi-
13 fying and addressing challenges that affect water
14 availability, quality, and security, including through
15 direct engagement with affected communities and
16 partnerships with the private sector, State, tribal,
17 and local governments, non-profit organizations and
18 water management professionals; and
19 (3) grow the scientific workforce capable of
20 studying and managing water and wastewater sys-

1 tems, through education, training, and other profes-

2 sional development.

☒

Ms. MOORE. Thank you so much, Chairwoman, for recognizing me again. Again, Amendment Number 2—I, like you, Madam Chair, am from a Great Lake State, and I just want to emphasize that our Great Lakes provide about 84 percent of our fresh surface water to North America, and 21 percent of the freshwater on the planet. It's really an important ecosystem. And, as we consider ways to take the NSF into the future, to continue to move our Nation's research enterprise forward, we need to make sure it continues to deal with some of the pressing challenges holding our communities back and endangering our children. Making clean water accessible and sustainable for future generations requires investments in new ideas, and NSF is uniquely positioned to advance water innovation.

And how can we talk about competing with China when our children and our communities are still being lead poisoned, something that we've known about as being poison for centuries? A 2016 report by the President's Council and Advisors on Science and Technology noted that "the Federal Government should create a new focused research entity to develop transformational technologies aimed at improving the safety of drinking water." And while we have gone a long way to meet that recommendation, this amendment starts us on that road by authorizing NSF funding to support clean water research and technology acceleration. My amendment would make sure that NSF continues to focus on research and application of science and technology to address the challenges of providing safe drinking water for everyone.

Now, you know, many communities in our Nation would benefit from the development of low cost and innovative technologies to detect and remove a broad spectrum of contaminants from our water, and address other water challenges that, in fact, have a negative adverse impact on our economy, as well as our ecosystem. You know, contaminants like invasive species. The NSF should be more robustly helping us to get where we need to get, and it's my belief that advances in science and technology will offer new opportunities for the development of safe, affordable, and reliable water monitoring, and hopefully treatment options. The NSF needs to be a supporter of such efforts, including helping us as this research, and the technology is spawns, are deployed into our communities. And my amendment has a simple purpose. It let us bring all of our Nation's premiere Federal science agencies to more effectively address its challenges facing our Nation's drinking water. And, of course, science can't solve all of our water challenges, but innovation can help us with more tools that are desperately needed.

This amendment will also help expand the number of researchers, education students, including traditionally underserved populations involved in this supported water research. I urge my colleagues to support this amendment, and I yield back whatever seconds may be available to me.

Chairwoman STEVENS. Would any other Member like to be recognized for discussion on this amendment at this time? The Chair will recognize herself briefly.

Thank you, Congresswoman Moore, for another valuable addition to the bill. Across the United States, from rural parts of Tennessee, to urban centers like Flint and Miami, water and wastewater sys-

tems shape the health, vitality, and future of our communities. Current gaps in water research and actionable information must be addressed to ensure long term resilience. Your amendment directs the NSF to support research and education activities to improve our water systems. It is a ripe innovation and research opportunity for us, and I encourage my colleagues to support this amendment, and yield back.

And, again, would any other Member, for the good of the order, like to be recognized for discussion on this amendment at this time?

If there's no further discussion, the vote occurs on the amendment. All in favor say aye. Those opposed say no. The ayes have it, and the amendment is agreed to.

The next amendment is offered by a gentleman from Michigan. He is recognized to offer an amendment, Congressman Meijer.

Mr. MEIJER. Madam Chair, I have an amendment at the desk.

Chairwoman STEVENS. The Clerk will report the amendment.

The CLERK. Amendment to H.R. 2225 offered——

[The amendment of Mr. Meijer follows:]

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AMENDMENT TO H.R. 2225

OFFERED BY _____.

Page 25, line 3, insert a new subparagraph (C) at the end of section 5(c)(2):

(C) CYBERSECURITY SCHOLARSHIPS AND GRADUATE FELLOWSHIPS.—The Director shall ensure that students pursuing master's degrees and doctoral degrees in fields relating to cybersecurity are considered as applicants for scholarships and graduate fellowships under the Graduate Research Fellowship Program under section 10 of the National Science Foundation Act of 1950 (42 U.S.C. 1869).

☒

Chairwoman STEVENS. I ask unanimous consent to dispense with the reading. Without objection, so ordered. I recognize the gentleman for 5 minutes to explain the amendment.

Mr. MEIJER. Thank you, Chairwoman Stevens, and Ranking Member Waltz. My amendment today would simply modify this bill to ensure that students interested in degrees related to cybersecurity are eligible applicants for scholarships and fellowships under the NSF's Graduate Research Fellowship Program. This timely amendment will ensure we are promoting and encouraging students to pursue important graduate work in cybersecurity. After the recent attacks on the Colonial Pipeline, which are ongoing, and have impacted millions across this country, and the gasoline supply, and the earlier solar winds attacks that we're still learning the full extent of, we know that improving our cybersecurity capabilities is more important than ever, a significant national security issue, and something we need to encourage our best and brightest students at home to pursue in their graduate work. I am proud to offer this amendment, and I urge all of my colleagues to support it. Thank you, Madam Chair. With that, I will yield back the remaining 4 minutes and 3 seconds of my time.

Chairwoman STEVENS. Is there further discussion on the amendment?

Ms. ROSS. Madam Chair, I'd like to be recognized.

Chairwoman STEVENS. Congresswoman Waltz—or Congressman Ross shall be recognized.

Ms. ROSS. Thank you very much, Madam Chair. I just want to thank the gentleman for bringing this very, very important amendment forward. My State of North Carolina was affected dramatically, and still suffers the effects from the Colonial Pipeline. I also want the gentleman to know that North Carolina State University has an outstanding graduate program that is ready to receive these funds, so thank you so much for bringing this forward.

Chairwoman STEVENS. Any other Member would like to discuss this amendment at this time?

Mr. WALTZ. Madam Chair?

Chairwoman STEVENS. Ranking Member Waltz is recognized.

Mr. WALTZ. Yeah, thank you, Madam Chair. I strongly support Congressman Meijer's amendment. I appreciate—I greatly appreciate his work on cybersecurity issues, as a Member of the Science Committee, as well as on the Homeland Security Committee. The gentleman's amendment does help address a critical need for cybersecurity professionals in the United States. The pipeline cyber attack earlier this week, which dramatically has disrupted gas distribution all across the Southeast, is just—it's just the latest example of the threats we face. Cyber criminals, foreign actors, foreign governments are working every day to find vulnerabilities in our cyber systems. The United States is in desperate need of workers with cyber skills at all levels, from Ph.D. to skilled technical workers. And this change to the Graduate Research Fellowship Program was a recommendation made—I think this is critically important—this was a recommendation made by the Cyberspace Solarium Commission. The bipartisan commission was authorized as part of the *National Defense Authorization Act (NDAA) of 2019* to develop a consensus on a strategic approach to defending the United States

in cyberspace against cyberattacks of significant consequences. Congress has made steady progress in passing the legislative recommendations made by the Commission. I'm glad this amendment continues that work. I urge my colleagues to support the amendment, and I yield back.

Chairwoman STEVENS. Thank you. And the Chair would like to recognize herself.

I too want to thank Congressman Meijer for this good amendment. Part of the reason cybersecurity issues are so prevalent is that the demand for skilled cybersecurity professionals far exceeds the supply, and this is something that I was working on in the public/private partnership space before I got to Congress, in regards to how we can compel a cybersecurity workforce to emerge, to grow, and to step up, and this is a great step in that direction, for including those who get a Master's or a Doctorate in cybersecurity fields to be eligible for a graduate research fellowship program. This couldn't be more important for the integration of the digital manufacturing systems that are so important not only to our industrial base, but also to our defense base, and on. There are countless examples of cybersecurity attacks that have taken place just in the last year alone that are threatening not only our government systems but our supply chain, and this couldn't be more ready. So I urge my colleagues to support this amendment, and want to also provide the space for any other Member who wishes to be recognized on this amendment at this time to be able to do so.

If there is no further discussion, the vote will occur on this amendment. And all in favor will say aye. Those opposed say no. The ayes have it, and the amendment is agreed to.

We will move to the next amendment on the roster. The gentleman from Ohio, Congressman Gonzalez, is recognized to offer an amendment.

Mr. GONZALEZ. Madam Chair, I have an amendment at the desk.

Chairwoman STEVENS. The Clerk will report the amendment.

The CLERK. Amendment Number 4, amendment to H.R. 2225——

[The amendment of Mr. Gonzalez follows:]

AMENDMENT TO H.R. 2225

OFFERED BY MR. GONZALEZ OF OHIO

Page 28, after line 15, insert the following new subsection (e):

1 (e) CYBER WORKFORCE DEVELOPMENT RESEARCH
2 AND DEVELOPMENT.—
3 (1) IN GENERAL.—The Director shall award
4 grants on a merit-reviewed, competitive basis to in-
5 stitutions of higher education or non-profit organiza-
6 tions (of a consortia of thereof) to carry out research
7 on the cyber workforce.
8 (2) RESEARCH.—In carrying out research pur-
9 suant to paragraph (1), the Director shall support
10 research and development activities to—
11 (A) Understand the current state of the
12 cyber workforce, including factors that influence
13 growth, retention, and development of that
14 workforce;
15 (B) examine paths to entry and re-entry
16 into the cyber workforce;
17 (C) understand trends of the cyber work-
18 force, including demographic representation,
19 educational and professional backgrounds

1 present, competencies available, and factors
2 that shape employee recruitment, development,
3 and retention and how to increase the size, di-
4 versity, and capability of the cyber workforce;
5 (D) examine and evaluate training prac-
6 tices, models, programs, and technologies; and
7 (F) other closely related topics as the Di-
8 rector determines appropriate.
9 (3) REQUIREMENTS.—In carrying out the ac-
10 tivities described in paragraph (1), the Director
11 shall—
12 (A) collaborate with the National Institute
13 for Standards and Technology, including the
14 National Initiative for Cybersecurity Education,
15 the Department of Homeland Security, the De-
16 partment of Defense, the Office of Personnel
17 Management, and other Federal departments
18 and agencies, as appropriate;
19 (B) align with or build on the National
20 Initiative on Cybersecurity Education Cybersec-
21 urity Workforce Framework wherever prac-
22 ticable and applicable;
23 (C) leverage the collective body of knowl-
24 edge from existing cyber workforce development
25 research and education activities; and

1 (D) engage with other Federal depart-
2 ments and agencies, research communities, and
3 potential users of information produced under
4 this subsection.

Chairwoman STEVENS. I ask unanimous consent to dispense the reading. Without objection, so ordered. I recognize the gentleman for 5 minutes to explain the amendment.

Mr. GONZALEZ. Thank you, Madam Chair. I want to first express my support for the underlying legislation. The *NSF for the Future Act* takes important steps to advance the mission of NSF and invest in our research community. As always, I'm pleased to work with the Chairs, the Chairs of the Full Committee and the Subcommittees, on what is an incredibly bipartisan and productive Committee, and I'm always proud to be on this Committee, so I thank you for all the work that you do making this happen.

My amendment would improve the underlying bill by expanding on the collection of STEM workforce data. Specifically, the amendment would direct NSF to award grants on a competitive basis to universities or nonprofits to carry out research on the cyber workforce, and this research would focus on understanding the current state of the cyber workforce, examining past entry and re-entry, understanding demographic trends, and evaluating training practices, models, programs, and technologies in the cyber workforce.

Now, this amendment is based on a recommendation by the Cyberspace Solarium Commission, created in the 2019 NDAA to evaluate the state of the U.S. cyber workforce, with a focus on cybersecurity. The Commission report found a need for a clear understanding and data on the cybersecurity workforce in this country. Currently we do not have great data, and without good data, it's difficult to make the right investments. My amendment would help to address this issue by making sure there is reliable data to base policy decisions on, an awareness of the current trends in the cyber workforce, so Congress can continue its work to foster participation in the field. The U.S. must make sure we are maintaining our competitive advantage across the STEM workforce, and importantly, in the field of cybersecurity.

I want to conclude with what I said earlier, which is thank you to the Chairs and Ranking Members for making this such a productive Committee, and I yield back.

Chairwoman STEVENS. Is there any further discussion on this amendment? Would any Member like to be recognized at this time?

Mr. WALTZ. Madam Chair?

Chairwoman STEVENS. Ranking Member Waltz.

Mr. WALTZ. Thank you, Madam Chair. I strongly support Representative Gonzalez's amendment. Like the Meijer amendment, this amendment, as he mentioned, it addresses a recommendation made by the Cyberspace Solarium Commission. You know, while we know that the Nation's cyber workforce needs are great, we—you know, I concur we do not have the qualitative data necessary to effectively understand and address the need, and this amendment directs the NSF to support basic research on the current state of the cyber workforce, including paths to entry, demographic trends of the cyber workforce, and retention issues. This research will help universities, employers, policymakers better understand our Nation's cyber workforce needs, make the interventions needed to recruit and retain cyber professionals. And I can say certainly, over on the DOD (Department of Defense) side, the Defense Department side on Armed Services, this is a critical issue as well.

Congressman Gonzalez has been a great advocate for improving our domestic STEM workforce, and I appreciate his work on this amendment. I urge my colleagues to support, and I yield back my time.

Chairwoman STEVENS. Thank you, and the Chair would like to recognize herself, and also thank Congressman Gonzalez for this good amendment in the vein of Congressman Meijer's amendment as well. One of the major challenges that has led to our national cybersecurity workforce shortage is a lack of understanding of workforce trends, something that I was working with the National Defense Industrial Association on years prior, in terms of identifying our cybersecurity workforce needs. We find ourselves in the middle of a pandemic, and hungry for the access to data and information. This will be a very important guide, and I would also like to recognize and make note of the work taking place throughout Manufacturing USA, the network of R&D labs that exist, and—across the country, and particularly some of the work that that—those partnerships are doing to also encourage an understanding of the data on our cybersecurity workforce. So this amendment couldn't be more timely for NSF's role in Manufacturing USA, and the network of partners that are also hungry for this information. And I truly thank Mr. Gonzalez not only for being a Midwestern leader, but being a leader on this topic. This amendment is going to continue to enable NSF to support research and work with other Federal agencies to address this challenge, and I urge my colleagues to support this amendment.

Would any other Member like to be recognized at this time? And if there's further discussion, the vote will occur on the amendment. So all in favor will say aye. Those opposed will say no. The ayes have it, and the amendment is agreed to.

We will continue to the next amendment on the roster. The gentleman from Kansas is recognized to offer an amendment.

Mr. LATURNER. Thank you, Madam Chair. I do have an amendment at the desk.

Chairwoman STEVENS. The Clerk will report the amendment.

The CLERK. Amendment Number 5, amendment to H.R. 2225——

[The amendment of Mr. LaTurner follows:]

AMENDMENT TO H.R. 2225

OFFERED BY MR. LATURNER OF KANSAS

Page 34, after line 21, insert the following new subsection (h):

1 (h) CONTINUING SUPPORT FOR EPSCoR.—
2 (1) SENSE OF CONGRESS.—
3 (A) IN GENERAL.—It is the sense of Con-
4 gress that—
5 (i) since maintaining the Nation's sci-
6 entific and economic leadership requires
7 the participation of talented individuals na-
8 tionwide, EPSCoR investments into State
9 research and education capacities are in
10 the Federal interest and should be sus-
11 tained; and
12 (ii) EPSCoR should maintain its ex-
13 perimental component by supporting inno-
14 vative methods for improving research ca-
15 pacity and competitiveness.
16 (B) DEFINITION OF EPSCOR.—In this sub-
17 section, the term "EPSCoR" has the meaning
18 given the term in section 502 of the America

1 COMPETES Reauthorization Act of 2010 (42
2 U.S.C. 1862p note).
3 (2) UPDATE OF EPSCOR.—Section 517(f)(2) of
4 the America COMPETES Reauthorization Act of
5 2010 (42 U.S.C. 1862p–9(f)(2)) is amended—
6 (A) in subparagraph (A), by striking
7 "and" at the end; and
8 (B) by adding at the end the following:
9 "(C) to increase the capacity of rural com-
10 munities to provide quality STEM education
11 and STEM workforce development program-
12 ming to students, and teachers; and".

Chairwoman STEVENS. I ask for unanimous consent to dispense with the reading. And without objection, so ordered. I recognize the gentleman for 5 minutes to explain the amendment.

Mr. LATURNER. Thank you, Madam Chair. This amendment is to express support for the Established Program to Stimulate Competitive Research, or EPSCoR. This program supports 25 States in three jurisdictions that, combined, receive just over 10 percent of the NSF funding. EPSCoR serves the NSF mission by creating strategic partnerships, strengthening States' research and development capacity, and building national competitiveness. Since 2006 Kansas NSF EPSCoR has received more than $89.9 million in Federal funds, which has supported more than 590 graduate and undergraduate students, and has allowed institutions such as the University of Kansas and universities across the country to conduct research projects related to environmental health, soil quality, and energy inefficiency—energy efficiency, as well as engage K through 12 students in scientific research.

By creating a stronger research base nationwide, we can increase opportunities for students in communities to have access to high quality STEM education, training, and workforce development. This is a serious need, especially as global competition for STEM talent continues to grow. A trained workforce and research capability will lead to the creation of new jobs and businesses, growing innovation and our economy. If we want to ensure America's leadership in scientific research and development and stay ahead of China, we must leverage the talent, expertise, and capabilities found across the entire country. The Nation's future competitiveness will require that we provide STEM opportunities for all Americans. Thank you, and I yield back the balance of my time.

Chairwoman STEVENS. Great. And would any other Member like to be recognized to speak on this amendment at this time?

Mr. LUCAS. Madam Chair, I'd like to strike the last word.

Chairwoman STEVENS. Ranking Member Lucas is recognized.

Mr. LUCAS. Thank you, Madam Chair. I strongly support the gentleman's amendment. This amendment reinforces the important role that NSF's Established Program to Stimulate Competitive Research plays in addressing geographic disparities in Federal research funding between rural and urban communities. In my home State of Oklahoma, EPSCoR Program has engaged over 60,000 K through 12 students and teachers in STEM, including through an innovative state-wide Girl Scout STEM initiative. It has also added more than 25 new faculty positions at Oklahoma universities. These investments have a tremendous impact ensuring that we're giving every student, no matter their zip code, access to high qualify STEM opportunities. It is important to make sure investment doesn't just happen on the coasts, or at the top 10 universities, but also in places like Stillwater, Oklahoma, land grant university institutions like Oklahoma State, or historically Black colleges and universities like Frankston University. We need to do more to ensure STEM opportunities reach more Americans, and EPSCoR plays a critical role in making that happen. I urge my colleagues to support this amendment, and I yield back, Madam Chair.

Chairwoman STEVENS. Would any other Member like to be recognized at this time on this amendment? If not, the Chair would like to briefly recognize herself.

I want to also thank Mr. LaTurner for his amendment. This amendment highlights the importance of the EPSCoR Program. I thank Mr. LaTurner for his energy around this program. The amendment will ensure researchers and students across the country, including those who happen to live in rural areas, have opportunities to participate in NSF funded projects. And this is part of the stakeholder feedback that we've received about NSF's mission, and purpose, and opportunity. Study after study has shown that research experience is a critical driver of student retention in STEM fields. The EPSCoR Program addresses longstanding geographic inequities, something that Mr. LaTurner is seeking to champion here today, in Federal research funding, and plays a critical role in ensuring we are drawing on STEM talent in regions all across the country. I urge my colleagues to support this amendment.

And if there is no further discussion, the vote will occur on the amendment. All in favor will say aye. Those opposed will say no. The ayes have it, and the amendment is agreed to.

The Chair will recognize the next amendment on the roster, being offered by Ranking Member Waltz, the gentleman from Florida. He is recognized to offer the amendment.

Mr. WALTZ. Madam Chair, I have an amendment at the desk.

Chairwoman STEVENS. The Clerk will report the amendment.

The CLERK. Amendment Number 6, amendment to H.R. 2225——

[The amendment of Mr. Waltz follows:]

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AMENDMENT TO H.R. 2225
OFFERED BY MR. WALTZ OF FLORIDA + Mr. Foster of Illinois

Page 36, beginning on line 11, strike "positions" and insert "positions, in addition to the Chief of Research Security established in paragraph (2) of this subsection".

Page 40, beginning on line 1, redesignate paragraphs (7) and (8) as paragraphs (9) and (10), respectively.

Page 40, line 1, insert the following:

1 (7) AUTHORITIES.—
2 (A) IN GENERAL.—In addition to existing
3 authorities for preventing waste, fraud, abuse,
4 and mismanagement of federal funds, the Di-
5 rector, acting through the Office of Research
6 Security and Policy and in coordination with
7 the Foundation's Office of Inspector General,
8 shall have the authority to—
9 (i) conduct risk assessments, including
10 through the use of open-source analysis
11 and analytical tools, of research and devel-
12 opment award applications and disclosures

1 to the Foundation, in coordination with the
2 Risk Assessment Center established in
3 paragraph (5);
4 (ii) request the submission to the
5 Foundation, by an institution of higher
6 education or other organization applying
7 for a research and development award, of
8 supporting documentation, including copies
9 of contracts, grants, or any other agree-
10 ment specific to foreign appointments, em-
11 ployment with a foreign institution, partici-
12 pation in a foreign talent program and
13 other information reported as current and
14 pending support for all covered individuals
15 in a research and development award ap-
16 plication; and
17 (iii) upon receipt and review of the in-
18 formation provided under clause (ii) and in
19 consultation with the institution of higher
20 education or other organization submitting
21 such information, initiate the substitution
22 or removal of a covered individual from a
23 research and development award, reduce
24 the award funding amount, or suspend or
25 terminate the award if the Director deter-

1 mines such contracts, grants, or agree-
2 ments include obligations that—
3 (I) interfere with the capacity for
4 Foundation-supported activities to be
5 carried out; or
6 (II) create duplication with
7 Foundation-supported activities.
8 (B) LIMITATIONS.—In exercising the au-
9 thorities under this paragraph, the Director
10 shall—
11 (i) take necessary steps, as prac-
12 ticable, to protect the privacy of all covered
13 individuals and other parties involved in
14 the application and disclosure assessments
15 under clause (A)(i);
16 (ii) endeavor to provide justification
17 for requests for supporting documentation
18 made under clause (A)(ii);
19 (iii) require that allegations be proven
20 by a preponderance of evidence; and
21 (iv) as practicable, afford subjects an
22 opportunity to provide comments and re-
23 buttal and an opportunity to appeal before
24 final administrative action is taken.
25 (8) SECURITY TRAINING MODULES.—

1 (A) IN GENERAL.—Not later than 90 days
2 after the date of enactment of this Act, the Di-
3 rector, in collaboration with the Director of the
4 National Institutes of Health and other relevant
5 Federal research agencies, shall enter into an
6 agreement or contract with a qualified entity
7 for the development of online research security
8 training modules for the research community,
9 including modules focused on international col-
10 laboration and international travel, foreign in-
11 terference, and rules for proper use of funds,
12 disclosure, conflict of commitment, and conflict
13 of interest.
14 (B) STAKEHOLDER INPUT.—Prior to en-
15 tering into the agreement under clause (A), the
16 Director shall seek input from academic, private
17 sector, intelligence, and law enforcement stake-
18 holders regarding the scope and content of
19 training modules, including the diversity of
20 needs across institutions of higher education
21 and other grantees of different sizes and types,
22 and recommendations for minimizing adminis-
23 trative burden on institutions of higher edu-
24 cation and researchers.

1 (C) DEVELOPMENT.—The Director shall
2 ensure that the entity identified in (A)—
3 (i) develops modules that can be
4 adapted and utilized across Federal science
5 agencies; and
6 (ii) develops and implements a plan
7 for regularly updating the modules as
8 needed.
9 (D) GUIDELINES.—The Director, in col-
10 laboration with the Director of the National In-
11 stitutes of Health, shall develop guidelines for
12 institutions of higher education and other orga-
13 nizations receiving Federal research and devel-
14 opment funds to use in developing their own
15 training programs to address the unique needs,
16 challenges, and risk profiles of such institu-
17 tions, including adoption of training modules
18 developed under this paragraph.
19 (E) IMPLEMENTATION.—Drawing on
20 stakeholder input under subparagraph (B), not
21 later than 12 months after the date of enact-
22 ment of this Act, the Director shall establish a
23 requirement that, as part of an application for
24 a research and development award from the
25 Foundation—

1 (i) each covered individual listed on
2 the application for a research and develop-
3 ment award certify that they have com-
4 pleted research security training that
5 meets the guidelines developed under
6 clause (D) within one year of the applica-
7 tion; and
8 (ii) each institution of higher edu-
9 cation or other organization applying for
10 such award certify that each covered indi-
11 vidual who is employed by the institution
12 or organization and listed on the applica-
13 tion has been made aware of the require-
14 ment under this subparagraph.
15 (F) DEFINITIONS.—In this subsection:
16 (i) COVERED INDIVIDUAL.—The term
17 "covered individual" means the principal
18 investigator, co-principal investigators, and
19 any other person at the institution who is
20 responsible for the design, conduct, or re-
21 porting of research or educational activities
22 funded or proposed for funding by the
23 Foundation.
24 (ii) FEDERAL RESEARCH AGENCY.—
25 The term "Federal research agency"

1 means any Federal agency with an annual
2 extramural research expenditure of over
3 $100,000,000.
4 (iii) RESEARCH AND DEVELOPMENT
5 AWARD.—The term "research and develop-
6 ment award" means support provided to
7 an individual or entity by a Federal re-
8 search agency to carry out research and
9 development activities, which may include
10 support in the form of a grant, contract,
11 cooperative agreement, or other such
12 transaction. The term does not include a
13 grant, contract, agreement or other trans-
14 action for the procurement of goods or
15 services to meet the administrative needs
16 of a Federal research agency.

Page 40, beginning on line 10, strike "and training to raise awareness of potential security threats and Federal export control, disclosure, and reporting requirements".

Chairwoman STEVENS. I will ask unanimous consent to dispense with the reading. Without objection, so ordered. I recognize the gentleman from Florida for 5 minutes to explain the amendment.

Mr. WALTZ. Thank you, Chairwoman Stevens for the opportunity to speak on my amendment. I'd like to thank Dr. Foster for agreeing to co-sponsor this important amendment with me. As I mentioned in my opening statement, the *NSF for the Future Act* bill increases funding for fundamental research, improved STEM education and research training, increases that I believe are necessary for our global competitiveness. Again, while making these investments, we must also secure taxpayer funded research and technologies from adversaries like the Chinese Communist Party. While the *NSF for the Future Act* includes some provisions to increase research security, my amendment would build upon these provisions to improve the best practices, provide tougher safeguards to prevent research theft and foreign influence.

Currently the NSF funds approximately 27 percent of all federally funded basic research at U.S. colleges and universities, leading to 12,000 annual awards to more than 40,000 recipients. Through these investments this bill proposes, these numbers are anticipated to nearly double. With that growth comes a greater need for resources, authorities, and tools for the Foundation, sponsoring institutions and applicants to identify and address maligned foreign influence and research theft. My amendment will help the Office of Research Security within the NSF with staff needed to handle the growing number of cases it is faced with, and the authority to further investigate and act on concerned findings.

My amendment also instructs the director to develop required online security training modules for the research community. This annual training will include a focus on international collaboration and international travel, foreign interference, and the rules for proper use of funds, proper disclosure, conflicts of commitment, and conflicts of interest. These training modules will ensure that individual researchers understand, and, frankly, have no excuse, for what makes an appropriate partnership, and the importance of accurate disclosures. It will set a baseline for what is acceptable and unacceptable for future applicants. It is critical that we strike the correct balance between keeping our research enterprise open, but also protecting it from adversaries who seek to take an advantage of that open system. There is more work to be done, for sure, but I think this amendment takes some big steps in striking that balance.

I want to thank Dr. Foster, as well as Chairwoman Johnson, Chairwoman Stevens, Ranking Member Lucas, for working with me on this amendment. I want to thank their staffs as well, and I want to continue to make research security a priority. I particularly want to thank Chairwoman Johnson's staff, including Dahlia Sokolov and Sarah Barber for their attention to this issue, and for working with my team on this amendment. I encourage the Members of this Subcommittee to support this amendment, which builds upon Congress's previous efforts to safeguard America's intellectual property (IP), confront the CCP's wholesale theft from our research institutions. Thank you, I reserve the balance of my time.

Chairwoman STEVENS. Thank you. It's always a good day to thank Dahlia and Sarah Barber from our staff. Thank you for those comments, Ranking Member Waltz. Would any other Member like to be recognized for further discussion on this amendment at this——

Mr. FOSTER. Madam——

Chairwoman STEVENS [continuing]. Time?

Mr. FOSTER. —Chair? Madam Chair?

Chairwoman STEVENS. Dr. Foster is recognized.

Mr. FOSTER. I move to strike the last word. Well, thank you.

Chairwoman STEVENS. So be it.

Mr. FOSTER. Thank you. Thank you, Madam Chairwoman. The concept of international scientific cooperation has always been key to making advancements in science. Benjamin Franklin became a hero to scientists in Europe, and around the world, for his groundbreaking research not only in electricity, but, as is less well known, in climate science. Scientists throughout the U.S. rely on their collaborations with counterparts from around the world to perform the excellent scientific research that they work on every day. In all of my time in science, I was never on an experiment that did not have foreign collaborators. And I'm very proud that, at the laboratory that I worked at for decades, Fermi National Accelerator Laboratory, when it opened during the depth of the cold war, the very first experiment performed there had Russian collaborators.

However, the NSF gives out grants to members of the scientific community, and when it does that, it's important that the Foundation be continuously aware that some of its grant recipients may have conflicts of interest, or foreign obligations, that might—you know, that ought to restrict NSF's ability to award the funding, or to continue it. And, in that spirit, this amendment provides NSF with the authority to conduct risk assessments based on the information that they receive in grant proposals. It also gives the Foundation the authority to request additional supporting documents, if faced with something potentially concerning. It gives them the authority to remove the lead scientist from a grant, reduce the funding amount provided, or end the grant if the recipients are found to have other obligations that would interfere with or duplicate the award activities. And although the amendment is not prescriptive on this point, it is the expectation of at least one Member of Congress that such grant revocation action should be undertaken very rarely, and in a fully transparent manner.

The amendment also includes language on the need to implement training to combat threats to research security. The research community needs clarity on what is OK and what is not OK, so it directs the Foundation to develop training modules for the principal scientific investigators on grant applications. It's my hope that this amendment, which I'm co-sponsoring with Ranking Member Waltz, will ensure that we are funding scientists who are able to participate in the international scientific community without conflicts of interest. I yield back.

Chairwoman STEVENS. Thank you, I—Dr. Foster. The Chair will recognize herself. I too want to thank Ranking Member Waltz for this important amendment, and Dr. Foster for working together in

a bipartisan manner on this critical issue. The amendment addresses pressing issues related to research security. We can't look away, and now is the time to address them. It provides the—this amendment will provide the NSF with the authority to conduct risk assessments, based on information disclosed in grant proposals, and to request supporting documentation when they see something that raises question or a flag.

The amendment also gives the NSF the authority to take action if the contract includes obligations that interfere or duplicate the award activities. The amendment also addresses one of the most pressing needs in addressing threats to research security, training. It directs the Foundation to support the development of training modules, and establishes a requirement for NSF funded researchers to take such training. I support this amendment, and urge my colleagues to join with me in supporting. I also recognize that this remains an ongoing discussion and effort for us to address, something, again, I look forward to collaborating with Mr. Waltz on, and other Committees within the stakeholder community. We want to work toward coherent, governmentwide policies, as we've done in collaboration with the Armed Services Committee over the last several years. We will keep having these conversations, deliberations, discussions, and carving out a path forward as we look at—look to strengthen provisions within the NSF bill.

Is there further discussion on the amendment at this time? If there is no further discussion, the vote occurs on the amendment. All in favor will say aye. Those opposed will say no. The ayes have it, and the amendment is agreed to.

The next amendment on the roster is offered by the gentlelady from Pennsylvania. Congresswoman Wild is recognized to offer an amendment.

Ms. WILD. Thank you so much, Madam Chair. I am glad to have the——

Chairwoman STEVENS. The Clerk will report the amendment. Yeah.

The CLERK. Amendment Number 7, amendment to H.R. 2225 offered——

[The amendment of Ms. Wild follows:]

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AMENDMENT TO H.R. 2225

OFFERED BY MS. WILD OF PENNSYLVANIA

Page 53, strike line 18 and all that follows through page 54, line 2, and insert the following:

1 (2) the creation of novel engineered systems so-
2 lutions for resilient complex infrastructures, particu-
3 larly those that address critical interdependence
4 among infrastructures and leverage the growing in-
5 fusion of cyber-physical-social components into the
6 infrastructures;
7 (3) development of equipment and instrumenta-
8 tion for innovation in resilient engineered infrastruc-
9 tures; and
10 (4) multidisciplinary research on the behaviors
11 individuals and communities engage in to detect,
12 perceive, understand, predict, assess, mitigate, and
13 prevent risks and to improve and increase resilience.

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Chairwoman STEVENS. And I ask unanimous consent to dispense with the reading. Without objection, so ordered. I now recognize the gentlelady for 5 minutes to explain the amendment.

Ms. WILD. Thank you, Madam Chair. I am glad we have the opportunity today to further America's scientific and research leadership with this comprehensive, bipartisan, National Science Foundation legislation. I'm excited that the bill also looks to tackle key issues confronting our country, such as cybersecurity, climate change, and our science, technology, engineering, and math workforce with a new National Science Foundation directorate. Among the many important areas of fundamental research supported by the Foundation, the *National Science Foundation for the Future Act* identifies risk and resilience research as a key need for our country in the coming years, and I completely agree with this topic's importance.

I represent Pennsylvania's Lehigh Valley, where we are seeing increasing frequent and severe floods that disrupt our lives and damage our infrastructure. Our scientific community must play a leading role in advancing our knowledge of the evolving risks our society faces. But in order to develop resilience to these threats, we also need research that accounts for the complexity of our infrastructure systems and that examines the human nature aspect of these questions. My amendment to this bill expands upon the research the NSF will support to that end. Specifically, it builds on the bill's current language to also support research that advances understanding of the interdependence among critical infrastructures that helps develop the tools we need for innovation in resilient infrastructures, and that investigates human perception and understanding of risk both as individuals, and as a community.

Lehigh University, in my district, is one institution that is leading in such areas, as home to three interdisciplinary research institutes. For example, the Institute for Cyber Physical Infrastructure and Energy has researchers investigating our society's reliance on energy, communications, and transportation systems, how such systems are connected and dependent on each other, and, from that understanding, how they can be developed and adapted to be resilient and secure in light of changing risks. Retaining our Nation's leadership in science and technology will require that we have a strong understanding of the risks our critical systems face, and the ability to build resilience to those threats. For that reason I urge adoption of this amendment, and I yield back.

Chairwoman STEVENS. Is there any further discussion on this amendment? If not, the Chair will recognize herself, and thank Congresswoman Wild for her spot-on amendment. The amendment expands the scope of the activity supported by NSF's risk and resilience research programs to include research equipment, and instrumentation for resilient engineered infrastructure. Each year natural disasters cause billions of dollars in damage to our infrastructure. Climate change has amplified these risks, and we have witnessed a new devastating scale of destruction from tornadoes, hurricanes, floods, earthquakes, and wildfires. As we debate a major new investment in infrastructure in the House Chamber, we must invest in research and research-enabling equipment and instru-

mentation to ensure those investments can stand the test of time. I urge my colleagues to support this important amendment.

And, again, we'll leave it open for any further discussion at this time. If there is none, the vote will occur on this amendment, and all in favor will say aye. Those opposed will say no. The ayes have it, and the amendment is agreed to. We're cruising through our amendments.

We will continue to the next amendment on the roster. The next amendment is also offered by the gentlelady from Pennsylvania. She is recognized to offer an amendment.

Ms. WILD. Thank you, Madam Chair.

Chairwoman STEVENS. The Clerk will report the amendment.

The CLERK. Amendment Number 8, amendment to H.R. 2225——

[The amendment of Ms. Wild follows:]

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AMENDMENT TO H.R. 2225

OFFERED BY MS. WILD OF PENNSYLVANIA

Page 55, after line 14, insert the following:

1 (n) TECHNOLOGY AND BEHAVIORAL SCIENCE RE-
2 SEARCH.—The Director shall award grants on a merit-
3 based, competitive basis for research to—
4 (1) increase understanding of social media and
5 consumer technology access and use patterns and re-
6 lated psychological and behavioral issues, particu-
7 larly for adolescents; and
8 (2) explore the role of social media and con-
9 sumer technology in rising rates of depressive symp-
10 toms, suicidal ideation, drug use, and deaths of de-
11 spair, particularly for communities experiencing
12 long-term economic distress.

Chairwoman STEVENS. And I will ask unanimous consent to dispense with the reading. Without objection, so ordered. I recognize the gentlelady for 5 minutes to explain the amendment.

Ms. WILD. Thank you, Madam Chair. The *National Science Foundation for the Future Act* we're considering today invests in our Nation's basic and fundamental research enterprise, aiming to set our country up with the scientific understanding we need to confront the challenges of today and the coming decades. Among the Foundations activities, the Social, Behavioral, and Economic Sciences Directorate supports essential basic research on people and society. The Directorate's work on understanding human behavior and social organization is just as vital to our scientific leadership and ability to address big questions as other directorates' work, and I think its insight helps inform our work in Congress on a range of issues, such as child development, psychological health well-being, and economic decisionmaking.

One thing I hear about constantly in my district is the influence of technology on our lives, our brains, our attention spans, our productivity, and our self-esteem, particularly for kids and teens. Needless to say, the past decade has brought a watershed of change in how we use technology and consume content on social media and other technology platforms, while at the same time we have seen rising rates of drug misuse, depression and anxiety, deaths from suicide, and other such harms of despair in our country. In the years prior to the COVID–19 pandemic, we had made progress in working to address such issues as the opioid crisis, access to mental health care, and breaking down the social stigma associated with these issues. But the pandemic disrupted and set back our work, while leaving many people far more isolated, and even more dependent on technology than they were before.

We are online more than ever, working, learning, and trying to keep our social connections alive, so I think the intersection of technology and human psychology and wellness is one of the essential areas that we need our scientific community to investigate. My amendment would add an additional topic to the legislation's areas of fundamental research to this end. Specifically, it directs the NSF to support merit-based competitive research grants to increase our understanding of how social media and technology interact with psychological and behavioral issues, and to explore their roles in rising rates of social issues, including suicide, drug use, and the phenomenon of death of despair. I believe this Committee can send a strong signal with ongoing support for the social, behavioral, and Economic Directorate's work to build our understanding of these key issues, and inform our society's responses for the coming decades. I urge adoption of this amendment, and I yield back.

Chairwoman STEVENS. Is there further discussion on this amendment at this time? I would like to recognize myself—the Chair would like to recognize herself to thank Congresswoman Wild for her excellent amendment, which directs the NSF to fund research to improve the understandings of the impacts of consumer technologies like social media on mental health and wellbeing. Research on this issue is urgently needed, and the social and behavioral science community is poised to tackle questions about how these technologies are affecting our health and our society, particu-

larly for vulnerable communities. This is an important amendment, and I urge my colleagues to support it.

And if there is no further discussion at this time, the vote occurs on the amendment. All in favor will say aye. Those opposed will say no. The ayes have it, and the amendment is agreed to.

The next amendment is offered by the gentleman from Pennsylvania. He is recognized to offer an amendment.

Mr. LAMB. Madam Chair, I have an amendment at the desk.

Chairwoman STEVENS. The Clerk will report the amendment.

The CLERK. Amendment Number 9, amendment to H.R. 2225——

[The amendment of Mr. Lamb follows:]

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AMENDMENT TO H.R. 2225

OFFERED BY MR. LAMB OF PENNSYLVANIA

Page 55, after line 14, insert the following new subsection:

1 (n) MANUFACTURING RESEARCH AMENDMENT.—
2 Section 506(a) of the America COMPETES Reauthoriza-
3 tion Act of 2010 (42 U.S.C. 1862p–1(a)) is amended—
4 (1) in paragraph (5), by striking "and" at the
5 end;
6 (2) in paragraph (6)—
7 (A) by striking "and" before "virtual man-
8 ufacturing"; and
9 (B) by striking the period at the end and
10 inserting "; and artificial intelligence and ma-
11 chine learning; and"; and
12 (3) by adding at the end the following:
13 "(7) additive manufacturing, including new ma-
14 terial designs, complex materials, rapid printing
15 techniques, and real-time process controls.".

Chairwoman STEVENS. I will ask unanimous consent to dispense with the reading. Without objection, so ordered. The Chair recognizes the gentleman for 5 minutes to explain the amendment.

Mr. LAMB. Thank you, Madam Chair. This is a simple change to the existing code to include advanced manufacturing in the provision on manufacturing, and then also it'll be to include that—research on artificial intelligence is included in manufacturing. In places like Western Pennsylvania, and I know in Michigan, Madam Chair, it used to be that advanced technologies were seen almost as an enemy of jobs in manufacturing, but these days I think they present a realistic path forward to bring some of these jobs home, or to create the jobs here in the first place, with new technologies that we are manufacturing. Robots—in Western Pennsylvania, it's really additive manufacturing for metals, is the area where we're trying to achieve distinction, and so we want good coordinated research and development around that area, so we need to be sure that the National Science Foundation is on board, that they are helping to act as a catalyst for these important new technologies, particularly because we all know that this isn't happening in a vacuum.

We're in a competition. We're in competition with the Chinese Communist Party, that doesn't worry too much about the distinction between private sector and government research, and financing, and all the rest, so we have to be strong, we have to be aggressive, and I think this amendment will help us do that in a couple of key areas. With that, I yield back.

Chairwoman STEVENS. OK. Is there further discussion on this amendment? If not, the Chair will recognize herself just to thank Mr. Lamb for his amendment. Obviously the United States has been a longtime powerhouse in manufacturing, and—thanks in large part to federally funded research that also helps to catalyze innovations and forge public/private partnerships, and investment in advanced manufacturing has just consistently played off—excuse me, paid off for communities across the country, particularly in the place I call home. And, as you mentioned robots, Mr. Lamb, I do boast the largest robot in the world at FANUC Systems in my district, so we're pleased to see where your head is at, and also how people continue to utilize these technologies and aspect of advanced manufacturing to create wealth opportunities, and to advance our economic development. So I urge my colleagues to support this good amendment.

And if there is no further discussion at this time, the vote will occur on the amendment. All in favor will say aye. Those opposed will say no. The ayes have it, the amendment is agreed to.

We will now proceed to the next amendment on the roster. The next amendment is offered by the gentleman from Illinois. Dr. Foster is recognized to offer an amendment.

Mr. FOSTER. Thank you, Madam Chair, I have an amendment——

Chairwoman STEVENS. And the—and then the Clerk will report the amendment.

The CLERK. Amendment Number 10, amendment to H.R. 2225——

[The amendment of Mr. Foster follows:]

AMENDMENT TO H.R. 2225

OFFERED BY MR. FOSTER OF ILLINOIS

Page 58, strike line 12 and all that follows through page 59, line 20, and insert the following:

1 (d) ADVANCED COMPUTING.—

2 (1) COMPUTING NEEDS.—To gather informa-
3 tion about the computational needs of Foundation-
4 funded projects, the Director shall require grant pro-
5 posals submitted to the Foundation, as appropriate,
6 to include estimates of computational resource needs
7 for projects that require use of advanced computing.
8 The Director shall encourage and provide access to
9 tools that facilitate the inclusion of these measures,
10 including those identified in the 2016 Academies re-
11 port entitled "Future Directions for NSF Advanced
12 Computing Infrastructure to Support U.S. Science
13 and Engineering in 2017–2020".

14 (2) REPORTS.—The Director shall document
15 and publish every two years a summary of the
16 amount and types of advanced computing capabili-
17 ties that are needed to fully meet the Foundation's
18 project needs as identified under paragraph (1).

1 (3) ROADMAP.—To set priorities and guide
2 strategic decisions regarding investments in ad-
3 vanced computing capabilities, the Director shall de-
4 velop, publish, and regularly update a 5-year ad-
5 vanced computing roadmap that—
6 (A) describes the advanced computing re-
7 sources and capabilities that would fully meet
8 anticipated project needs, including through in-
9 vestments in the Mid-Scale Research Infra-
10 structure program and the Major Research
11 Equipment and Facilities Construction account;
12 (B) draws on community input, informa-
13 tion contained in research proposals, allocation
14 requests, insights from Foundation-funded
15 cyber-infrastructure operators, and Foundation-
16 wide information gathering regarding commu-
17 nity needs;
18 (C) considers computational needs of
19 planned major facilities;
20 (D) reflects anticipated technology trends;
21 (E) informs users and potential partners
22 about future facilities and services;
23 (F) addresses the needs of groups histori-
24 cally underrepresented in STEM and geo-

1 graphic regions with low availability and high
2 demand for advanced computing resources;
3 (G) considers how Foundation-supported
4 advanced computing capabilities can be lever-
5 aged for activities through the Directorate for
6 Science and Engineering Solutions; and
7 (H) provides an update to Congress about
8 the level of funding necessary to fully meet
9 computational resource needs for the research
10 community.

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Chairwoman STEVENS. And I will ask unanimous consent to dispense with the reading. Without objection, so ordered. And the Chair will now recognize the gentleman for 5 minutes to explain the amendment.

Mr. FOSTER. Thank you, Madam Chairwoman. In my opening remarks I emphasized the need for coordinated and forward-looking planning, both within the NSF and on an inter-agency basis. Nowhere is this more important than in advanced scientific computing, where both capabilities, and both the demand for scientific commuting—computing and data storage are increasing exponentially, or faster. So I'm introducing an amendment to Section 8(b) on advanced computing, which adds more specificity to the advanced computing road map.

It's crucial for the U.S. to maintain leading edge high performance computing, or HPC, infrastructure in order to continue U.S. world leadership in scientific competitiveness, particularly given the increasing demands on the U.S.'s own HPC resources. The NSF should lay out a plan for its future computing investment to enable transformational science and engineering research. The NSF has already begun the planning process for a Leadership Class Computing Facility, or LCCF. Now, this facility is expected to support a computing environment tenfold or more faster in time to solution performance compared to the current NSF leadership system. However, this system alone will not be enough to meet U.S. science and engineering research needs and maintain U.S. leadership. As the need increases for effective data management across NSF research areas, expanded NSF investments in adequate computing assets, resources, and services will be needed to ensure U.S. leadership in a range of innovation areas.

The *NSF for the Future Act* takes an important step to address this issue by encouraging NSF to collect information on the advanced computing needs of grant proposals, and to publish a 5-year advanced computing road map. This amendment will strengthen this language by, among other things, first, requiring grant proposals to include information on estimated computational resource needs, requiring information on advanced computing needs to be released every 2 years, and ensuring that the road map establishes both what the advanced computing resources—what—are needed, as well as how investments in mid-scale research infrastructure programs can play a part, and how the major research equipment and facilities, or MREFC, account can be leveraged. I look forward to the advances that NSF will be able to make through this amendment, and I yield back.

Chairwoman STEVENS. Is there further discussion on this amendment at this time? If not, the Chair will recognize herself. Thank you, Dr. Foster, for this amendment. It is certainly going to address the urgent need for ramping up our domestic computing capabilities. Increases in advanced computing capabilities are going to open the door to new areas of scientific discovery and innovation, and many of us Midwesterners will remember from almost a decade now the National Digital, Engineering, Manufacturing Consortium that leveraged advanced computing technologies in partnership with universities and small manufacturers to help them diversify production lines.

And this was a one-off investment from the Economic Development Administration, but it is so right of you to propose this amendment to our NSF reauthorization to continue to harness the capabilities of advanced computing for purposes of scientific research and discovery, and also the elements of this bill that speak to the applications of our research and potential other commercialization effort. So we want to be transparent about the needs to get to a path of fully addressing an advanced computing road map, and this amendment will also help us to engage in that effort.

And I encourage colleagues to support this good amendment, and again leave it open to further discussion. If there is no further discussion, the vote will occur on this amendment. All in favor will say aye. And those opposed will say no. The ayes have it, the amendment is agreed to.

The next amendment on the roster is offered by the gentleman from the Commonwealth of Virginia. Mr. Beyer is recognized to offer an amendment.

Mr. BEYER. Thank you, Madam Chairwoman. I'm offering this amendment to the NSF——

Chairwoman STEVENS. And the Clerk will—pardon me, Mr. Beyer. The Clerk will report the amendment.

Mr. BEYER. Thank you.

The CLERK. Amendment Number 11, amendment to H.R. 2225, offered by——

[The amendment of Mr. Beyer follows:]

AMENDMENT TO H.R. 2225

OFFERED BY MR. BEYER OF VIRGINIA

Page 59, after line 20, insert the following new subsection:

1 (e) NATIONAL SECURE DATA SERVICE.—

2 (1) IN GENERAL.—The Director, in consulta-
3 tion with the Chief Statistician of the United States,
4 shall establish a demonstration project to develop,
5 refine and test models to inform the full implemen-
6 tation of the Commission on Evidence-Based Policy-
7 making recommendation for a government-wide data
8 linkage and access infrastructure for statistical ac-
9 tivities conducted for statistical purposes, as defined
10 in chapter 35 of title 44, United States Code.

11 (2) ESTABLISHMENT.—Not later than one year
12 after the date of enactment of this Act, the Director
13 shall establish a National Secure Data Service dem-
14 onstration project. The National Secure Data Serv-
15 ice demonstration project shall be—

16 (A) aligned with the principles, best prac-
17 tices, and priority actions recommended by the
18 Advisory Committee on Data for Evidence
19 Building, to the extent feasible; and

1 (B) operated directly by or via a contract
2 that is managed by the National Center for
3 Science and Engineering Statistics.
4 (3) DATA.—In carrying out this subsection, the
5 Director shall engage with Federal and State agen-
6 cies to collect, acquire, analyze, report, and dissemi-
7 nate statistical data in the United States and other
8 nations to support governmentwide evidence-building
9 activities consistent with the Foundations for Evi-
10 dence-Based Policymaking Act of 2018.
11 (4) PRIVACY AND CONFIDENTIALITY PROTEC-
12 TIONS.—If the Director issues a management con-
13 tract under paragraph (2), the awardee shall be des-
14 ignated as an "agent" under chapter 35 of title 44,
15 United States Code, subchapter III, section 3561 et
16 seq., with all requirements and obligations for pro-
17 tecting confidential information delineated in the
18 Confidential Information Protection and Statistical
19 Efficiency Act of 2018 and the Privacy Act of 1974.
20 (5) TECHNOLOGY.—In carrying out this sub-
21 section, the Director shall consider application and
22 use of systems and technologies that incorporate
23 protection measures to reasonably ensure confiden-
24 tial data and statistical products are protected in ac-
25 cordance with obligations under chapter 35 of title

1 44, United States Code, subchapter III, section
2 3561 et seq., including systems and technologies
3 that ensure raw data and other sensitive inputs are
4 not accessible to recipients of statistical outputs
5 from the National Secure Data Service demonstra-
6 tion project.
7 (6) TRANSPARENCY.—The National Secure
8 Data Service established under paragraph (2) shall
9 maintain a public website with up-to-date informa-
10 tion on supported projects.
11 (7) REPORT.—Not later than 2 years after the
12 date of enactment of this Act, the National Secure
13 Data Service demonstration project established
14 under paragraph (2) shall submit a report to Con-
15 gress that includes—
16 (A) a description of policies for protecting
17 data, consistent with applicable federal law;
18 (B) a comprehensive description of all
19 completed or active data linkage activities and
20 projects;
21 (C) an assessment of the effectiveness of
22 the demonstration project for mitigating risks
23 and removing barriers to a sustained implemen-
24 tation of the National Secure Data Service as

1 recommended by the Commission on Evidence-
2 Based Policymaking; and
3 (D) if deemed effective by the Director, a
4 plan for scaling up the demonstration project to
5 facilitate data access for evidence building while
6 ensuring transparency and privacy.
7 (8) AUTHORIZATION OF APPROPRIATIONS.—
8 There are authorized to be appropriated to the Di-
9 rector to carry out this subsection $9,000,000 for
10 each of fiscal years 2022 through 2026.

Chairwoman STEVENS. And I will ask unanimous consent to dispense with the reading. Without objection, so ordered. The Chair now recognizes the gentleman for 5 minutes to explain the amendment.

Mr. BEYER. Thank you again, Madam Chairwoman. So I'm offering this amendment to the *NSF for the Future Act*, which I introduced as a standalone bill yesterday, anticipating this wonderful markup today. And this amendment would establish a national secure data service demonstration project within the National Science Foundation.

As you all know, there's a critical lack of coordination across the Federal Government's data infrastructure and statistical system. This comes up in meeting after meeting, and this hinders researchers as they seek to link together data collected—surveys, program administration, and especially non-governmental data sources, and therefore it limits out ability as policymakers to make evidence-based decisions. So—I didn't come up with this by myself. This is based on recommendations from the 2017 Commission On Evidence-Based Policymaking report, which actually recommended the establishment of a national secure data service. So this service is going to begin as a demonstration project, so it'll facilitate access to data for qualified researchers, but it will also ensure privacy and transparency for the data services activities.

So the national data service demonstration project will test and refine models on how to implement and scale up the service in the future. We all know that one of the central challenges, central opportunities, to our place in history is we have more data, more information, than ever before—increases at an exponential rate. Organizing it, trying to see the patterns, trying to find meaning out of it, things that can actually help us make good decisions, that's the really hard work ahead, and this national secure data service is an important step forward. So I urge my colleagues to support my amendment, and I look forward to passing this crucial legislation out of the Subcommittee. With that, Madam Chair, I yield back.

Chairwoman STEVENS. Is there further discussion on this amendment at this time? The Chair would like to recognize herself, and applaud Mr. Beyer for this good amendment, that became an amendment from his original bill, but his amendment does address the top recommendation from the Commission for Evidence-Based Policymaking to modernize our Federal data infrastructure by establishing a national secure data service. Such a service would link data from across the Federal Government and make it accessible to researchers to help us get answers to critically important questions and inform government decisionmaking.

While full scale data service will take some time to stand up, this amendment directs the NSF to buy down risk by supporting a demonstration project perfectly and neatly in their wheelhouse to test various models and technology for linking, analyzing, and projecting data. Again, the access to data in this age of COVID–19 could not be more essential, and is something that comes up time and time again, so I join my colleague Mr. Beyer in urging colleagues to support this amendment.

And if there is no further discussion, the vote will occur on the amendment. All in favor will say aye. Those opposed will say no. The ayes have it, the amendment is agreed to. And I just loudly banged the mouse.

We have reached the last amendment on the roster. It is my amendment. The Clerk will report the amendment.

The CLERK. Amendment Number 12, amendment to H.R. 2225, offered by Ms. Stevens of——

[The amendment of Chairwoman Stevens follows:]

AMENDMENT TO H.R. 2225

OFFERED BY MS. STEVENS OF MICHIGAN

At the end add the following new section:

1 **SEC. 11. PLANNING AND CAPACITY BUILDING GRANTS.**

2 Section 602 of the American Innovation and Com-
3 petitiveness Act (42 U.S.C. 1862s–9) is amended—

4 (1) by redesignating subsection (e) as sub-
5 section (f); and

6 (2) by inserting after subsection (d), the fol-
7 lowing:

8 "(e) PLANNING AND CAPACITY BUILDING GRANTS.—

9 "(1) IN GENERAL.—Under the program estab-
10 lished in section 508 of the America COMPETES
11 Reauthorization Act of 2010 (42 U.S.C. 1862p–2)
12 and the activities authorized under this section, the
13 Director shall award grants to eligible entities for
14 planning and capacity building at institutions of
15 higher education.

16 "(2) ELIGIBLE ENTITY DEFINED.—In this sub-
17 section, the term 'eligible entity' means an institu-
18 tion of higher education (or a consortium of such in-
19 stitutions) that, according to the data published by
20 the National Center for Science and Engineering

1 Statistics, is not, on average, among the top 100 in-
2 stitutions in Federal R&D expenditures during the 3
3 year period prior to the year of the award.
4 "(3) USE OF FUNDS.—In addition to activities
5 listed under subsection (c), an eligible entity receiv-
6 ing a grant under this subsection may use funds
7 to—
8 "(A) ensure the availability of staff, includ-
9 ing technology transfer professionals, entre-
10 preneurs in residence, and other mentors as re-
11 quired to accomplish the purpose of this sub-
12 section;
13 "(B) revise institution policies, including
14 policies related to intellectual property and fac-
15 ulty entrepreneurship, and taking other nec-
16 essary steps to implement relevant best prac-
17 tices for academic technology transfer;
18 "(C) develop new local and regional part-
19 nerships among institutions of higher education
20 and between institutions of higher education
21 and private sector entities and other relevant
22 organizations with the purpose of building net-
23 works, expertise, and other capacity to identify
24 promising research that may have potential
25 market value and enable researchers to pursue

1 further development and transfer of their ideas
2 into possible commercial or other use;
3 "(D) develop seminars, courses, and other
4 educational opportunities for students, post-doc-
5 toral researchers, faculty, and other relevant
6 staff at institutions of higher education to in-
7 crease awareness and understanding of entre-
8 preneurship, patenting, business planning, and
9 other areas relevant to technology transfer, and
10 connect students and researchers to relevant re-
11 sources, including mentors in the private sector;
12 and
13 "(E) create and fund competitions to allow
14 entrepreneurial students and faculty to illus-
15 trate the commercialization potential of their
16 ideas.
17 "(4) MINIMUM DURATION AND SIZE OF
18 AWARD.—Grants awarded under this subsection
19 shall be at least 3 years in duration and $500,000
20 in total amount.
21 "(5) APPLICATION.—An eligible entity seeking
22 funding under this subsection shall submit an appli-
23 cation to the Director of the Foundation at such
24 time, in such manner, and containing such informa-
25 tion and assurances as such Director may require.

1 The application shall include, at a minimum, a de-
2 scription of how the eligible entity submitting an ap-
3 plication plans to sustain the proposed activities be-
4 yond the duration of the grant.

5 "(6) AUTHORIZATION OF APPROPRIATIONS.—
6 From within funds authorized under section 9, there
7 are authorized to carry out the activities under this
8 subsection $40 million for each of fiscal years 2022
9 through 2026.".

Chairwoman STEVENS. All right, I'll ask unanimous consent to dispense with the record—with the reading, and, without objection, so ordered. I will recognize—the Chair will recognize herself for 5 minutes to discuss the—an amendment that supports technology transfer capacity building at smaller research institutions.

And I have some very nice comments prepared which I would like to share with all of you, but I'd like to begin with just a brief recognition around what is taking place in the Chamber that we serve in, and the bicameral Chamber on the other side of the Capitol, as we see this other bill moving forward, the *Endless Frontier Act*. And as we today are here marking up the *NSF for the Future Act*, our responsibility to the National Science Foundation, we can certainly recognize that there are similarities between the *Endless Frontier Act* and the *NSF for the Future Act*. They are not the same bill, but there are certainly similarities, and there is also a joint desire in each bill to advance American research, do so in a bipartisan way, address our innovation needs, and be able to compete.

The giant of China, and the Chinese Communist approach does not terrify me because I know, time and time again, our approach, which is the harnessing of public/private partnerships, of freedom, and of free markets in the United States, which compel innovation, compel competitiveness, will continue to win out. Now, do we need to be effective stewards of the taxpayer dollars? Absolutely. Do we need to continue to think through and make determinative decisions around how we are going to compete and invest in American scientific research? Absolutely. Are we engaging our colleagues across the spectrum? Of course. Are we doing the work here on the Science Committee, in the Subcommittee of Research and Technology, under the great leadership of Chair Johnson and Ranking Member Lucas? Absolutely.

So today's amendment, my amendment, is going to take the National Science Foundation, and—or part of the National Science Foundation that is invested in translational research into commercial use. So Congress first authorized the Partnerships For Innovation, or the PFI Program, in the 2010 *Competes Act*, and it provided additional guidance in the *American Innovation and Competitiveness Act*. A primary goal of this program is to accelerate commercialization of research results and partnerships with the private sector, support for prototyping, which we know is so important in manufacturing, and the entrepreneurial education and engagement of faculty and students.

The challenge for small universities to do good research is that they need to have the capacity to build capacity, meaning they must demonstrate in their proposal that they already have enough support and infrastructure at their institution to successfully move results out of the lab and into the private sector. As a result, this program, like so many others at NSF, tends to favor larger institutions that already have some technology transfer infrastructure. I see this in my own district, whereas Oakland University may not be MIT (Massachusetts Institute of Technology) or Stanford, but they have brilliant faculty, including recipients of the very prestigious NSF Career Award, but it only takes 6.3 million in Federal R&D funding annually. There are other provisions in the under-

lying bill, our bill, that address our need to build capacity at diverse institutions across our Nation.

We will continue, and we must continue, to tap into the talent across this Nation, this has been a theme of our amendments here today, and not leave out good ideas. And so we're not going to do that without providing extras support to build capacity at smaller institutions so that they can become more competitive, which is what my amendment absolutely does, to assist, and to help with the technology transfer capacity at what other provisions would do in the research and STEM educational capacity of the NSF bill. So, with that, I would like to encourage colleagues to support this amendment that does drawn down from one good idea in the *Endless Frontiers Act*, but is quite complementary to what we are doing in the *NSF for the Futures* reauthorization and act.

And I would like to now yield back, and recognize any other Member for discussion on this amendment.

Mr. WALTZ. Madam Chair?

Chairwoman STEVENS. Ranking Member Waltz?

Mr. WALTZ. Madam Chair, I support your amendment, and I commend you for your work on improving technology transfer from universities to the private sector. To compete globally, we need—we must support inventions wherever they occur in the United States, and while large universities have vastly improved their technology transfer and commercialization activities over the last decade, many smaller universities and institutions still do not have the expertise or capacity to effectively move discoveries from the lab to the market. This amendment will help emerging research institutions, like those in my own district, build capacity and gain that expertise. These institutions will then have the tools they need to sustain these activities after the period of the grant.

There is more work to be done to improve government technology transfer beyond just NSF, as well as the protection of that IP, and I look forward to working with the Chair to address these issues. I urge my colleagues to support the amendment, and I yield back.

Chairwoman STEVENS. Thank you, Mr. Waltz. And if there's no further discussion at this time, the Chair would also just like to cede back 30 seconds of time to also emphasize how significant your endorsement is to me, and to this Committee, and you gave a very nice overview of this amendment. And I'd also just like to just emphasize that the amendment is also going to allow for a consortia of institutions to apply for NSF awards. So, for example, as I mentioned, Oakland University, they might be able to maximize their impact by pulling together a consortium of small Midwestern institutions to pool their expertise and resources, which further enables our capabilities.

So, with that, the Chair's going to yield back to—if there's no further discussion, the vote will occur on the amendment. All in favor will say aye. Those opposed will say no. The ayes have it, the amendment is agreed to.

Are there any other amendments? If not, a recording—a reporting quorum being present, I move that the Research and Technology Subcommittee of the Committee on Science, Space, and Technology report H.R. 225, as amended, to the Full Committee, with the recommendation that the bill be approved. Those in favor

of the motion will signify by saying aye. Opposed, no. The ayes have it, and the bill is favorably reported.

Without objection, the motion to reconsider is laid upon the table. I ask unanimous consent that staff be authorized to make any necessary technical and conforming changes to the bill. Without objection, so ordered. Members will have two subsequent calendar days in which to submit supplemental, minority, or additional views on the measure. I want to thank Members for their attendance and their involvement in today's markup. This concludes our Subcommittee markup.

[Whereupon, at 11:38 a.m., the Subcommittee was adjourned.]

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XXI. PROCEEDINGS OF THE FULL COMMITTEE MARKUP

MARKUPS: H.R. 2225, NATIONAL SCIENCE FOUNDATION FOR THE FUTURE ACT H.R. 3593, DEPARTMENT OF ENERGY SCIENCE FOR THE FUTURE ACT

MARKUPS

BEFORE THE

COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY HOUSE OF REPRESENTATIVES

ONE HUNDRED SEVENTEENTH CONGRESS

FIRST SESSION

JUNE 15, 2021

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MARKUPS: H.R. 2225, NATIONAL SCIENCE FOUNDATION FOR THE FUTURE ACT
H.R. 3593, DEPARTMENT OF ENERGY SCIENCE FOR THE FUTURE ACT

COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY

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C O N T E N T S

June 15, 2021

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MARKUP ON H.R. 2225, NATIONAL SCIENCE FOUNDATION FOR THE FUTURE ACT

MARKUP ON H.R. 3593, DEPARTMENT OF ENERGY SCIENCE FOR THE FUTURE ACT

TUESDAY, JUNE 15, 2021

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY,
Washington, D.C.

The Committee met, pursuant to notice, at 10:05 a.m., via Zoom, Hon. Eddie Bernice Johnson [Chairwoman of the Committee] presiding.

Chairwoman JOHNSON. Good morning. The Committee will come to order. Without objection, the Chair is authorized to declare recess at any time. Pursuant to Committee rule 2(e) and House rule XI, the Committee announces that she may postpone rollcall votes.

Pursuant to *House Resolution 8*, today, the Committee is meeting virtually. I want to announce a couple of reminders to the Members about the conduct of this remote meeting. First, Members should keep their video feed on as long as they are present in the meeting. Members are responsible for their own microphones. And please also keep your microphones muted unless you are speaking. Finally, if Members have documents they wish to submit to the record, please email them to Committee Clerk, whose email address was circulated prior to the meeting.

Pursuant to the Committee—to the—pursuant to notice, the Committee meets to consider the following measures: H.R. 2225, the *National Science Foundation for the Future Act*; and H.R. 3593, the *Department of Energy Sciences for the Future Act*.

Good morning and welcome to today's markup of H.R. 2225, the *National Science Foundation for the Future Act*; and H.R. 3593, the *Department of Energy Science for the Future Act*.

America has always been a driving force for innovation, and that innovation has been the most important engine of our economic growth for at least 100 years. However, our international competitors have taken note of our success, and those competitors are making huge bets on science and technology (S&T) investments in the hopes that they will see the same fruits of innovation that we have seen. If we are to remain the world's leader in science and technology, we need to act now. But we shouldn't act rashly. Instead of trying to copy the efforts of our emerging competitors, we should be doubling down on the proven innovation engines we have

at the National Science Foundation (NSF) and the Department of Energy (DOE).

The bills before us today do just that. The race to be the best at science and technology is a race to have good high-paying jobs. And I want to be clear. I'm not just talking about scientists and computer programmers. I'm also talking about the electricians and pipefitters who help to build our research and computing centers. And I'm talking about the technicians and custodial staff that help maintain these facilities. I'm talking about the factory workers manufacturing the next generation of green technologies right here in America. That's what is at stake when we consider these bills today.

The first bill we will be considering today is *NSF for the Future Act*. It is the first comprehensive reauthorization of NSF in more than 10 years. The legislation puts NSF on a sustainable 5-year doubling path. It strategically builds an NSF existing—on NSF existing strengths while also pushing the agency in bold new directions. It represents a significant step forward in building more regional and institutional diversity in our academic research enterprise, and it addresses our STEM (science, technology, engineering, and mathematics) pipeline at all levels.

I am very proud of where this bill is today. It includes many good ideas from Members on both sides of the aisle. It also reflects input from the most diverse group of stakeholders this Committee has ever consulted. We have dozens of letters of support from organizations representing all fields of science and engineering. Thousands of individual scientists have publicly voiced their support. Countless thought leaders, universities, and former government leaders have told us how much they support this bill. This is reflected in the strongly worded endorsements we have received from groups like the Association of American Universities and the American Chemical Society.

We will also consider the *DOE Science for the Future Act*. The Department of Energy's Office of Science is the Nation's premier Federal agency that supports research in the physical sciences for energy applications. And the bill we are considering today will ensure that the Office of Science remains the world leader in these pursuits for years to come.

Consideration of this bill could not come at a more critical juncture as the world forges a clean energy future so that America can reap the rewards of that transition. This bipartisan bill would be the first comprehensive authorization for this crucial office that supports over half of DOE's non-defense R&D (research and development) budget. H.R. 3593 authorizes significant, steady, and sustainable growth for the Office of Science. The bill ensures that the office's construction projects and upgrades to its user facilities have the resources they need to be completed on time and on budget. That's why the bill has been endorsed by stakeholders in the business community like the U.S. Chamber of Commerce, the academic community like the University of Texas, and the scientific community like the American Physical Society.

Without objection, I will place into the record the full list of endorsing organizations for both bills.

[The information referred to follows:]

********** COMMITTEE INSERT **********

Chairwoman JOHNSON. The bills before us today are the result of a collaborative bipartisan approach.

Before I yield back, I want to recognize the efforts of Ranking Member Lucas and his staff in helping us to get where we are today. I feel strongly that the legislation we are considering today represents the best of this Committee, and it would not have been possible without the strong collaboration by Ranking Member Lucas. I look forward to a productive markup and to getting these bills to the floor so we can send them to the Senate.

[The prepared statement of Chairwoman Johnson follows:]

Good morning, and welcome to today's markup of H.R. 2225, the *National Science Foundation for the Future Act* and HR 3593, the *Department of Energy Science for the Future Act*.

America has always been a driving force of innovation. And that innovation has been the most important engine of our economic growth for at least the past 100 years. However, our international competitors have taken note of our success. And those competitors are making huge bets on science and technology investments in the hopes that they will see the same fruits of innovation that we have seen. If we are to remain the world leader in science and technology, we need to act now.

But we shouldn't act rashly. Instead of trying to copy the efforts of our emerging competitors, we should be doubling down on the proven innovation engines we have at the National Science Foundation and the Department of Energy. The bills before us today do just that.

The race to be the best at science and technology is a race to have good high-paying jobs. And I want to be clear—I'm not just talking about scientists and computer programmers. I'm also talking about the electricians and pipefitters who help to build our research and computing centers. I'm talking about the technicians and custodial staff that help maintain these facilities. I'm talking about the factory workers manufacturing the next generation of green technologies right here in America. That's what is at stake when we consider these bills today.

The first bill we will be considering today is the *NSF for the Future Act*. It is the first comprehensive reauthorization of NSF in more than 10 years. This legislation puts NSF on a sustainable, 5-year doubling path. It strategically builds on NSF's existing strengths, while also pushing the agency in bold new directions. It represents a significant step forward in building more regional and institutional diversity in our academic research enterprise. And it addresses our STEM pipeline at all levels.

I am very proud of where this bill is today. It includes many good ideas from Members on both sides of the aisle. It also reflects input from the most diverse group of stakeholders this Committee has ever consulted. We have dozens of letters of support from organizations representing all fields of science and engineering. Thousands of individual scientists have publicly voiced their support. Countless thought leaders, universities, and former government leaders have told us how much they support this bill. This is reflected in the strongly worded endorsements we have received from groups like the Association of American Universities and the American Chemical Society.

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The bills before us today are the result of a collaborative bipartisan approach. Before I yield back, I want to recognize the efforts of Ranking Member Lucas and his

staff in helping us to get to where we are today. I feel strongly that the legislation we are considering today represents the best of this Committee, and it would not have been possible without the strong collaboration by Ranking Member Lucas.

I look forward to a productive markup, and to getting these bills to the floor so we can send them to the Senate.

Chairwoman JOHNSON. I now recognize our Ranking Member Mr. Lucas for his opening remarks.

Mr. LUCAS. Thank you, Chairwoman Johnson, for holding today's markup of the *NSF for the Future Act* and the *DOE Science for the Future Act*. These comprehensive reauthorization bills of the National Science Foundation and the Department of Energy Office of Science are the accumulation of years of work by this Committee to consider the best path forward for two of the most important pieces of America's Federal research enterprise.

America's scientific and technological competitiveness has been our highest priority. I should say ours and my highest priority as Ranking Member of this Committee. It's gratifying to see the amount of momentum on both sides of the aisle in the House and the Senate for legislation to secure our global scientific and technological leadership.

The need to act now to redouble our research investment is best captured by two data points. First, as much as 85 percent of America's long-term economic growth is due to advances in science and technology. There's a direct connection between investment in research and development and job growth here at home.

Second, China increased public R&D by 56 percent between 2011 and 2016, but the U.S. investment in the same period fell by 12 percent in absolute terms. China has likely surpassed the United States in total R&D spending and though—through both investment and theft is working to overtake us as the global leader in science and technology. Our international competitiveness is at stake.

America's continued scientific leadership requires comprehensive and strategic approach to research and development that provides long-term increased investment and stability across the research ecosystem. It also requires interagency collaboration and public-private partnerships. And it must focus on evolving technologies that are crucial to our national and economic security like AI (artificial intelligence), semiconductors, quantum sciences.

I believe we have achieved that with these two bills. In the *NSF for the Future Act* we put a great deal of care into crafting a new directorate that provides NSF's ability—improves it might be the best way to describe their ability to advance fundamental research without duplicating or seeking to replace the missions of other Federal research agencies. Our proposed Directorate for Science and Engineering Solutions takes the basic research funded by NSF and helps supply those discoveries to solve national challenges from cybersecurity to climate change.

We also propose a funding profile for the new directorate that is practical, sustainable, and in balance with the rest of the Foundation. Although most of the public attention has been on the new directorate, our bill also provides updated policy direction to the rest of the Foundation. It has been 4 years since NSF received a comprehensive policy update and 11 years since the last reauthorization, so these provisions are important.

I will share a few highlights of the bill. NSF is the largest Federal funder of STEM education, and our bill directs new mechanisms to improve the Foundation's investment in STEM at all levels. The bill also includes provisions to improve the availability of research data to more rapidly advance innovation and to improve transparency and reproducibility of taxpayer-funded research. Additionally, the bill includes important measures to protect American research from foreign influence and theft. These policies were developed after months of input from stakeholders and bipartisan discussions. It's smart legislation, and I'll discuss some other provisions in the bill when we consider the bipartisan amendment in the nature of a substitute (ANS).

Next, we'll consider the *DOE Science for the Future Act*. This bill reauthorizes the Office of Science to increase our investment and provide a roadmap for DOE's research and development work. If it becomes law, it will be the first comprehensive authorization of the Office of Science, and it could not come at a better time. The bill provides nearly $50 billion over 5 years, giving the Office of Science and our national labs the resources they need to continue to excel. We need cutting-edge facilities for our Federal scientists and researchers from academia and industry to conduct big science, research that can't be done in individual labs and requires massive equipment that industry cannot provide like advanced light sources and neutron sources.

Our Nation's national laboratories, hosted by DOE's Office of Science, are experts in conducting this type of complex, large-scale research. Our bill authorizes funding timelines for DOE research facilities and equipment that will bring them online as quickly as possible and at the lowest possible project cost. I'll discuss more provisions of this bill when we consider the bipartisan amendment in the nature of a substitute.

Chairwoman Johnson and I have taken a deliberative and bipartisan approach to revitalizing American research. Together, the *NSF for the Future Act* and the *DOE Science for the Future Act* are a sustainable strategy for American progress. It comprehensively scales up our research enterprise. Today, we'll consider many amendments that I think will improve these bills. I hope that through the process we can maintain the bipartisan spirit that created these two groundbreaking pieces of legislation.

Thank you, Chairwoman, for your partnership in this process. Your leadership should serve as a model for all of how the Committee legislative process should work, and I say that with the greatest of sincerity.

And I yield back the balance of my time. Thank you, Madam Chair.

[The prepared statement of Mr. Lucas follows:]

Thank you, Chairwoman Johnson, for holding today's markup of the *NSF for the Future Act* and the *DOE Science for the Future Act*. These comprehensive reauthorization bills of the National Science Foundation and the Department of Energy Office of Science are the culmination of years of work by this Committee to consider the best path forward for two of the most important pieces of America's federal research enterprise.

America's scientific and technological competitiveness has been my highest priority as Ranking Member of this Committee. It's gratifying to see that there is now momentum on both sides of the aisle in the House and Senate for legislation to secure our global science and technology leadership.

The need to act now to redouble our research investment is best captured by two data points. First, as much as 85% of America's long-term economic growth is due to advances in science and technology. There's a direct connection between investment in research and development and job growth here at home. Second, China increased public R&D by 56% between 2011 and 2016, but U.S. investment in the same period fell by 12% in absolute terms. China has likely surpassed the U.S. in total R&D spending and-through both investment and theft-is working to overtake us as the global leader in science and technology. Our international competitiveness is at stake.

America's continued scientific leadership requires a comprehensive and strategic approach to research and development that provides long-term increased investment and stability across the research ecosystem. It also requires inter-agency collaboration and public-private partnerships. And it must focus on evolving technologies that are crucial to our national and economic security, like AI, semiconductors, and quantum sciences. I believe we have achieved that with these two bills.

In the *NSF for the Future Act*, we put a great deal of care into crafting a new directorate that improves NSF's ability to advance fundamental research, without duplicating or seeking to replace the missions of other federal research agencies. Our proposed Directorate for Science and Engineering Solutions takes the basic research funded by NSF and helps apply those discoveries to solving national challenges from cybersecurity to climate change. We also propose a funding profile for the new directorate that is practical, sustainable, and in balance with the rest of the Foundation. Although most of the public attention has been on the new directorate, our bill also provides updated policy direction to the rest of the Foundation.

It has been four years since NSF received a comprehensive policy update, and 11 years since the last reauthorization, so these provisions are important. I will share a few highlights of the bill. NSF is the largest federal funder of STEM education, and our bill directs new mechanisms to improve the Foundation's investments in STEM at all levels.

The bill also includes provisions to improve the availability of research data, to more rapidly advance innovation, and to improve transparency and reproducibility of taxpayer funded research. Additionally, the bill includes important measures to protect American research from foreign influence and theft.

These policies were developed after months of input from stakeholders and bipartisan discussions. It's smart legislation, and I will discuss some other provisions in the bill when we consider the bipartisan Amendment in the Nature of a Substitute.

Next we will consider the *DOE Science for the Future Act*. The bill reauthorizes the Office of Science to increase our investments and provide a roadmap for DOE's research and development work. If it becomes law, it will be the first comprehensive authorization of the Office of Science, and it could not come at a better time.

The bill proposes nearly $50 billion over 5 years, giving the Office of Science and our National Labs the resources they need to continue to excel.

We need cutting-edge facilities for our federal scientists and researchers from academia and industry to conduct big science-research that can't be done in individual labs and requires massive equipment that industry cannot provide, like advanced light sources and neutron sources. Our Nation's National Laboratories, hosted by DOE's Office of Science, are experts in conducting this type of complex, large-scale research.

Our bill authorizes funding timelines for DOE research facilities and equipment that will bring them online as quickly as possible, at the lowest possible total project cost.

I will discuss more provisions of this bill when we consider the bipartisan Amendment in the Nature of a Substitute.

Chairwoman Johnson and I have taken a deliberative and bipartisan approach to revitalizing American research. Together, the *NSF for the Future Act* and the *DOE Science for the Future Act* together are a sustainable strategy for American progress that comprehensively scales up our research enterprise.

Today we will consider many amendments that I think will improve these bills. I hope through the process we can maintain the bipartisan spirit that created these two groundbreaking pieces of legislation.

Thank you, Chairwoman, for your partnership in this

Chairwoman JOHNSON. OK. Thank you very much, Mr. Lucas.

We will now consider H.R. 2225, the *National Science Foundation for the Future Act*. And the Clerk will report the bill.

The CLERK. H.R. 2225, the *National Science Foundation for the Future Act*.

[The bill follows:]

COMMITTEE PRINT

[Showing the text of H.R. 2225 as forwarded by the Subcommittee on Research and Technology on May 13, 2021]

1 **SECTION 1. SHORT TITLE.**

2 This Act may be cited as the "National Science
3 Foundation for the Future Act".

4 **SEC. 2. FINDINGS.**

5 Congress finds the following:

6 (1) Over the past seven decades, the National
7 Science Foundation has played a critical role in ad-
8 vancing the United States academic research enter-
9 prise by supporting fundamental research and edu-
10 cation across science and engineering disciplines.

11 (2) Discoveries enabled by sustained investment
12 in fundamental research and the education of the
13 United States science and engineering workforce
14 have led to transformational innovations and
15 spawned new industries.

16 (3) While the traditional approach to invest-
17 ment in research has delivered myriad benefits to so-
18 ciety, a concerted effort is needed to ensure the ben-
19 efits of federally funded science and engineering are
20 enjoyed by all Americans.

(4) As countries around the world increase investments in research and STEM education, United States global leadership in science and engineering is eroding, posing significant risks to economic competitiveness, national security, and public well-being.

(5) To address major societal challenges and sustain United States leadership in innovation, the Federal Government must increase investments in research, broaden participation in the STEM workforce, and bolster collaborations among universities, National Laboratories, companies, non-profit funders of research, local policymakers, civil societies and stakeholder communities, and international partners.

SEC. 3. DEFINITIONS.

In this Act:

(1) ACADEMIES.—The term "Academies" means the National Academies of Sciences, Engineering, and Medicine.

(2) AWARDEE.—The term "awardee" means the legal entity to which Federal assistance is awarded and that is accountable to the Federal Government for the use of the funds provided.

(3) BOARD.—The term "Board" means the National Science Board.

1 (4) DIRECTOR.—The term "Director" means
2 the Director of the National Science Foundation.
3 (5) EMERGING RESEARCH INSTITUTION.—The
4 term "emerging research institution" means an in-
5 stitution of higher education with an established un-
6 dergraduate student program that has, on average
7 for 3 years prior to the time of application for an
8 award, received less than $35,000,000 in Federal re-
9 search funding.
10 (6) FEDERAL SCIENCE AGENCY.—The term
11 "Federal science agency" means any Federal agency
12 with an annual extramural research expenditure of
13 over $100,000,000.
14 (7) FOUNDATION.—The term "Foundation"
15 means the National Science Foundation.
16 (8) INSTITUTION OF HIGHER EDUCATION.—The
17 term "institution of higher education" has the
18 meaning given the term in section 101(a) of the
19 Higher Education Act of 1965 (20 U.S.C. 1001(a)).
20 (9) NON-PROFIT ORGANIZATION.—The term
21 "non-profit organization" means an organization
22 which is described in section 501(c)(3) of the Inter-
23 nal Revenue Code of 1986 and exempt from tax
24 under section 501(a) of such code.

1 (10) NSF INCLUDES.—The term "NSF in-
2 cludes" means the initiative carried out under sec-
3 tion 6(c).
4 (11) PREK-12.—The term "preK-12" means
5 pre-kindergarten through grade 12.
6 (12) SKILLED TECHNICAL WORK.—The term
7 "skilled technical work" means an occupation that
8 requires a high level of knowledge in a technical do-
9 main and does not require a bachelor's degree for
10 entry.
11 (13) STEM.—The term "STEM" has the
12 meaning given the term in section 2 of the America
13 COMPETES Reauthorization Act of 2010 (42
14 U.S.C. 6621 note).

15 **SEC. 4. AUTHORIZATION OF APPROPRIATIONS.**

16 (a) FISCAL YEAR 2022.—
17 (1) IN GENERAL.—There are authorized to be
18 appropriated to the Foundation $11,469,200,000 for
19 fiscal year 2022.
20 (2) SPECIFIC ALLOCATIONS.—Of the amount
21 authorized under paragraph (1)—
22 (A) $9,444,100,000 shall be made avail-
23 able to carry out research and related activities,
24 of which—

(i) $208,150,000 shall be for the Graduate Research Fellowship Program;

(ii) $55,000,000 shall be for the Mid-Scale Research Infrastructure Program; and

(iii) $1,000,000,000 shall be for the Directorate for Science and Engineering Solutions;

(B) $1,333,860,000 shall be made available for education and human resources, of which—

(i) $73,700,000 shall be for the Robert Noyce Teacher Scholarship Program;

(ii) $59,500,000 shall be for the NSF Research Traineeship Program;

(iii) $208,150,000 shall be for the Graduate Research Fellowship Program; and

(iv) $66,000,000 shall be for the Cybercorps Scholarship for Service Program;

(C) $190,000,000 shall be made available for major research equipment and facilities construction, of which $65,000,000 shall be for the Mid-Scale Research Infrastructure Program;

1 (D) $473,500,000 shall be made available
2 for agency operations and award management;
3 (E) $4,620,000 shall be made available for
4 the Office of the National Science Board; and
5 (F) $23,120,000 shall be made available
6 for the Office of the Inspector General.
7 (b) FISCAL YEAR 2023.—
8 (1) IN GENERAL.—There are authorized to be
9 appropriated to the Foundation $12,668,000,000 for
10 fiscal year 2023.
11 (2) SPECIFIC ALLOCATIONS.—Of the amount
12 authorized under paragraph (1)—
13 (A) $10,367,460,000 shall be made avail-
14 able to carry out research and related activities,
15 of which—
16 (i) $227,070,000 shall be for the
17 Graduate Research Fellowship Program;
18 (ii) $60,000,000 shall be for the Mid-
19 Scale Research Infrastructure Program;
20 and
21 (iii) $1,500,000,000 shall be for the
22 Directorate for Science and Engineering
23 Solutions;

1 (B) $1,391,320,000 shall be made avail-
2 able for education and human resources, of
3 which—
4 (i) $80,400,000 shall be for the Rob-
5 ert Noyce Teacher Scholarship Program;
6 (ii) $64,910,000 shall be for the NSF
7 Research Traineeship Program;
8 (iii) $227,070,000 shall be for the
9 Graduate Research Fellowship Program;
10 and
11 (iv) $72,000,000 shall be for the
12 Cybercorps Scholarship for Service Pro-
13 gram;
14 (C) $355,000,000 shall be made available
15 for major research equipment and facilities con-
16 struction, of which $75,000,000 shall be for the
17 Mid-Scale Research Infrastructure Program;
18 (D) $522,940,000 shall be made available
19 for agency operations and award management;
20 (E) $4,660,000 shall be made available for
21 the Office of the National Science Board; and
22 (F) $26,610,000 shall be made available
23 for the Office of the Inspector General.
24 (c) FISCAL YEAR 2024.—

1 (1) IN GENERAL.—There are authorized to be
2 appropriated to the Foundation $14,148,200,000 for
3 fiscal year 2024.
4 (2) SPECIFIC ALLOCATIONS.—Of the amount
5 authorized under paragraph (1)—
6 (A) $11,702,420,000 shall be made avail-
7 able to carry out research and related activities,
8 of which—
9 (i) $245,990,000 shall be for the
10 Graduate Research Fellowship Program;
11 (ii) $70,000,000 shall be for the Mid-
12 Scale Research Infrastructure Program;
13 and
14 (iii) $2,250,000,000 shall be for the
15 Directorate for Science and Engineering
16 Solutions;
17 (B) $1,457,590,000 shall be made avail-
18 able for education and human resources, of
19 which—
20 (i) $87,100,000 shall be for the Rob-
21 ert Noyce Teacher Scholarship Program;
22 (ii) $70,320,000 shall be for the NSF
23 Research Traineeship Program;

(iii) $245,990,000 shall be for the Graduate Research Fellowship Program; and

(iv) $78,000,000 shall be for the Cybercorps Scholarship for Service Program;

(C) $370,000,000 shall be made available for major research equipment and facilities construction, of which $85,000,000 shall be for the Mid-Scale Research Infrastructure Program;

(D) $582,380,000 shall be made available for agency operations and award management;

(E) $4,700,000 shall be made available for the Office of the National Science Board; and

(F) $31,110,000 shall be made available for the Office of the Inspector General.

(d) FISCAL YEAR 2025.—

(1) IN GENERAL.—There are authorized to be appropriated to the Foundation $16,036,900,000 for fiscal year 2025.

(2) SPECIFIC ALLOCATIONS.—Of the amount authorized under paragraph (1)—

(A) $13,440,840,000 shall be made available to carry out research and related activities, of which—

1 (i) $264,920,000 shall be for the
2 Graduate Research Fellowship Program;
3 (ii) $75,000,000 shall be for the Mid-
4 Scale Research Infrastructure Program;
5 and
6 (iii) $3,375,000,000 shall be for the
7 Directorate for Science and Engineering
8 Solutions;
9 (B) $1,522,890,000 shall be made avail-
10 able for education and human resources, of
11 which—
12 (i) $93,800,000 shall be for the Rob-
13 ert Noyce Teacher Scholarship Program;
14 (ii) $75,730,000 shall be for the NSF
15 Research Traineeship Program;
16 (iii) $264,920,000 shall be for the
17 Graduate Research Fellowship Program;
18 and
19 (iv) $84,000,000 shall be for the
20 Cybercorps Scholarship for Service Pro-
21 gram;
22 (C) $372,000,000 shall be made available
23 for major research equipment and facilities con-
24 struction, of which $90,000,000 shall be for the
25 Mid-Scale Research Infrastructure Program;

1 (D) $661,830,000 shall be made available
2 for agency operations and award management;
3 (E) $4,740,000 shall be made available for
4 the Office of the National Science Board; and
5 (F) $34,610,000 shall be made available
6 for the Office of the Inspector General.
7 (e) FISCAL YEAR 2026.—
8 (1) IN GENERAL.—There are authorized to be
9 appropriated to the Foundation $18,325,020,000 for
10 fiscal year 2026.
11 (2) SPECIFIC ALLOCATIONS.—Of the amount
12 authorized under paragraph (1)—
13 (A) $15,549,390,000 shall be made avail-
14 able to carry out research and related activities,
15 of which—
16 (i) $283,840,000 shall be for the
17 Graduate Research Fellowship Program;
18 (ii) $80,000,000 shall be for the Mid-
19 Scale Research Infrastructure Program;
20 and
21 (iii) $5,062,500,000 shall be for the
22 Directorate for Science and Engineering
23 Solutions;

1 (B) $1,601,470,000 shall be made avail-
2 able for education and human resources, of
3 which—
4 (i) $100,500,000 shall be for the Rob-
5 ert Noyce Teacher Scholarship Program;
6 (ii) $81,140,000 shall be for the NSF
7 Research Traineeship Program;
8 (iii) $283,840,000 shall be for the
9 Graduate Research Fellowship Program;
10 and
11 (iv) $90,000,000 shall be for the
12 Cybercorps Scholarship for Service Pro-
13 gram;
14 (C) $375,000,000 shall be made available
15 for major research equipment and facilities con-
16 struction, of which $100,000,000 shall be for
17 the Mid-Scale Research Infrastructure Pro-
18 gram;
19 (D) $756,270,000 shall be made available
20 for agency operations and award management;
21 (E) $4,780,000 shall be made available for
22 the Office of the National Science Board; and
23 (F) $38,110,000 shall be made available
24 for the Office of the Inspector General.

1 **SEC. 5. STEM EDUCATION.**

2 (a) PREK-12 STEM EDUCATION.—

3 (1) DECADAL SURVEY OF STEM EDUCATION RE-
4 SEARCH.—Not later than 45 days after the date of
5 enactment of this Act, the Director shall enter into
6 a contract with the Academies to review and assess
7 the status and opportunities for PreK–12 STEM
8 education research and make recommendations for
9 research priorities over the next decade.

10 (2) SCALING INNOVATIONS IN PREK-12 STEM
11 EDUCATION.—

12 (A) IN GENERAL.—The Director shall es-
13 tablish a program to award grants, on a com-
14 petitive basis, to institutions of higher edu-
15 cation or non-profit organizations (or consortia
16 of such institutions or organizations) to estab-
17 lish no fewer than 3 multidisciplinary Centers
18 for Tranformative Education Research and
19 Translation (in this section referred to as "Cen-
20 ters") to support research and development on
21 widespread and sustained implementation of
22 STEM education innovations.

23 (B) APPLICATION.—An institution of high-
24 er education or non-profit organization (or a
25 consortium of such institutions or organiza-
26 tions) seeking funding under subparagraph (A)

1 shall submit an application to the Director at
2 such time, in such manner, and containing such
3 information as the Director may require. The
4 application shall include, at a minimum, a de-
5 scription of how the proposed Center will—
6 (i) establish partnerships among aca-
7 demic institutions, local or State education
8 agencies, and other relevant stakeholders
9 in supporting programs and activities to
10 facilitate the widespread and sustained im-
11 plementation of promising, evidence-based
12 STEM education practices, models, pro-
13 grams, and technologies;
14 (ii) support enhanced STEM edu-
15 cation infrastructure, including
16 cyberlearning technologies, to facilitate the
17 widespread adoption of promising, evi-
18 dence-based practices;
19 (iii) support research and development
20 on scaling practices, partnerships, and al-
21 ternative models to current approaches, in-
22 cluding approaches sensitive to the unique
23 combinations of capabilities, resources, and
24 needs of varying localities, educators, and
25 learners;

1 (iv) include a focus on the learning
2 needs of under resourced schools and
3 learners in low-resource or underachieving
4 local education agencies in urban and rural
5 communities; and
6 (v) support research and development
7 on scaling practices and models to support
8 and sustain highly-qualified STEM edu-
9 cators in urban and rural communities.
10 (C) ADDITIONAL CONSIDERATIONS.—In
11 awarding a grant under this paragraph, the Di-
12 rector may also consider the extent to which the
13 proposed Center will—
14 (i) leverage existing collaborations,
15 tools, and strategies supported by the
16 Foundation, including NSF INCLUDES
17 and the Convergence Accelerators;
18 (ii) support research on and the devel-
19 opment and scaling of innovative ap-
20 proaches to distance learning and edu-
21 cation for various student populations;
22 (iii) support education innovations
23 that leverage new technologies or deepen
24 understanding of the impact of technology
25 on educational systems; and

1 (iv) include a commitment from local
2 or State education administrators to mak-
3 ing the proposed reforms and activities a
4 priority.
5 (D) PARTNERSHIP.—In carrying out the
6 program under subparagraph (A), the Director
7 shall explore opportunities to partner with the
8 Department of Education, including through
9 jointly funding activities under this paragraph.
10 (E) ANNUAL MEETING.—The Director
11 shall encourage and facilitate an annual meet-
12 ing of the Centers to foster collaboration among
13 the Centers and to further disseminate the re-
14 sults of the Centers' activities.
15 (F) REPORT.—Not later than 5 years after
16 the date of enactment of this Act, the Director
17 shall submit to Congress a report describing the
18 activities carried out pursuant to this para-
19 graph that includes—
20 (i) a description of the focus and pro-
21 posed goals of each Center; and
22 (ii) an assessment of the program's
23 success in helping to promote scalable solu-
24 tions in PreK-12 STEM education.

1 (3) NATIONAL ACADEMIES STUDY.—Not later
2 than 45 days after the date of enactment of this
3 Act, the Director shall enter into an agreement with
4 the Academies to conduct a study to—
5 (A) review the research literature and iden-
6 tify research gaps regarding the interconnected
7 factors that foster and hinder successful imple-
8 mentation of promising, evidence-based PreK-
9 12 STEM education innovations at the local,
10 regional, and national level;
11 (B) present a compendium of promising,
12 evidence-based PreK-12 STEM education prac-
13 tices, models, programs, and technologies;
14 (C) identify barriers to widespread and
15 sustained implementation of such innovations;
16 and
17 (D) make recommendations to the Founda-
18 tion, the Department of Education, the Na-
19 tional Science and Technology Council's Com-
20 mittee on Science, Technology, Engineering,
21 and Mathematics Education, State and local
22 educational agencies, and other relevant stake-
23 holders on measures to address such barriers.
24 (b) UNDERGRADUATE STEM EDUCATION.—

1 (1) RESEARCH ON STEM EDUCATION AND
2 WORKFORCE NEEDS.—The Director shall award
3 grants, on a competitive basis, to four-year institu-
4 tions of higher education or non-profit organizations
5 (or consortia of such institutions or organizations) to
6 support research and development activities to—
7 (A) encourage greater collaboration and
8 coordination between institutions of higher edu-
9 cation and industry to enhance education and
10 improve alignment with workforce needs;
11 (B) understand the current composition of
12 the STEM workforce and the factors that influ-
13 ence growth, retention, and development of that
14 workforce; and
15 (C) increase the size, diversity, capability,
16 and flexibility of the STEM workforce.
17 (2) ADVANCED TECHNOLOGICAL EDUCATION
18 PROGRAM UPDATE.—Section 3(b) of the Scientific
19 and Advanced Technology Act of 1992 (42 U.S.C.
20 1862i(b)) is amended to read as follows:
21 "(b) NATIONAL COORDINATION NETWORK FOR
22 SCIENCE AND TECHNICAL EDUCATION.—The Director
23 shall award grants to institutions of higher education,
24 non-profit organizations, and associate-degree granting
25 colleges (or consortia of such institutions or organizations)

1 to establish a network of centers for science and technical
2 education. The centers shall—
3 "(1) coordinate research, training, and edu-
4 cation activities funded by awards under subsection
5 (a) and share information and best practices across
6 the network of awardees;
7 "(2) serve as a national and regional clearing-
8 house and resource to communicate and coordinate
9 research, training, and educational activities across
10 disciplinary, organizational, geographic, and inter-
11 national boundaries and disseminate best practices;
12 and
13 "(3) develop national and regional partnerships
14 between PreK–12 schools, two-year colleges, institu-
15 tions of higher education, workforce development
16 programs, and industry to meet workforce needs.".
17 (3) INNOVATIONS IN STEM EDUCATION AT COM-
18 MUNITY COLLEGES.—
19 (A) IN GENERAL.—The Director shall
20 award grants on a merit-reviewed, competitive
21 basis to institutions of higher education or non-
22 profit organizations (or consortia of such insti-
23 tutions or organizations) to advance research on
24 the nature of learning and teaching at commu-
25 nity colleges and to improve outcomes for stu-

1 dents who enter the workforce upon completion
2 of their STEM degree or credential or transfer
3 to 4-year institutions, including by—
4 (i) examining how to scale up success-
5 ful programs at Community Colleges that
6 are improving student outcomes in
7 foundational STEM courses;
8 (ii) supporting research on effective
9 STEM teaching practices in community
10 college settings;
11 (iii) designing and developing new
12 STEM curricula;
13 (iv) providing STEM students with
14 hands-on training and research experi-
15 ences, internships, and other experiential
16 learning opportunities;
17 (v) increasing access to high quality
18 STEM education through new tech-
19 nologies;
20 (vi) re-skilling or up-skilling incum-
21 bent workers for new STEM jobs;
22 (vii) building STEM career and seam-
23 less transfer pathways; and
24 (viii) developing novel mechanisms to
25 identify and recruit talent into STEM pro-

1 grams, in particular talent from groups
2 historically underrepresented in STEM.
3 (B) PARTNERSHIPS.—In carrying out ac-
4 tivities under this paragraph, the Director shall
5 encourage applications to develop, enhance, or
6 expand cooperative STEM education and train-
7 ing partnerships between institutions of higher
8 education, industry, and labor organizations.
9 (c) GRADUATE STEM EDUCATION.—
10 (1) MENTORING AND PROFESSIONAL DEVELOP-
11 MENT.—
12 (A) MENTORING PLANS.—
13 (i) UPDATE.—Section 7008 of the
14 America Creating Opportunities to Mean-
15 ingfully Promote Excellence in Technology,
16 Education, and Science Act (42 U.S.C.
17 1862o) is amended by—
18 (I) inserting "and graduate stu-
19 dent" after "postdoctoral"; and
20 (II) inserting "The requirement
21 may be satisfied by providing such in-
22 dividuals with access to mentors, in-
23 cluding individuals not listed on the
24 grant." after "review criterion.".

1 (ii) EVALUATION.—Not later than 45
2 days after the date of enactment of this
3 Act, the Director shall enter into an agree-
4 ment with a qualified independent organi-
5 zation to evaluate the effectiveness of the
6 postdoctoral mentoring plan requirement
7 for improving mentoring for Foundation-
8 supported postdoctoral researchers.
9 (B) CAREER EXPLORATION.—
10 (i) IN GENERAL.—The Director shall
11 award grants, on a competitive basis, to in-
12 stitutions of higher education and non-
13 profit organizations (or consortia of such
14 institutions or organizations) to develop in-
15 novative approaches for facilitating career
16 exploration of academic and non-academic
17 career options and for providing oppor-
18 tunity-broadening experiences for graduate
19 students and postdoctoral scholars that
20 can then be considered, adopted, or adapt-
21 ed by other institutions and to carry out
22 research on the impact and outcomes of
23 such activities.
24 (ii) REVIEW OF PROPOSALS.—In se-
25 lecting grant recipients under this subpara-

1 graph, the Director shall consider, at a
2 minimum—
3 (I) the extent to which the ad-
4 ministrators of the institution are
5 committed to making the proposed ac-
6 tivity a priority; and
7 (II) the likelihood that the insti-
8 tution or organization will sustain or
9 expand the proposed activity effort be-
10 yond the period of the grant.
11 (C) DEVELOPMENT PLANS.—The Director
12 shall require that annual project reports for
13 awards that support graduate students and
14 postdoctoral scholars include certification by the
15 principal investigator that each graduate stu-
16 dent and postdoctoral scholar receiving substan-
17 tial support from such award, as determined by
18 the Director, in consultation with faculty advi-
19 sors, has developed and annually updated an in-
20 dividual development plan to map educational
21 goals, career exploration, and professional de-
22 velopment.
23 (D) PROFESSIONAL DEVELOPMENT SUP-
24 PLEMENT.—The Director shall carry out a five-
25 year pilot initiative to award up to 2,500 ad-

1 ministrative supplements of up to $2,000 to ex-
2 isting research grants annually, on a competi-
3 tive basis, to support graduate student profes-
4 sional development experiences for graduate
5 students who receive a substantial portion of
6 their support under such grants, as determined
7 by the Director.

8 (E) GRADUATE EDUCATION RESEARCH.—
9 The Director shall award grants, on a competi-
10 tive basis, to institutions of higher education or
11 non-profit organizations (or consortia of such
12 institutions or organizations) to support re-
13 search on the graduate education system and
14 outcomes of various interventions and policies,
15 including—

16 (i) the effects of traineeships, fellow-
17 ships, internships, and teaching and re-
18 search assistantships on outcomes for
19 graduate students;

20 (ii) the effects of graduate education
21 and mentoring policies and procedures on
22 degree completion, including differences
23 across gender, race and ethnicity, and citi-
24 zenship; and

1 (iii) the development and assessment
2 of new or adapted interventions, including
3 approaches that improve mentoring rela-
4 tionships, develop conflict management
5 skills, and promote healthy research teams.
6 (2) GRADUATE RESEARCH FELLOWSHIP PRO-
7 GRAM UPDATE.—
8 (A) SENSE OF CONGRESS.—It is the sense
9 of Congress that the Foundation should in-
10 crease the number of new graduate research fel-
11 lows supported annually over the next 5 years
12 to no fewer than 3,000 fellows.
13 (B) PROGRAM UPDATE.—Section 10 of the
14 National Science Foundation Act of 1950 (42
15 U.S.C. 1869) is amended—
16 (i) in subsection (a), by inserting
17 "and as will address national workforce de-
18 mand in critical STEM fields" after
19 "throughout the United States";
20 (ii) in subsection (b), by striking "of
21 $12,000" and inserting "up to $16,000";
22 and
23 (iii) by adding at the end the fol-
24 lowing:

1 "(c) OUTREACH.—The Director shall ensure program
2 outreach to recruit fellowship applicants from fields of
3 study that are in areas of critical national need, from all
4 regions of the country, and from historically underrep-
5 resented populations in STEM.".

6 (C) CYBERSECURITY SCHOLARSHIPS AND
7 GRADUATE FELLOWSHIPS.—The Director shall
8 ensure that students pursuing master's degrees
9 and doctoral degrees in fields relating to cyber-
10 security are considered as applicants for schol-
11 arships and graduate fellowships under the
12 Graduate Research Fellowship Program under
13 section 10 of the National Science Foundation
14 Act of 1950 (42 U.S.C. 1869).

15 (3) STUDY ON GRADUATE STUDENT FUND-
16 ING.—

17 (A) IN GENERAL.—Not later than 45 days
18 after the date of enactment of this Act, the Di-
19 rector shall enter into an agreement with a
20 qualified independent organization to evalu-
21 ate—

22 (i) the role of the Foundation in sup-
23 porting graduate student education and
24 training through fellowships, traineeships,
25 and other funding models; and

1 (ii) the impact of different funding
2 mechanisms on graduate student experi-
3 ences and outcomes, including whether
4 such mechanisms have differential impacts
5 on subsets of the student population.
6 (B) REPORT.—Not later than 1 year after
7 the date of enactment of this Act, the organiza-
8 tion charged with carrying out the study under
9 subparagraph (A) shall publish the results of its
10 evaluation, including a recommendation for the
11 appropriate balance between fellowships,
12 traineeships, and other funding models.
13 (d) STEM WORKFORCE DATA.—
14 (1) SKILLED TECHNICAL WORKFORCE PORT-
15 FOLIO REVIEW.—
16 (A) IN GENERAL.—Not later than 1 year
17 after the date of enactment of this Act, the Di-
18 rector shall conduct a full portfolio analysis of
19 the Foundation's skilled technical workforce in-
20 vestments across all Directorates in the areas of
21 education, research, infrastructure, data collec-
22 tion, and analysis.
23 (B) REPORT.—Not later than 180 days
24 after the date of the review under subparagraph
25 (A) is complete, the Director shall submit to

1 Congress and make widely available to the pub-
2 lic a summary report of the portfolio review.
3 (2) SURVEY DATA.—
4 (A) ROTATING TOPIC MODULES.—To meet
5 evolving needs for data on the state of the
6 science and engineering workforce, the Director
7 shall assess, through coordination with other
8 Federal statistical agencies and drawing on
9 input from relevant stakeholders, the feasibility
10 and benefits of incorporating questions or topic
11 modules to existing National Center for Science
12 and Engineering Statistics surveys that would
13 vary from cycle to cycle.
14 (B) NEW DATA.—Not later than 1 year
15 after the date of enactment of this Act, the Di-
16 rector shall submit to Congress and the Board
17 the results of an assessment, carried out in co-
18 ordination with other Federal agencies and with
19 input from relevant stakeholders, of the feasi-
20 bility and benefits of incorporating new ques-
21 tions or topic modules to existing National Cen-
22 ter for Science and Engineering Statistics sur-
23 veys on—
24 (i) the skilled technical workforce;

1 (ii) working conditions and work-life
2 balance;
3 (iii) harassment and discrimination;
4 (iv) sexual orientation and gender
5 identity;
6 (v) immigration and emigration; and
7 (vi) any other topics at the discretion
8 of the Director.
9 (C) LONGITUDINAL DESIGN.—The Direc-
10 tor shall continue and accelerate efforts to en-
11 hance the usefulness of National Center for
12 Science and Engineering Statistics survey data
13 for longitudinal research and analysis.
14 (D) GOVERNMENT ACCOUNTABILITY OF-
15 FICE REVIEW.—Not later than 1 year after the
16 date of enactment of this Act, the Comptroller
17 General of the United States shall submit a re-
18 port to Congress that—
19 (i) evaluates Foundation processes for
20 ensuring the data and analysis produced
21 by the National Center for Science and
22 Engineering Statistics meets current and
23 future needs; and

1 (ii) includes such recommendations as
2 the Comptroller General determines are
3 appropriate to improve such processes.
4 (e) CYBER WORKFORCE DEVELOPMENT RESEARCH
5 AND DEVELOPMENT.—
6 (1) IN GENERAL.—The Director shall award
7 grants on a merit-reviewed, competitive basis to in-
8 stitutions of higher education or non-profit organiza-
9 tions (of a consortia of thereof) to carry out research
10 on the cyber workforce.
11 (2) RESEARCH.—In carrying out research pur-
12 suant to paragraph (1), the Director shall support
13 research and development activities to—
14 (A) Understand the current state of the
15 cyber workforce, including factors that influence
16 growth, retention, and development of that
17 workforce;
18 (B) examine paths to entry and re-entry
19 into the cyber workforce;
20 (C) understand trends of the cyber work-
21 force, including demographic representation,
22 educational and professional backgrounds
23 present, competencies available, and factors
24 that shape employee recruitment, development,

1 and retention and how to increase the size, di-
2 versity, and capability of the cyber workforce;
3 (D) examine and evaluate training prac-
4 tices, models, programs, and technologies; and
5 (E) other closely related topics as the Di-
6 rector determines appropriate.
7 (3) REQUIREMENTS.—In carrying out the ac-
8 tivities described in paragraph (1), the Director
9 shall—
10 (A) collaborate with the National Institute
11 for Standards and Technology, including the
12 National Initiative for Cybersecurity Education,
13 the Department of Homeland Security, the De-
14 partment of Defense, the Office of Personnel
15 Management, and other Federal departments
16 and agencies, as appropriate;
17 (B) align with or build on the National
18 Initiative on Cybersecurity Education Cybersec-
19 curity Workforce Framework wherever prac-
20 ticable and applicable;
21 (C) leverage the collective body of knowl-
22 edge from existing cyber workforce development
23 research and education activities; and
24 (D) engage with other Federal depart-
25 ments and agencies, research communities, and

1 potential users of information produced under
2 this subsection.

3 **SEC. 6. BROADENING PARTICIPATION.**

4 (a) PRESIDENTIAL AWARDS FOR EXCELLENCE IN
5 MATHEMATICS AND SCIENCE TEACHING.—

6 (1) IN GENERAL.—Section 117(a) of the Na-
7 tional Science Foundation Authorization Act of 1988
8 (42 U.S.C.1881b(a)) is amended—

9 (A) in subparagraph (B)—

10 (i) by striking "108" and inserting
11 "110";

12 (ii) by striking clause (iv);

13 (iii) in clause (v), by striking the pe-
14 riod at the end and inserting "; and";

15 (iv) by redesignating clauses (i), (ii),
16 (iii), and (v) as subclauses (I), (II), (III),
17 and (IV), respectively, and moving the
18 margins of such subclauses (as so redesig-
19 nated) two ems to the right; and

20 (v) by striking "In selecting teachers"
21 and all that follows through "two teach-
22 ers—" and inserting the following:

23 "(C) In selecting teachers for an award au-
24 thorized by this subsection, the President shall
25 select—

1 "(i) at least two teachers—"; and

2 (B) in subparagraph (C), as designated by

3 paragraph (1)(A)(v), by adding at the end the

4 following:

5 "(ii) at least one teacher—

6 "(I) from the Commonwealth of

7 the Northern Mariana Islands;

8 "(II) from American Samoa;

9 "(III) from the Virgin Islands of

10 the United States; and

11 "(IV) from Guam.".

12 (2) EFFECTIVE DATE.—The amendments made

13 by paragraph (1) shall apply with respect to awards

14 made on or after the date of the enactment of this

15 Act.

16 (b) ROBERT NOYCE TEACHER SCHOLARSHIP PRO-

17 GRAM UPDATE.—

18 (1) SENSE OF CONGRESS.—It is the sense of

19 Congress that over the next five years the Founda-

20 tion should increase the number of scholarships

21 awarded under the Robert Noyce Teacher Scholar-

22 ship program established under section 10 of the

23 National Science Foundation Authorization Act of

24 2002 (42 U.S.C. 1862n–1) by 50 percent.

1 (2) OUTREACH.—To increase the diversity of
2 participants, the Director shall support symposia, fo-
3 rums, conferences, and other activities to expand
4 and enhance outreach to—
5 (A) historically Black colleges and univer-
6 sities that are part B institutions, as defined in
7 section 322(2) of the Higher Education Act of
8 1965 (20 U.S.C. 1061(2));
9 (B) minority institutions, as defined in sec-
10 tion 365(3) of the Higher Education Act of
11 1965 (20 U.S.C. 1067k(3));
12 (C) institutions of higher education that
13 are located near or serve rural communities;
14 (D) emerging research institutions; and
15 (E) higher education programs that serve
16 or support veterans.
17 (c) NSF INCLUDES INITIATIVE.—The Director
18 shall award grants and cooperative agreements, on a com-
19 petitive basis, to institutions of higher education or non-
20 profit organizations (or consortia of such institutions or
21 organizations) to carry out a comprehensive national ini-
22 tiative to facilitate the development of networks and part-
23 nerships to build on and scale up effective practices in
24 broadening participation in STEM studies and careers of

1 groups historically underrepresented in such studies and
2 careers.

3 (d) BROADENING PARTICIPATION ON MAJOR FACILI-
4 TIES AWARDS.—The Director shall require organizations
5 seeking a cooperative agreement for the management of
6 the operations and maintenance of a Foundation project
7 to demonstrate prior experience and current capabilities
8 in employing best practices in broadening participation in
9 science and engineering and ensure implementation of
10 such practices is considered in oversight of the award.

11 (e) PARTNERSHIPS WITH EMERGING RESEARCH IN-
12 STITUTIONS.—The Director shall establish a five-year
13 pilot program to enhance partnerships between emerging
14 research institutions and institutions classified as very
15 high research activity by the Carnegie Classification of In-
16 stitutions of Higher Education at the time of application.
17 In carrying out this program, the Director shall—

18 (1) require that each proposal submitted by a
19 multi-institution collaboration for an award, includ-
20 ing those under section 9, that exceeds $1,000,000,
21 as appropriate, specify how the applicants will sup-
22 port substantive, meaningful, and mutually-bene-
23 ficial partnerships with one or more emerging re-
24 search institutions;

1 (2) require awardees funded under paragraph
2 (1) to direct no less than 25 percent of the total
3 award to one or more emerging research institutions
4 to build research capacity, including through support
5 for faculty salaries and training, research experi-
6 ences for undergraduate and graduate students, and
7 maintenance and repair of research equipment and
8 instrumentation;
9 (3) require awardees funded under paragraph
10 (1) to report on the partnership activities as part of
11 the annual reporting requirements of the Founda-
12 tion;
13 (4) solicit feedback on the partnership directly
14 from partner emerging research institutions, in such
15 form as the Director deems appropriate; and
16 (5) submit a report to Congress after the third
17 year of the pilot program that includes—
18 (A) an assessment, drawing on feedback
19 from the research community and other sources
20 of information, of the effectiveness of the pilot
21 program for improving the quality of partner-
22 ships with emerging research institutions; and
23 (B) if deemed effective, a plan for perma-
24 nent implementation of the pilot program.

1 (f) TRIBAL COLLEGES AND UNIVERSITIES PROGRAM
2 UPDATE.—
3 (1) IN GENERAL.—Section 525 of the America
4 COMPETES Reauthorization Act of 2010 (42
5 U.S.C. 1862p–13) is amended—
6 (A) in subsection (a) by—
7 (i) striking "Native American" and
8 inserting "American Indian, Alaska Na-
9 tive, and Native Hawaiian"; and
10 (ii) inserting "post-secondary creden-
11 tials and" before "associate's"; and
12 (iii) striking "or baccalaureate de-
13 grees" and inserting ", baccalaureate, and
14 graduate degrees"; and
15 (B) in subsection (b) by striking "under-
16 graduate"; and
17 (C) in subsection (c) by inserting "and
18 STEM" after "laboratory".
19 (2) AUTHORIZATION OF APPROPRIATIONS.—
20 There is authorized to be appropriated to the Direc-
21 tor to carry out this program $107,250,000 for fis-
22 cal year 2022 through fiscal year 2026.
23 (g) DIVERSITY IN TECH RESEARCH.—The Director
24 shall award grants, on a competitive basis, to institutions
25 of higher education or non-profit organizations (or con-

1 sortia of such institutions or organizations) to support
2 basic and applied research that yields a scientific evidence
3 base for improving the design and emergence, development
4 and deployment, and management and ultimate effective-
5 ness of organizations of all kinds, including research re-
6 lated to diversity, equity, and inclusion in the technology
7 sector.

8 (h) CONTINUING SUPPORT FOR EPSCoR.—

9 (1) SENSE OF CONGRESS.—

10 (A) IN GENERAL.—It is the sense of Con-
11 gress that—

12 (i) since maintaining the Nation's sci-
13 entific and economic leadership requires
14 the participation of talented individuals na-
15 tionwide, EPSCoR investments into State
16 research and education capacities are in
17 the Federal interest and should be sus-
18 tained; and

19 (ii) EPSCoR should maintain its ex-
20 perimental component by supporting inno-
21 vative methods for improving research ca-
22 pacity and competitiveness.

23 (B) DEFINITION OF EPSCOR.—In this sub-
24 section, the term "EPSCoR" has the meaning
25 given the term in section 502 of the America

1 COMPETES Reauthorization Act of 2010 (42
2 U.S.C. 1862p note).
3 (2) UPDATE OF EPSCOR.—Section 517(f)(2) of
4 the America COMPETES Reauthorization Act of
5 2010 (42 U.S.C. 1862p–9(f)(2)) is amended—
6 (A) in subparagraph (A), by striking
7 "and" at the end; and
8 (B) by adding at the end the following:
9 "(C) to increase the capacity of rural com-
10 munities to provide quality STEM education
11 and STEM workforce development program-
12 ming to students, and teachers; and".
13 **SEC. 7. FUNDAMENTAL RESEARCH.**
14 (a) BROADER IMPACTS.—
15 (1) ASSESSMENT.—Not later than 45 days
16 after the date of enactment of this Act, the Director
17 shall enter into an agreement with a qualified inde-
18 pendent organization to assess how the Broader Im-
19 pacts review criterion is applied across the Founda-
20 tion and make recommendations for improving the
21 effectiveness for meeting the goals established in sec-
22 tion 526 of the America Creating Opportunities to
23 Meaningfully Promote Excellence in Technology,
24 Education, and Science Reauthorization Act of 2010
25 (42 U.S.C. 1862p-14).

1 (2) ACTIVITIES.—The Director shall award
2 grants on a competitive basis, to institutions of high-
3 er education or non-profit organizations (or con-
4 sortia of such institutions or organizations) to sup-
5 port activities to increase the efficiency, effective-
6 ness, and availability of resources for implementing
7 the Broader Impacts review criterion, including—
8 (A) training and workshops for program
9 officers, merit review panelists, grant office ad-
10 ministrators, faculty, and students to improve
11 understanding of the goals and the full range of
12 potential broader impacts available to research-
13 ers to satisfy this criterion;
14 (B) repositories and clearinghouses for
15 sharing best practices and facilitating collabora-
16 tion; and
17 (C) tools for evaluating and documenting
18 societal impacts of research.
19 (b) SENSE OF CONGRESS.—It is the sense of Con-
20 gress that the Director should continue to identify oppor-
21 tunities to reduce the administrative burden on research-
22 ers.
23 (c) RESEARCH INTEGRITY AND SECURITY.—
24 (1) OFFICE OF RESEARCH SECURITY AND POL-
25 ICY.—The Director shall maintain a Research Secu-

1 rity and Policy office within the Office of the Direc-
2 tor with no fewer than 4 full time equivalent posi-
3 tions, in addition to the Chief of Research Security
4 established in paragraph (2) of this subsection. The
5 functions of the Research Security and Policy office
6 shall be to coordinate all research security policy
7 issues across the Foundation, including by—
8 (A) consulting and coordinating with the
9 Foundation Office of Inspector General and
10 with other Federal science agencies and intel-
11 ligence and law enforcement agencies, as appro-
12 priate, through the National Science and Tech-
13 nology Council in accordance with the authority
14 provided under section 1746 of the National
15 Defense Authorization Act for Fiscal Year 2020
16 (Public Law 116–92; 42 U.S.C. 6601 note), to
17 identify and address potential security risks
18 that threaten research integrity and other risks
19 to the research enterprise;
20 (B) serving as the Foundation's primary
21 resource for all issues related to the security
22 and integrity of the conduct of Foundation-sup-
23 ported research;

1 (C) conducting outreach and education ac-
2 tivities for awardees on research policies and
3 potential security risks;
4 (D) educating Foundation program man-
5 agers and other directorate staff on evaluating
6 Foundation awards and awardees for potential
7 security risks; and
8 (E) communicating reporting and disclo-
9 sure requirements to awardees and applicants
10 for funding.
11 (2) CHIEF OF RESEARCH SECURITY.—The Di-
12 rector shall appoint a senior agency official within
13 the Office of the Director as a Chief of Research Se-
14 curity, whose primary responsibility is to manage the
15 office established under paragraph (1).
16 (3) REPORT TO CONGRESS.—No later than 180
17 days after the date of enactment of this Act, the Di-
18 rector shall provide a report to the Committee on
19 Science, Space, and Technology of the House of
20 Representatives, the Committee on Commerce,
21 Science, and Transportation of the Senate, the Com-
22 mittee on Appropriations of the House of Represent-
23 atives, and the Committee on Appropriations of the
24 Senate on the resources and the number of full time

1 employees needed to carry out the functions of the
2 Office established in paragraph (1).
3 (4) ONLINE RESOURCE.—The Director shall de-
4 velop an online resource hosted on the Foundation's
5 website containing up-to-date information, tailored
6 for institutions and individual researchers, includ-
7 ing—
8 (A) an explanation of Foundation research
9 security policies;
10 (B) unclassified guidance on potential se-
11 curity risks that threaten scientific integrity
12 and other risks to the research enterprise;
13 (C) examples of beneficial international
14 collaborations and how such collaborations dif-
15 fer from foreign government interference efforts
16 that threaten research integrity;
17 (D) promising practices for mitigating se-
18 curity risks that threaten research integrity;
19 and
20 (E) additional reference materials, includ-
21 ing tools that assist organizations seeking
22 Foundation funding and awardees in informa-
23 tion disclosure to the Foundation.
24 (5) RISK ASSESSMENT CENTER.—The Director
25 shall enter into an agreement with a qualified inde-

1 pendent organization to create a new risk assess-
2 ment center to—
3 (A) help the Foundation develop the online
4 resources under paragraph (4); and
5 (B) help awardees in assessing and identi-
6 fying issues related to nondisclosure of current
7 and pending research funding, risks to the
8 Foundation merit review process, and other
9 issues that may negatively affect the Founda-
10 tion proposal and award process due to undue
11 foreign interference.
12 (6) RESEARCH GRANTS.—The Director shall
13 continue to award grants, on a competitive basis, to
14 institutions of higher education or non-profit organi-
15 zations (or consortia of such institutions or organi-
16 zations) to support research on the conduct of re-
17 search and the research environment, including re-
18 search on research misconduct or breaches of re-
19 search integrity and detrimental research practices.
20 (7) AUTHORITIES.—
21 (A) IN GENERAL.—In addition to existing
22 authorities for preventing waste, fraud, abuse,
23 and mismanagement of federal funds, the Di-
24 rector, acting through the Office of Research
25 Security and Policy and in coordination with

1 the Foundation's Office of Inspector General,
2 shall have the authority to—
3 (i) conduct risk assessments, including
4 through the use of open-source analysis
5 and analytical tools, of research and devel-
6 opment award applications and disclosures
7 to the Foundation, in coordination with the
8 Risk Assessment Center established in
9 paragraph (5);
10 (ii) request the submission to the
11 Foundation, by an institution of higher
12 education or other organization applying
13 for a research and development award, of
14 supporting documentation, including copies
15 of contracts, grants, or any other agree-
16 ment specific to foreign appointments, em-
17 ployment with a foreign institution, partici-
18 pation in a foreign talent program and
19 other information reported as current and
20 pending support for all covered individuals
21 in a research and development award ap-
22 plication; and
23 (iii) upon receipt and review of the in-
24 formation provided under clause (ii) and in
25 consultation with the institution of higher

1 education or other organization submitting
2 such information, initiate the substitution
3 or removal of a covered individual from a
4 research and development award, reduce
5 the award funding amount, or suspend or
6 terminate the award if the Director deter-
7 mines such contracts, grants, or agree-
8 ments include obligations that—
9 (I) interfere with the capacity for
10 Foundation-supported activities to be
11 carried out; or
12 (II) create duplication with
13 Foundation-supported activities.
14 (B) LIMITATIONS.—In exercising the au-
15 thorities under this paragraph, the Director
16 shall—
17 (i) take necessary steps, as prac-
18 ticable, to protect the privacy of all covered
19 individuals and other parties involved in
20 the application and disclosure assessments
21 under clause (A)(i);
22 (ii) endeavor to provide justification
23 for requests for supporting documentation
24 made under clause (A)(ii);

1 (iii) require that allegations be proven
2 by a preponderance of evidence; and
3 (iv) as practicable, afford subjects an
4 opportunity to provide comments and re-
5 buttal and an opportunity to appeal before
6 final administrative action is taken.
7 (8) SECURITY TRAINING MODULES.—
8 (A) IN GENERAL.—Not later than 90 days
9 after the date of enactment of this Act, the Di-
10 rector, in collaboration with the Director of the
11 National Institutes of Health and other relevant
12 Federal research agencies, shall enter into an
13 agreement or contract with a qualified entity
14 for the development of online research security
15 training modules for the research community,
16 including modules focused on international col-
17 laboration and international travel, foreign in-
18 terference, and rules for proper use of funds,
19 disclosure, conflict of commitment, and conflict
20 of interest.
21 (B) STAKEHOLDER INPUT.—Prior to en-
22 tering into the agreement under clause (A), the
23 Director shall seek input from academic, private
24 sector, intelligence, and law enforcement stake-
25 holders regarding the scope and content of

1 training modules, including the diversity of
2 needs across institutions of higher education
3 and other grantees of different sizes and types,
4 and recommendations for minimizing adminis-
5 trative burden on institutions of higher edu-
6 cation and researchers.
7 (C) DEVELOPMENT.—The Director shall
8 ensure that the entity identified in (A)—
9 (i) develops modules that can be
10 adapted and utilized across Federal science
11 agencies; and
12 (ii) develops and implements a plan
13 for regularly updating the modules as
14 needed.
15 (D) GUIDELINES.—The Director, in col-
16 laboration with the Director of the National In-
17 stitutes of Health, shall develop guidelines for
18 institutions of higher education and other orga-
19 nizations receiving Federal research and devel-
20 opment funds to use in developing their own
21 training programs to address the unique needs,
22 challenges, and risk profiles of such institu-
23 tions, including adoption of training modules
24 developed under this paragraph.

1 (E) IMPLEMENTATION.—Drawing on
2 stakeholder input under subparagraph (B), not
3 later than 12 months after the date of enact-
4 ment of this Act, the Director shall establish a
5 requirement that, as part of an application for
6 a research and development award from the
7 Foundation—
8 (i) each covered individual listed on
9 the application for a research and develop-
10 ment award certify that they have com-
11 pleted research security training that
12 meets the guidelines developed under
13 clause (D) within one year of the applica-
14 tion; and
15 (ii) each institution of higher edu-
16 cation or other organization applying for
17 such award certify that each covered indi-
18 vidual who is employed by the institution
19 or organization and listed on the applica-
20 tion has been made aware of the require-
21 ment under this subparagraph.
22 (F) DEFINITIONS.—In this subsection:
23 (i) COVERED INDIVIDUAL.—The term
24 "covered individual" means the principal
25 investigator, co-principal investigators, and

1 any other person at the institution who is
2 responsible for the design, conduct, or re-
3 porting of research or educational activities
4 funded or proposed for funding by the
5 Foundation.
6 (ii) FEDERAL RESEARCH AGENCY.—
7 The term "Federal research agency"
8 means any Federal agency with an annual
9 extramural research expenditure of over
10 $100,000,000.
11 (iii) RESEARCH AND DEVELOPMENT
12 AWARD.—The term "research and develop-
13 ment award" means support provided to
14 an individual or entity by a Federal re-
15 search agency to carry out research and
16 development activities, which may include
17 support in the form of a grant, contract,
18 cooperative agreement, or other such
19 transaction. The term does not include a
20 grant, contract, agreement or other trans-
21 action for the procurement of goods or
22 services to meet the administrative needs
23 of a Federal research agency.
24 (9) RESPONSIBLE CONDUCT IN RESEARCH
25 TRAINING.—Section 7009 of the America Creating

1 Opportunities to Meaningfully Promote Excellence in
2 Technology, Education, and Science Act (42 U.S.C.
3 1862o-1) is amended by—
4 (A) striking "and postdoctoral research-
5 ers" and inserting "postdoctoral researchers,
6 faculty, and other senior personnel"; and
7 (B) inserting the following at the end: ",
8 including mentor training".
9 (10) NATIONAL ACADEMIES GUIDE TO RESPON-
10 SIBLE CONDUCT IN RESEARCH.—
11 (A) IN GENERAL.—Not later than 180
12 days after the date of enactment of this Act,
13 the Director shall enter into an agreement with
14 the Academies to update the report entitled
15 "On Being a Scientist: A Guide to Responsible
16 Conduct in Research" issued by the Academies.
17 The report, as so updated, shall include—
18 (i) updated professional standards of
19 conduct in research;
20 (ii) promising practices for preventing,
21 addressing, and mitigating the negative
22 impact of harassment, including sexual
23 harassment and gender harassment as de-
24 fined in the 2018 Academies report enti-
25 tled "Sexual Harassment of Women: Cli-

1 mate, Culture, and Consequences in Aca-
2 demic Sciences, Engineering, and Medi-
3 cine"; and
4 (iii) promising practices for mitigating
5 potential security risks that threaten re-
6 search integrity.
7 (B) REPORT.—Not later than 18 months
8 after the effective date of the agreement under
9 subparagraph (A), the Academies, as part of
10 such agreement, shall submit to the Director
11 and the Committee on Science, Space, and
12 Technology of the House of Representatives
13 and the Committee on Commerce, Science, and
14 Transportation of the Senate the report re-
15 ferred to in such subparagraph, as updated pur-
16 suant to such subparagraph.
17 (d) RESEARCH ETHICS.—
18 (1) SENSE OF CONGRESS.—It is the sense of
19 Congress that—
20 (A) a number of emerging areas of re-
21 search have potential ethical, social, safety, and
22 security implications that might be apparent as
23 early as the basic research stage;
24 (B) the incorporation of ethical, social,
25 safety, and security considerations into the re-

1 search design and review process for Federal
2 awards, may help mitigate potential harms be-
3 fore they happen;
4 (C) the Foundation's agreement with the
5 Academies to conduct a study and make rec-
6 ommendations with respect to governance of re-
7 search in emerging technologies is a positive
8 step toward accomplishing this goal; and
9 (D) the Foundation should continue to
10 work with stakeholders to understand and
11 adopt policies that promote best practices for
12 governance of research in emerging technologies
13 at every stage of research.
14 (2) ETHICS STATEMENTS.—Drawing on stake-
15 holder input, not later than 18 months after the
16 date of enactment of this Act, the Director shall
17 amend award proposal instructions to include a re-
18 quirement for an ethics statement to be included as
19 part of any proposal for funding prior to making the
20 award. Such statement shall be considered by the
21 Director in the review of proposals, taking into con-
22 sideration any relevant input from the peer-reviewers
23 for the proposal, and shall factor into award deci-
24 sions as deemed necessary by the Director. Such
25 statements may include, as appropriate—

1 (A) any foreseeable or quantifiable risks to
2 society, including how the research could enable
3 products, technologies, or other outcomes that
4 could intentionally or unintentionally cause sig-
5 nificant societal harm;
6 (B) how technical or social solutions can
7 mitigate such risks and, as appropriate, a plan
8 to implement such mitigation measures; and
9 (C) how partnerships and collaborations in
10 the research can help mitigate potential harm
11 and amplify potential societal benefits.
12 (3) GUIDANCE.—The Director shall solicit
13 stakeholder input to develop clear guidance on what
14 constitutes a foreseeable or quantifiable risk as de-
15 scribed in paragraph (2)(A), and to the extent prac-
16 ticable harmonize this policy with existing ethical
17 policies or related requirements for human subjects.
18 (4) RESEARCH.—The Director shall award
19 grants, on a competitive basis, to institutions of
20 higher education or non-profit organizations (or con-
21 sortia of such institutions or organizations) to sup-
22 port—
23 (A) research to assess the potential ethical
24 and societal implications of Foundation-sup-
25 ported research and products or technologies

1 enabled by such research, including the benefits
2 and risks identified pursuant to paragraph
3 (2)(A); and
4 (B) the development and verification of ap-
5 proaches to proactively mitigate foreseeable
6 risks to society, including the technical and so-
7 cial solutions identified pursuant to paragraph
8 (2)(B).
9 (5) ANNUAL REPORT.—The Director shall en-
10 courage awardees to update their ethics statements
11 as appropriate as part of the annual reports re-
12 quired by all awardees under the award terms and
13 conditions.
14 (e) RESEARCH REPRODUCIBILITY AND
15 REPLICABILITY.—Consistent with existing Federal law for
16 privacy, intellectual property, and security, the Director
17 shall facilitate the public access to research products, in-
18 cluding data, software, and code, developed as part of
19 Foundation-supported projects.
20 (1) DATA MANAGEMENT PLANS.—
21 (A) The Director shall require that every
22 proposal for funding for research include a ma-
23 chine-readable data management plan that in-
24 cludes a description of how the awardee will ar-
25 chive and preserve public access to data, soft-

1 ware, and code developed as part of the pro-
2 posed project.
3 (B) In carrying out the requirement in
4 subparagraph (A), the Director shall—
5 (i) provide necessary resources, in-
6 cluding trainings and workshops, to edu-
7 cate researchers and students on how to
8 develop and review high quality data man-
9 agement plans;
10 (ii) ensure program officers and merit
11 review panels are equipped with the re-
12 sources and training necessary to review
13 the quality of data management plans; and
14 (iii) ensure program officers and
15 merit review panels treat data management
16 plans as essential elements of grant pro-
17 posals, where appropriate.
18 (2) OPEN REPOSITORIES.—The Director
19 shall—
20 (A) coordinate with the heads of other
21 Federal science agencies, and solicit input from
22 the scientific community, to develop and widely
23 disseminate a set of criteria for trusted open re-
24 positories, accounting for discipline-specific
25 needs and necessary protections for sensitive in-

1 formation, to be used by Federally funded re-
2 searchers for the sharing of data, software, and
3 code;
4 (B) work with stakeholders to identify sig-
5 nificant gaps in available repositories meeting
6 the criteria developed under subparagraph (A)
7 and options for supporting the development of
8 additional or enhanced repositories;
9 (C) award grants on a competitive basis to
10 institutions of higher education or non-profit
11 organizations (or consortia of such institutions
12 or organizations) for the development, up-
13 grades, and maintenance of open data reposi-
14 tories that meet the criteria developed under
15 subparagraph (A);
16 (D) work with stakeholders and build on
17 existing models, where appropriate, to establish
18 a single, public, web-based point of access to
19 help users locate repositories storing data, soft-
20 ware, and code resulting from or used in Foun-
21 dation-supported projects;
22 (E) work with stakeholders to establish the
23 necessary policies and procedures and allocate
24 the necessary resources to ensure, as prac-
25 ticable, data underlying published findings re-

1 sulting from Foundation-supported projects are
2 deposited in repositories meeting the criteria
3 developed under subparagraph (A) at the time
4 of publication;
5 (F) incentivize the deposition of data, soft-
6 ware, and code into repositories that meet the
7 criteria developed under subparagraph (A); and
8 (G) coordinate with the scientific pub-
9 lishing community to develop uniform consensus
10 standards around data archiving and sharing.
11 (3) RESEARCH, DEVELOPMENT, AND EDU-
12 CATION.—The Director shall award grants, on a
13 competitive basis to institutions of higher education
14 or non-profit organizations (or consortia of such in-
15 stitutions or organizations) to—
16 (A) support research and development of
17 open source, sustainable, usable tools and infra-
18 structure that support reproducibility for a
19 broad range of studies across different dis-
20 ciplines;
21 (B) support research on computational re-
22 producibility, including the limits of reproduc-
23 ibility and the consistency of computational re-
24 sults in the development of new computation
25 hardware, tools, and methods; and

1 (C) support the education and training of
2 students, faculty, and researchers on computa-
3 tional methods, tools, and techniques to improve
4 the quality and sharing of data, code, and sup-
5 porting metadata to produce reproducible re-
6 search.
7 (f) CLIMATE CHANGE RESEARCH.—
8 (1) IN GENERAL.—The Director shall award
9 grants, on a competitive basis, to institutions of
10 higher education or non-profit organizations (or con-
11 sortia of such institutions or organizations) to sup-
12 port research to improve our understanding of the
13 climate system and related human and environ-
14 mental systems.
15 (2) USE OF FUNDS.—Activities funded by a
16 grant under this subsection may include—
17 (A) fundamental research on climate
18 forcings, feedbacks, responses, and thresholds
19 in the earth system;
20 (B) research on climate-related human be-
21 haviors and institutions;
22 (C) research on climate-related risk, vul-
23 nerability, resilience, and adaptive capacity of
24 coupled human-environment systems, including

1 risks to ecosystem stability and risks to vulner-
2 able populations;
3 (D) research to support the development
4 and implementation of effective social strategies
5 and tools for mitigating and adapting to climate
6 change, including at the local level;
7 (E) improved modeling, projections, anal-
8 yses, and assessments of climate and other
9 Earth system changes;
10 (F) the development of effective strategies
11 for educating and training future climate
12 change researchers, and climate change re-
13 sponse and mitigation professionals, in both re-
14 search and development methods, as well as
15 community engagement and science commu-
16 nication; and
17 (G) the development of effective strategies
18 for public and community engagement in the all
19 stages of the research and development process.
20 (g) VIOLENCE RESEARCH.—
21 (1) IN GENERAL.—The Director shall award
22 grants, on a competitive basis, to institutions of
23 higher education or non-profit organizations (or con-
24 sortia of such institutions or organizations) to sup-
25 port research to improve our understanding of the

1 nature, scope, causes, consequences, prevention, and
2 response to all forms of violence.
3 (2) USE OF FUNDS.—Activities funded by a
4 grant under this subsection may include—
5 (A) research on the magnitude and dis-
6 tribution of fatal and nonfatal violence;
7 (B) research on risk and protective factors;
8 (C) research on the design, development,
9 implementation, and evaluation of interventions
10 for preventing and responding to violence;
11 (D) research on scaling up effective inter-
12 ventions; and
13 (E) one or more interdisciplinary research
14 centers to conduct violence research, foster new
15 and expanded collaborations, and support ca-
16 pacity building activities to increase the number
17 and diversity of new researchers trained in
18 cross-disciplinary violence research.
19 (h) SOCIAL, BEHAVIORAL, AND ECONOMIC
20 SCIENCES.—The Director shall—
21 (1) actively communicate opportunities and so-
22 licit proposals for social, behavioral, and economic
23 science researchers to participate in cross-cutting
24 and interdisciplinary programs, including the Con-

1 vergence Accelerator and Big Ideas activities, and
2 the Mid-Scale Research Infrastructure program; and
3 (2) ensure social, behavioral, and economic
4 science researchers are represented on relevant merit
5 review panels for such activities.
6 (i) FOOD-ENERGY-WATER RESEARCH.—The Director
7 shall award grants on a competitive basis to institutions
8 of higher education or non-profit organizations (or con-
9 sortia of such institutions or organizations) to—
10 (1) support research to significantly advance
11 our understanding of the food-energy-water system
12 through quantitative and computational modeling,
13 including support for relevant cyberinfrastructure;
14 (2) develop real-time, cyber-enabled interfaces
15 that improve understanding of the behavior of food-
16 energy-water systems and increase decision support
17 capability;
18 (3) support research that will lead to innovative
19 solutions to critical food-energy-water system prob-
20 lems; and
21 (4) grow the scientific workforce capable of
22 studying and managing the food-energy-water sys-
23 tem, through education and other professional devel-
24 opment.

1 (j) SUSTAINABLE CHEMISTRY RESEARCH AND EDU-
2 CATION.—In accordance with section 263 of the National
3 Defense Authorization Act for Fiscal Year 2021, the Di-
4 rector shall carry out activities in support of sustainable
5 chemistry, including—
6 (1) establishing a program to award grants, on
7 a competitive basis, to institutions of higher edu-
8 cation or non-profit organizations (or consortia of
9 such institutions or organizations) to support—
10 (A) individual investigators and teams of
11 investigators, including to the extent prac-
12 ticable, early career investigators for research
13 and development;
14 (B) collaborative research and development
15 partnerships among universities, industry, and
16 non-profit organizations; and
17 (C) integrating sustainable chemistry prin-
18 ciples into elementary, secondary, under-
19 graduate, and graduate chemistry and chemical
20 engineering curriculum and research training,
21 as appropriate to that level of education and
22 training; and
23 (2) incorporating sustainable chemistry into ex-
24 isting Foundation research and development pro-
25 grams.

1 (k) RISK AND RESILIENCE RESEARCH.—The Direc-
2 tor shall award grants on a competitive basis to institu-
3 tions of higher education or non-profit organizations (or
4 consortia of such institutions or organizations) to advance
5 knowledge of risk assessment and predictability and to
6 support the creation of tools and technologies for in-
7 creased resilience through—
8 (1) improvements in our ability to understand,
9 model, and predict extreme events and natural haz-
10 ards, including pandemics;
11 (2) the creation of novel engineered systems so-
12 lutions for resilient complex infrastructures, particu-
13 larly those that address critical interdependence
14 among infrastructures and leverage the growing in-
15 fusion of cyber-physical-social components into the
16 infrastructures;
17 (3) development of equipment and instrumenta-
18 tion for innovation in resilient engineered infrastruc-
19 tures; and
20 (4) multidisciplinary research on the behaviors
21 individuals and communities engage in to detect,
22 perceive, understand, predict, assess, mitigate, and
23 prevent risks and to improve and increase resilience.
24 (l) LEVERAGING INTERNATIONAL EXPERTISE IN RE-
25 SEARCH.—The Director shall explore and advance oppor-

1 tunities for leveraging international capabilities and re-
2 sources that align with the Foundation and United States
3 research community priorities and have the potential to
4 benefit United States prosperity, security, health, and
5 well-being, including by sending teams of Foundation sci-
6 entific staff for site visits of scientific facilities and agen-
7 cies in other countries.

8 (m) BIOLOGICAL RESEARCH COLLECTIONS.—

9 (1) IN GENERAL.—The Director shall continue
10 to support databases, tools, methods, and other ac-
11 tivities that secure and improve existing physical and
12 digital biological research collections, improve the ac-
13 cessibility of collections and collection-related data
14 for research and educational purposes, develop ca-
15 pacity for curation and collection management, and
16 to transfer ownership of collections that are signifi-
17 cant to the biological research community, including
18 to museums and universities.

19 (2) SPECIMEN MANAGEMENT PLAN.—The Di-
20 rector shall require that every proposal for funding
21 for research that involves collecting or generating
22 specimens include a specimen management plan that
23 includes a description of how the specimens and as-
24 sociated data will be accessioned into and perma-

1 nently maintained in an established biological collec-
2 tion.
3 (3) ACTION CENTER FOR BIOLOGICAL COLLEC-
4 TIONS.—The Director shall award grants on a com-
5 petitive basis to institutions of higher education or
6 non-profit organizations (or consortia of such insti-
7 tutions or organizations) to establish an Action Cen-
8 ter for Biological Collections to facilitate coordina-
9 tion and data sharing among communities of prac-
10 tice for research, education, workforce training, eval-
11 uation, and business model development.
12 (n) CLEAN WATER RESEARCH AND TECHNOLOGY
13 ACCELERATION.—The Director shall award grants on a
14 competitive, merit-reviewed basis to institutions of higher
15 education or non-profit organizations (or consortia of such
16 institutions or organizations) to—
17 (1) support transdisciplinary research to signifi-
18 cantly advance our understanding of water avail-
19 ability, quality, and dynamics and the impact of
20 human activity and a changing climate on urban and
21 rural water and wastewater systems;
22 (2) develop, pilot and deploy innovative tech-
23 nologies, systems, and other approaches to identi-
24 fying and addressing challenges that affect water
25 availability, quality, and security, including through

1 direct engagement with affected communities and
2 partnerships with the private sector, State, tribal,
3 and local governments, non-profit organizations and
4 water management professionals; and
5 (3) grow the scientific workforce capable of
6 studying and managing water and wastewater sys-
7 tems, through education, training, and other profes-
8 sional development.
9 (o) TECHNOLOGY AND BEHAVIORAL SCIENCE RE-
10 SEARCH.—The Director shall award grants on a merit-
11 based, competitive basis for research to—
12 (1) increase understanding of social media and
13 consumer technology access and use patterns and re-
14 lated psychological and behavioral issues, particu-
15 larly for adolescents; and
16 (2) explore the role of social media and con-
17 sumer technology in rising rates of depressive symp-
18 toms, suicidal ideation, drug use, and deaths of de-
19 spair, particularly for communities experiencing
20 long-term economic distress.
21 (p) MANUFACTURING RESEARCH AMENDMENT.—
22 Section 506(a) of the America COMPETES Reauthoriza-
23 tion Act of 2010 (42 U.S.C. 1862p–1(a)) is amended—
24 (1) in paragraph (5), by striking "and" at the
25 end;

(2) in paragraph (6)—

(A) by striking "and" before "virtual manufacturing"; and

(B) by striking the period at the end and inserting "; and artificial intelligence and machine learning; and"; and

(3) by adding at the end the following:

"(7) additive manufacturing, including new material designs, complex materials, rapid printing techniques, and real-time process controls.".

SEC. 8. RESEARCH INFRASTRUCTURE.

(a) FACILITY OPERATION AND MAINTENANCE.—

(1) IN GENERAL.—The Director shall continue the Facility Operation Transition pilot program for a total of five years.

(2) COST SHARING.—The Facility Operation Transition program shall provide funding for 10–50 percent of the operations and maintenance costs for major research facilities that are within the first five years of operation, where the share is determined based on—

(A) the operations and maintenance costs of the major research facility; and

(B) the capacity of the managing directorate or division to absorb such costs.

1 (3) REPORT.—After the fifth year of the pilot
2 program, the Director shall transmit a report to
3 Congress that includes—
4 (A) an assessment, that includes feedback
5 from the research community, of the effective-
6 ness of the pilot program for—
7 (i) supporting research directorates
8 and divisions in balancing investments in
9 research grants and funding for the initial
10 operation and maintenance of major facili-
11 ties;
12 (ii) incentivizing the development of
13 new world-class facilities;
14 (iii) facilitating interagency and inter-
15 national partnerships;
16 (iv) funding core elements of multi-
17 disciplinary facilities; and
18 (v) supporting facility divestment
19 costs; and
20 (B) if deemed effective, a plan for perma-
21 nent implementation of the pilot program.
22 (b) REVIEWS.—The Director shall periodically carry
23 out reviews within each of the directorates and divisions
24 to assess the cost and benefits of extending the operations

1 of research facilities that have exceeded their planned
2 operational lifespan.
3 (c) HELIUM CONSERVATION.—
4 (1) MAJOR RESEARCH INSTRUMENTATION SUP-
5 PORT.—
6 (A) IN GENERAL.—The Director shall sup-
7 port, through the Major Research Instrumenta-
8 tion program, proposal requests that include
9 the purchase, installation, operation, and main-
10 tenance of equipment and instrumentation to
11 reduce consumption of helium.
12 (B) COST SHARING.—The Director may
13 waive the cost-sharing requirement for helium
14 conservation measures for non-Ph.D.-granting
15 institutions of higher education and Ph.D.-
16 granting institutions of higher education that
17 are not ranked among the top 100 institutions
18 receiving Federal research and development
19 funding, as documented by the National Center
20 for Science and Engineering Statistics.
21 (2) ANNUAL REPORT.—No later than 1 year
22 after the date of enactment of this Act and annually
23 for the subsequent two years, the Director shall sub-
24 mit an annual report to Congress on the use of
25 funding awarded by the Foundation for the purchase

1 and conservation of helium. The report should in-
2 clude—
3 (A) the volume and price of helium pur-
4 chased;
5 (B) changes in pricing and availability of
6 helium; and
7 (C) any supply disruptions impacting a
8 substantial number of institutions.
9 (d) ADVANCED COMPUTING.—
10 (1) COMPUTING NEEDS.—To gather informa-
11 tion about the computational needs of Foundation-
12 funded projects, the Director shall require grant pro-
13 posals submitted to the Foundation, as appropriate,
14 to include estimates of computational resource needs
15 for projects that require use of advanced computing.
16 The Director shall encourage and provide access to
17 tools that facilitate the inclusion of these measures,
18 including those identified in the 2016 Academies re-
19 port entitled "Future Directions for NSF Advanced
20 Computing Infrastructure to Support U.S. Science
21 and Engineering in 2017–2020".
22 (2) REPORTS.—The Director shall document
23 and publish every two years a summary of the
24 amount and types of advanced computing capabili-

1 ties that are needed to fully meet the Foundation's
2 project needs as identified under paragraph (1).
3 (3) ROADMAP.—To set priorities and guide
4 strategic decisions regarding investments in ad-
5 vanced computing capabilities, the Director shall de-
6 velop, publish, and regularly update a 5-year ad-
7 vanced computing roadmap that—
8 (A) describes the advanced computing re-
9 sources and capabilities that would fully meet
10 anticipated project needs, including through in-
11 vestments in the Mid-Scale Research Infra-
12 structure program and the Major Research
13 Equipment and Facilities Construction account;
14 (B) draws on community input, informa-
15 tion contained in research proposals, allocation
16 requests, insights from Foundation-funded
17 cyber-infrastructure operators, and Foundation-
18 wide information gathering regarding commu-
19 nity needs;
20 (C) considers computational needs of
21 planned major facilities;
22 (D) reflects anticipated technology trends;
23 (E) informs users and potential partners
24 about future facilities and services;

1 (F) addresses the needs of groups histori-
2 cally underrepresented in STEM and geo-
3 graphic regions with low availability and high
4 demand for advanced computing resources;
5 (G) considers how Foundation-supported
6 advanced computing capabilities can be lever-
7 aged for activities through the Directorate for
8 Science and Engineering Solutions; and
9 (H) provides an update to Congress about
10 the level of funding necessary to fully meet
11 computational resource needs for the research
12 community.
13 (e) NATIONAL SECURE DATA SERVICE.—
14 (1) IN GENERAL.—The Director, in consulta-
15 tion with the Chief Statistician of the United States,
16 shall establish a demonstration project to develop,
17 refine and test models to inform the full implemen-
18 tation of the Commission on Evidence-Based Policy-
19 making recommendation for a government-wide data
20 linkage and access infrastructure for statistical ac-
21 tivities conducted for statistical purposes, as defined
22 in chapter 35 of title 44, United States Code.
23 (2) ESTABLISHMENT.—Not later than one year
24 after the date of enactment of this Act, the Director
25 shall establish a National Secure Data Service dem-

1 onstration project. The National Secure Data Serv-
2 ice demonstration project shall be—
3 (A) aligned with the principles, best prac-
4 tices, and priority actions recommended by the
5 Advisory Committee on Data for Evidence
6 Building, to the extent feasible; and
7 (B) operated directly by or via a contract
8 that is managed by the National Center for
9 Science and Engineering Statistics.
10 (3) DATA.—In carrying out this subsection, the
11 Director shall engage with Federal and State agen-
12 cies to collect, acquire, analyze, report, and dissemi-
13 nate statistical data in the United States and other
14 nations to support governmentwide evidence-building
15 activities consistent with the Foundations for Evi-
16 dence-Based Policymaking Act of 2018.
17 (4) PRIVACY AND CONFIDENTIALITY PROTEC-
18 TIONS.—If the Director issues a management con-
19 tract under paragraph (2), the awardee shall be des-
20 ignated as an "agent" under chapter 35 of title 44,
21 United States Code, subchapter III, section 3561 et
22 seq., with all requirements and obligations for pro-
23 tecting confidential information delineated in the
24 Confidential Information Protection and Statistical
25 Efficiency Act of 2018 and the Privacy Act of 1974.

1 (5) TECHNOLOGY.—In carrying out this sub-
2 section, the Director shall consider application and
3 use of systems and technologies that incorporate
4 protection measures to reasonably ensure confiden-
5 tial data and statistical products are protected in ac-
6 cordance with obligations under chapter 35 of title
7 44, United States Code, subchapter III, section
8 3561 et seq., including systems and technologies
9 that ensure raw data and other sensitive inputs are
10 not accessible to recipients of statistical outputs
11 from the National Secure Data Service demonstra-
12 tion project.
13 (6) TRANSPARENCY.—The National Secure
14 Data Service established under paragraph (2) shall
15 maintain a public website with up-to-date informa-
16 tion on supported projects.
17 (7) REPORT.—Not later than 2 years after the
18 date of enactment of this Act, the National Secure
19 Data Service demonstration project established
20 under paragraph (2) shall submit a report to Con-
21 gress that includes—
22 (A) a description of policies for protecting
23 data, consistent with applicable federal law;

(B) a comprehensive description of all completed or active data linkage activities and projects;

(C) an assessment of the effectiveness of the demonstration project for mitigating risks and removing barriers to a sustained implementation of the National Secure Data Service as recommended by the Commission on Evidence-Based Policymaking; and

(D) if deemed effective by the Director, a plan for scaling up the demonstration project to facilitate data access for evidence building while ensuring transparency and privacy.

(8) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the Director to carry out this subsection $9,000,000 for each of fiscal years 2022 through 2026.

SEC. 9. DIRECTORATE FOR SCIENCE AND ENGINEERING SOLUTIONS.

(a) ESTABLISHMENT.—Subject to the availability of appropriated funds, there is established within the Foundation the Directorate for Science and Engineering Solutions to advance research and development solutions to address societal and national challenges for the benefit of all Americans.

1 (b) PURPOSE.—The purpose of the Directorate estab-
2 lished under subsection (a) is to accelerate the translation
3 of Foundation-supported fundamental research and to ad-
4 vance technologies, support use-inspired research, facili-
5 tate commercialization and use of Federally funded re-
6 search, and expand the pipeline of United States students
7 and researchers in areas of societal and national impor-
8 tance.

9 (c) ACTIVITIES.—The Director shall achieve the pur-
10 poses described in subsection (a) by awarding financial as-
11 sistance through the Directorate to—

12 (1) support transformational advances in use-
13 inspired and translational research through diverse
14 funding mechanisms and models, including conver-
15 gence accelerators;

16 (2) translate research into science and engineer-
17 ing innovations, including through developing inno-
18 vative approaches to connect research with societal
19 outcomes, education and training for students and
20 researchers on engaging with end users and the pub-
21 lic, partnerships that facilitate research uptake, ap-
22 plication, and scaling, prototype development, entre-
23 preneurial education, developing tech-to-market
24 strategies, and partnerships that connect research
25 products to businesses, accelerators, and incubators;

1 (3) develop and expand sustainable and mutu-
2 ally-beneficial use-inspired and translational research
3 and development partnerships and collaborations
4 among institutions of higher education, including
5 minority serving institutions and emerging research
6 institutions, non-profit organizations, businesses and
7 other for-profit entities, Federal or State agencies,
8 community organizations, other Foundation direc-
9 torates, national labs, international entities as ap-
10 propriate, and other organizations;
11 (4) build capacity for use-inspired and
12 translational research at institutions of higher edu-
13 cation, including necessary administrative support;
14 (5) expand opportunities for researchers to con-
15 tribute to use-inspired and translational research in-
16 cluding through support for workshops and con-
17 ferences, targeted incentives and training, and multi-
18 disciplinary research centers;
19 (6) support the education, mentoring, and
20 training of undergraduate students, graduate stu-
21 dents, and postdoctoral researchers in use-inspired
22 and translational approaches to research in key
23 focus areas identified under subsection (g) through
24 scholarships, fellowships, and traineeships;

1 (7) support translational research infrastruc-
2 ture, including platforms and testbeds, data manage-
3 ment and software tools, and networks and commu-
4 nication platforms for interactive and collective
5 learning and information sharing; and
6 (8) identify social, behavioral, and economic
7 drivers and consequences of technological innova-
8 tions.
9 (d) ASSISTANT DIRECTOR.—
10 (1) IN GENERAL.—The Director shall appoint
11 an Assistant Director responsible for the manage-
12 ment of the Directorate established under this sec-
13 tion.
14 (2) TERM LIMIT.—The Assistant Director ap-
15 pointed under paragraph (1) shall serve a term last-
16 ing no longer than 4 years.
17 (3) QUALIFICATIONS.—The Assistant Director
18 shall be an individual, who by reason of professional
19 background and experience, is specially qualified
20 to—
21 (A) advise the Director on all matters per-
22 taining to use-inspired and translational re-
23 search, development, and commercialization at
24 the Foundation, including partnership with the

1 private sector and other users of Foundation
2 funded research; and
3 (B) develop and implement the necessary
4 policies and procedures to promote a culture of
5 use-inspired and translational research within
6 the Directorate and across the Foundation and
7 carry out the responsibilities under paragraph
8 (4).
9 (4) RESPONSIBILITIES.—The responsibilities of
10 the Assistant Director shall include—
11 (A) advising the Director on all matters
12 pertaining to use-inspired and translational re-
13 search and development activities at the Foun-
14 dation, including effective practices for conver-
15 gence research;
16 (B) identifying opportunities for and facili-
17 tating coordination and collaboration, where ap-
18 propriate, on use-inspired and translational re-
19 search, development, commercialization, and so-
20 cietal application activities—
21 (i) among the offices, directorates,
22 and divisions within the Foundation; and
23 (ii) between the Foundation and
24 stakeholders in academia, the private sec-
25 tor, including non-profit entities, labor or-

1 ganizations, Federal or State agencies, and
2 international entities, as appropriate;
3 (C) ensuring that the activities carried out
4 under this section are not duplicative of activi-
5 ties supported by other parts of the Foundation
6 or other relevant Federal agencies;
7 (D) approving all new programs within the
8 Directorate;
9 (E) developing and testing diverse merit-
10 review models and mechanisms for selecting
11 and providing awards for use-inspired and
12 translational research and development at dif-
13 ferent scales, from individual investigator
14 awards to large multi-institution collaborations;
15 (F) assessing the success of programs;
16 (G) administering awards to achieve the
17 purposes described in subsection (b); and
18 (H) performing other such duties per-
19 taining to the purposes in subsection (b) as are
20 required by the Director.
21 (5) RELATIONSHIP TO THE DIRECTOR.—The
22 Assistant Director shall report to the Director.
23 (6) RELATIONSHIP TO OTHER PROGRAMS.—No
24 other directorate within the Foundation shall report
25 to the Assistant Director.

1 (e) ADVISORY COMMITTEE.—

2 (1) IN GENERAL.—In accordance with the Fed-
3 eral Advisory Committee Act (5 U.S.C. App.) the
4 Director shall establish an advisory committee to as-
5 sess, and make recommendations regarding, the ac-
6 tivities carried out under this section.

7 (2) MEMBERSHIP.—The advisory committee
8 members shall—

9 (A) be individuals with relevant experience
10 or expertise, including individuals from industry
11 and national labs, educators, academic subject
12 matter experts, technology transfer experts, and
13 representatives of civil society and other non-
14 governmental organizations; and

15 (B) consist of at least 10 members broadly
16 representative of stakeholders, including no less
17 than 3 members from the private sector, none
18 of whom shall be an employee of the Federal
19 Government.

20 (3) RESPONSIBILITIES.—The Committee shall
21 be responsible for—

22 (A) reviewing and evaluating activities car-
23 ried out under this section; and

1 (B) assessing the success of the Direc-
2 torate in and proposing new strategies for ful-
3 filling the purposes in subsection (b).
4 (f) EXISTING PROGRAMS.—The Convergence Accel-
5 erator, the Growing Convergence Research Big Idea, and
6 any other program, at the discretion of the Director, may
7 be managed by the Directorate.
8 (g) FOCUS AREAS.—In consultation with the Assist-
9 ant Director, the Board, and other Federal agencies and
10 taking into account advice under subsection (e), the Direc-
11 tor shall identify, and regularly update, up to 5 focus
12 areas to guide activities under this section. In selecting
13 such focus areas, the Director shall consider the following
14 societal challenges:
15 (1) Climate change and environmental sustain-
16 ability.
17 (2) Global competitiveness in critical tech-
18 nologies.
19 (3) Cybersecurity.
20 (4) National security.
21 (5) STEM education and workforce.
22 (6) Social and economic inequality.
23 (h) TRANSFER OF FUNDS.—
24 (1) IN GENERAL.—Funds made available to
25 carry out this section shall be available for transfer

1 to other offices, directorates, or divisions within the
2 Foundation for such use as is consistent with the
3 purposes for which such funds are provided.
4 (2) PROHIBITION ON TRANSFER FROM OTHER
5 OFFICES.—No funds shall be available for transfer
6 to the Directorate established under this section
7 from other offices, directorates, or divisions within
8 the Foundation.
9 (i) AUTHORITIES.—In addition to existing authorities
10 available to the Foundation, the Director may exercise the
11 following authorities in carrying out the activities under
12 this section:
13 (1) AWARDS.—In carrying out this section, the
14 Director may provide awards in the form of grants,
15 contracts, cooperative agreements, cash prizes, and
16 other transactions.
17 (2) APPOINTMENTS.—The Director shall have
18 the authority to—
19 (A) make appointments of scientific, engi-
20 neering, and professional personnel without re-
21 gard to the civil service laws as the Director de-
22 termines necessary for carrying out research
23 and development functions which require the
24 services of specially qualified personnel relating
25 to the focus areas identified under subsection

1 (g) and such other areas of national research
2 priorities as the Director may determine; and
3 (B) fix the basic pay of such personnel at
4 rates not in excess of the basic rate of pay of
5 the Vice President under section 104 of title 3,
6 United States Code, without regard to the civil
7 service laws.
8 (j) ETHICAL, LEGAL, AND SOCIETAL CONSIDER-
9 ATIONS.—The Director shall establish policies and set up
10 formal avenues for public input, as appropriate, to ensure
11 that ethical, legal, and societal considerations are explicitly
12 integrated into the priorities for the Directorate, including
13 the selection of focus areas under subsection (g), the
14 award-making process, and throughout all stages of sup-
15 ported projects.
16 (k) REPORTS AND ROADMAPS.—
17 (1) ANNUAL REPORT.—The Director shall pro-
18 vide to the relevant authorizing and appropriations
19 committees of Congress an annual report describing
20 projects supported by the Directorate during the
21 previous year.
22 (2) ROADMAP.—Not later than 1 year after the
23 date of enactment of this Act, the Director shall pro-
24 vide to the relevant authorizing and appropriations
25 committees of Congress a roadmap describing the

1 strategic vision that the Directorate will use to guide
2 investment decisions over the following 3 years.
3 (l) EVALUATION.—
4 (1) IN GENERAL.—After the Directorate has
5 been in operation for 6 years, the National Science
6 Board shall evaluate how well the Directorate is
7 achieving the purposes identified in subsection (b),
8 including an assessment of the impact of Directorate
9 activities on the Foundation's primary science mis-
10 sion.
11 (2) INCLUSIONS.—The evaluation shall in-
12 clude—
13 (A) a recommendation on whether the Di-
14 rectorate should be continued or terminated;
15 and
16 (B) a description of lessons learned from
17 operation of the Directorate.
18 (3) AVAILABILITY.—On completion of the eval-
19 uation, the evaluation shall be made available to
20 Congress and the public.
21 (m) LIMITATION.—No amounts may be appropriated
22 for the Directorate for each of fiscal years 2022, 2023,
23 2024, 2025, or 2026 unless—
24 (1) a specific appropriation is made for the Di-
25 rectorate; and

1 (2) the amount appropriated for the activities
2 of the Foundation, other than the activities author-
3 ized under this section, for each such fiscal year ex-
4 ceeds the amount appropriated for the Foundation
5 for fiscal year 2021, as adjusted for inflation in ac-
6 cordance with the Consumer Price Index published
7 by the Bureau of Labor Statistics of the Depart-
8 ment of Labor.

9 **SEC. 10. ADMINISTRATIVE AMENDMENTS.**

10 (a) SUPPORTING VETERANS IN STEM CAREERS.—
11 Section 3(c) of the Supporting Veterans in STEM Careers
12 Act is amended by striking "annual" and inserting "bien-
13 nial".

14 (b) SUNSHINE ACT COMPLIANCE.—Section 15 of the
15 National Science Foundation Authorization Act of 2002
16 is amended—

17 (1) so that paragraph (3) reads as follows:

18 "(3) COMPLIANCE REVIEW.—The Inspector
19 General of the Foundation shall conduct a review of
20 the compliance by the Board with the requirements
21 described in paragraph (2) as necessary based on a
22 triennial risk assessment. Any review deemed nec-
23 essary shall examine the proposed and actual con-
24 tent of closed meetings and determine whether the

1 closure of the meetings was consistent with section
2 552b of title 5, United States Code."; and
3 (2) by striking paragraphs (4) and (5) and in-
4 serting the following:
5 "(4) MATERIALS RELATING TO CLOSED POR-
6 TIONS OF MEETING.—To facilitate the risk assess-
7 ment required under paragraph (3) of this sub-
8 section, and any subsequent review conducted by the
9 Inspector General, the Office of the National Science
10 Board shall maintain the General Counsel's certifi-
11 cate, the presiding officer's statement, and a tran-
12 script or recording of any closed meeting, for at
13 least 3 years after such meeting.".
14 (c) SCIENCE AND ENGINEERING INDICATORS RE-
15 PORT SUBMISSION.—Section 4(j)(1) of the National
16 Science Foundation Act of 1950 (42 U.S.C. 1863(j)(1))
17 is amended by striking "January 15" and inserting
18 "March 15".
19 **SEC. 11. PLANNING AND CAPACITY BUILDING GRANTS.**
20 Section 602 of the American Innovation and Com-
21 petitiveness Act (42 U.S.C. 1862s–9) is amended—
22 (1) by redesignating subsection (e) as sub-
23 section (f); and
24 (2) by inserting after subsection (d), the fol-
25 lowing:

1 "(e) PLANNING AND CAPACITY BUILDING GRANTS.—

2 "(1) IN GENERAL.—Under the program estab-
3 lished in section 508 of the America COMPETES
4 Reauthorization Act of 2010 (42 U.S.C. 1862p–2)
5 and the activities authorized under this section, the
6 Director shall award grants to eligible entities for
7 planning and capacity building at institutions of
8 higher education.

9 "(2) ELIGIBLE ENTITY DEFINED.—In this sub-
10 section, the term 'eligible entity' means an institu-
11 tion of higher education (or a consortium of such in-
12 stitutions) that, according to the data published by
13 the National Center for Science and Engineering
14 Statistics, is not, on average, among the top 100 in-
15 stitutions in Federal R&D expenditures during the 3
16 year period prior to the year of the award.

17 "(3) USE OF FUNDS.—In addition to activities
18 listed under subsection (c), an eligible entity receiv-
19 ing a grant under this subsection may use funds
20 to—

21 "(A) ensure the availability of staff, includ-
22 ing technology transfer professionals, entre-
23 preneurs in residence, and other mentors as re-
24 quired to accomplish the purpose of this sub-
25 section;

1 "(B) revise institution policies, including
2 policies related to intellectual property and fac-
3 ulty entrepreneurship, and taking other nec-
4 essary steps to implement relevant best prac-
5 tices for academic technology transfer;
6 "(C) develop new local and regional part-
7 nerships among institutions of higher education
8 and between institutions of higher education
9 and private sector entities and other relevant
10 organizations with the purpose of building net-
11 works, expertise, and other capacity to identify
12 promising research that may have potential
13 market value and enable researchers to pursue
14 further development and transfer of their ideas
15 into possible commercial or other use;
16 "(D) develop seminars, courses, and other
17 educational opportunities for students, post-doc-
18 toral researchers, faculty, and other relevant
19 staff at institutions of higher education to in-
20 crease awareness and understanding of entre-
21 preneurship, patenting, business planning, and
22 other areas relevant to technology transfer, and
23 connect students and researchers to relevant re-
24 sources, including mentors in the private sector;
25 and

"(E) create and fund competitions to allow entrepreneurial students and faculty to illustrate the commercialization potential of their ideas.

"(4) MINIMUM DURATION AND SIZE OF AWARD.—Grants awarded under this subsection shall be at least 3 years in duration and $500,000 in total amount.

"(5) APPLICATION.—An eligible entity seeking funding under this subsection shall submit an application to the Director of the Foundation at such time, in such manner, and containing such information and assurances as such Director may require. The application shall include, at a minimum, a description of how the eligible entity submitting an application plans to sustain the proposed activities beyond the duration of the grant.

"(6) AUTHORIZATION OF APPROPRIATIONS.—From within funds authorized under section 9, there are authorized to carry out the activities under this subsection $40 million for each of fiscal years 2022 through 2026.".

☒

Chairwoman JOHNSON. Without objection, the bill is considered as read and open to amendment at any point.

Does anyone wish to be recognized to speak on the underlying bill?

Mr. Posey.

Mr. POSEY. Thank you very much, Chairwoman Johnson. And I want to echo the Ranking Member's comments about the truly great job that you've done bringing the bill forth so far.

And I just want to point out that this bill will directly compete with NASA's (National Aeronautics and Space Administration's) budget when it comes to appropriating funds because they're both funded out of the same pot of money, the same Commerce, Justice, Science appropriations lineup. The authorizing amount of funds has increased tremendously with this bill and will force the Appropriations Committee to fund it. I'm concerned that some of the funds may come from NASA's budget. There have been past amendments on the House floor cutting NASA's budget and sending funds to National Science Foundation and other places. I'd just like to make that clear, Madam Chairwoman, and I thank you again for the great job you've done.

Chairwoman JOHNSON. Thank you very much. Anyone else?

OK. We will proceed now with the amendments in the order on the roster. The first amendment on the roster is an amendment offered by myself, and the Clerk will report the amendment.

The CLERK. Amendment No. 1, amendment in the nature of a substitute to H.R. 2225 offered by Chairwoman Johnson and Ranking Member Lucas.

[The amendment of Chairwoman Johnson follows:]

AMENDMENT IN THE NATURE OF A SUBSTITUTE TO H.R. 2225

OFFERED BY M__. _____

Strike all after the enacting clause and insert the following:

1 **SECTION 1. SHORT TITLE.**

2 This Act may be cited as the "National Science
3 Foundation for the Future Act".

4 **SEC. 2. FINDINGS.**

5 Congress finds the following:

6 (1) Over the past seven decades, the National
7 Science Foundation has played a critical role in ad-
8 vancing the United States academic research enter-
9 prise by supporting fundamental research and edu-
10 cation across science and engineering disciplines.

11 (2) Discoveries enabled by sustained investment
12 in fundamental research and the education of the
13 United States science and engineering workforce
14 have led to transformational innovations and
15 spawned new industries.

16 (3) While the traditional approach to invest-
17 ment in research has delivered myriad benefits to so-
18 ciety, a concerted effort is needed to ensure the ben-

efits of federally funded science and engineering are enjoyed by all Americans.

(4) As countries around the world increase investments in research and STEM education, United States global leadership in science and engineering is eroding, posing significant risks to economic competitiveness, national security, and public well-being.

(5) To address major societal challenges and sustain United States leadership in innovation, the Federal Government must increase investments in research, broaden participation in the STEM workforce, and bolster collaborations among universities, National Laboratories, field stations and marine laboratories, companies, labor organizations, non-profit funders of research, local policymakers, civil societies and stakeholder communities, and international partners.

SEC. 3. DEFINITIONS.

In this Act:

(1) ACADEMIES.—The term "Academies" means the National Academies of Sciences, Engineering, and Medicine.

(2) ARTIFICIAL INTELLIGENCE.—The term "artificial intelligence" has the meaning given such term in section 5002 of the William M. (MAC)

1 Thornberry National Defense Authorization Act for
2 Fiscal Year 2021.
3 (3) AWARDEE.—The term "awardee" means
4 the legal entity to which Federal assistance is
5 awarded and that is accountable to the Federal Gov-
6 ernment for the use of the funds provided.
7 (4) BOARD.—The term "Board" means the Na-
8 tional Science Board.
9 (5) DIRECTOR.—The term "Director" means
10 the Director of the National Science Foundation.
11 (6) EMERGING RESEARCH INSTITUTION.—The
12 term "emerging research institution" means an in-
13 stitution of higher education with an established un-
14 dergraduate student program that has, on average
15 for 3 years prior to the time of application for an
16 award, received less than $35,000,000 in Federal re-
17 search funding.
18 (7) FEDERAL SCIENCE AGENCY.—The term
19 "Federal science agency" means any Federal agency
20 with an annual extramural research expenditure of
21 over $100,000,000.
22 (8) FOUNDATION.—The term "Foundation"
23 means the National Science Foundation.
24 (9) INSTITUTION OF HIGHER EDUCATION.—The
25 term "institution of higher education" has the

1 meaning given the term in section 101(a) of the
2 Higher Education Act of 1965 (20 U.S.C. 1001(a)).
3 (10) LABOR ORGANIZATION.—The term "labor
4 organization" has the meaning given the term in
5 section 2(5) of the National Labor Relations Act (29
6 U.S.C. 152(5)), except that such term shall also in-
7 clude—
8 (A) any organization composed of labor or-
9 ganizations, such as a labor union federation or
10 a State or municipal labor body; and
11 (B) any organization which would be in-
12 cluded in the definition for such term under
13 such section (5) but for the fact that the orga-
14 nization represents—
15 (i) individuals employed by the United
16 States, any wholly owned Government cor-
17 poration, any Federal Reserve Bank, or
18 any State or political subdivision thereof;
19 (ii) individuals employed by persons
20 subject to the Railway Labor Act (45
21 U.S.C. 151 et seq.); or
22 (iii) individuals employed as agricul-
23 tural laborers.
24 (11) NON-PROFIT ORGANIZATION.—The term
25 "non-profit organization" means an organization

which is described in section 501(c)(3) of the Internal Revenue Code of 1986 and exempt from tax under section 501(a) of such code.

(12) NSF INCLUDES.—The term "NSF includes" means the initiative carried out under section 6(c).

(13) PREK-12.—The term "preK-12" means pre-kindergarten through grade 12.

(14) SKILLED TECHNICAL WORK.—The term "skilled technical work" means an occupation that requires a high level of knowledge in a technical domain and does not require a bachelor's degree for entry.

(15) STEM.—The term "STEM" has the meaning given the term in section 2 of the America COMPETES Reauthorization Act of 2010 (42 U.S.C. 6621 note).

(16) STEM EDUCATION.—The term "STEM education" has the meaning given the term in section 2 of the STEM Education Act of 2015 (42 U.S.C. 6621 note).

SEC. 4. AUTHORIZATION OF APPROPRIATIONS.

(a) FISCAL YEAR 2022.—

1 (1) IN GENERAL.—There are authorized to be
2 appropriated to the Foundation $11,582,200,000 for
3 fiscal year 2022.
4 (2) SPECIFIC ALLOCATIONS.—Of the amount
5 authorized under paragraph (1)—
6 (A) $9,248,810,000 shall be made avail-
7 able to carry out research and related activities,
8 of which—
9 (i) $55,000,000 shall be for the Mid-
10 Scale Research Infrastructure Program;
11 and
12 (ii) $1,000,000,000 shall be for the
13 Directorate for Science and Engineering
14 Solutions;
15 (B) $1,583,160,000 shall be made avail-
16 able for education and human resources, of
17 which—
18 (i) $73,700,000 shall be for the Rob-
19 ert Noyce Teacher Scholarship Program;
20 (ii) $59,500,000 shall be for the NSF
21 Research Traineeship Program;
22 (iii) $416,300,000 shall be for the
23 Graduate Research Fellowship Program;
24 and

(iv) $70,000,000 shall be for the Cybercorps Scholarship for Service Program;

(C) $249,000,000 shall be made available for major research equipment and facilities construction, of which $76,250,000 shall be for the Mid-Scale Research Infrastructure Program;

(D) $473,500,000 shall be made available for agency operations and award management;

(E) $4,620,000 shall be made available for the Office of the National Science Board; and

(F) $23,120,000 shall be made available for the Office of the Inspector General.

(b) FISCAL YEAR 2023.—

(1) IN GENERAL.—There are authorized to be appropriated to the Foundation $12,721,000,000 for fiscal year 2023.

(2) SPECIFIC ALLOCATIONS.—Of the amount authorized under paragraph (1)—

(A) $10,157,260,000 shall be made available to carry out research and related activities, of which—

(i) $60,000,000 shall be for the Mid-Scale Research Infrastructure Program; and

(ii) $1,500,000,000 shall be for the Directorate for Science and Engineering Solutions;

(B) $1,654,520,000 shall be made available for education and human resources, of which—

(i) $80,400,000 shall be for the Robert Noyce Teacher Scholarship Program;

(ii) $64,910,000 shall be for the NSF Research Traineeship Program;

(iii) $454,140,000 shall be for the Graduate Research Fellowship Program; and

(iv) $72,000,000 shall be for the Cybercorps Scholarship for Service Program;

(C) $355,000,000 shall be made available for major research equipment and facilities construction, of which $80,000,000 shall be for the Mid-Scale Research Infrastructure Program;

(D) $522,940,000 shall be made available for agency operations and award management;

(E) $4,660,000 shall be made available for the Office of the National Science Board; and

(F) $26,610,000 shall be made available for the Office of the Inspector General.

(c) FISCAL YEAR 2024.—

(1) IN GENERAL.—There are authorized to be appropriated to the Foundation $14,204,380,000 for fiscal year 2024.

(2) SPECIFIC ALLOCATIONS.—Of the amount authorized under paragraph (1)—

(A) $11,476,970,000 shall be made available to carry out research and related activities, of which—

(i) $70,000,000 shall be for the Mid-Scale Research Infrastructure Program; and

(ii) $2,250,000,000 shall be for the Directorate for Science and Engineering Solutions;

(B) $1,739,210,000 shall be made available for education and human resources, of which—

(i) $87,100,000 shall be for the Robert Noyce Teacher Scholarship Program;

(ii) $70,320,000 shall be for the NSF Research Traineeship Program;

(iii) $491,990,000 shall be for the Graduate Research Fellowship Program; and

(iv) $78,000,000 shall be for the Cybercorps Scholarship for Service Program;

(C) $370,000,000 shall be made available for major research equipment and facilities construction, of which $85,000,000 shall be for the Mid-Scale Research Infrastructure Program;

(D) $582,380,000 shall be made available for agency operations and award management;

(E) $4,700,000 shall be made available for the Office of the National Science Board; and

(F) $31,110,000 shall be made available for the Office of the Inspector General.

(d) FISCAL YEAR 2025.—

(1) IN GENERAL.—There are authorized to be appropriated to the Foundation $16,096,450,000 for fiscal year 2025.

(2) SPECIFIC ALLOCATIONS.—Of the amount authorized under paragraph (1)—

(A) $13,199,800,000 shall be made available to carry out research and related activities, of which—

(i) $75,000,000 shall be for the Mid-Scale Research Infrastructure Program; and

(ii) $3,375,000,000 shall be for the Directorate for Science and Engineering Solutions;

(B) $1,823,470,000 shall be made available for education and human resources, of which—

(i) $93,800,000 shall be for the Robert Noyce Teacher Scholarship Program;

(ii) $75,730,000 shall be for the NSF Research Traineeship Program;

(iii) $529,830,000 shall be for the Graduate Research Fellowship Program; and

(iv) $84,000,000 shall be for the Cybercorps Scholarship for Service Program;

(C) $372,000,000 shall be made available for major research equipment and facilities construction, of which $90,000,000 shall be for the Mid-Scale Research Infrastructure Program;

(D) $661,830,000 shall be made available for agency operations and award management;

(E) $4,740,000 shall be made available for the Office of the National Science Board; and

(F) $34,610,000 shall be made available for the Office of the Inspector General.

(e) FISCAL YEAR 2026.—

(1) IN GENERAL.—There are authorized to be appropriated to the Foundation $18,388,140,000 for fiscal year 2026.

(2) SPECIFIC ALLOCATIONS.—Of the amount authorized under paragraph (1)—

(A) $15,292,390,000 shall be made available to carry out research and related activities, of which—

(i) $80,000,000 shall be for the Mid-Scale Research Infrastructure Program; and

(ii) $5,062,500,000 shall be for the Directorate for Science and Engineering Solutions;

(B) $1,921,600,000 shall be made available for education and human resources, of which—

(i) $100,500,000 shall be for the Robert Noyce Teacher Scholarship Program;

(ii) $81,140,000 shall be for the NSF Research Traineeship Program;

(iii) $567,680,000 shall be for the Graduate Research Fellowship Program; and

(iv) $90,000,000 shall be for the Cybercorps Scholarship for Service Program;

(C) $375,000,000 shall be made available for major research equipment and facilities construction, of which $100,000,000 shall be for the Mid-Scale Research Infrastructure Program;

(D) $756,270,000 shall be made available for agency operations and award management;

(E) $4,780,000 shall be made available for the Office of the National Science Board; and

(F) $38,110,000 shall be made available for the Office of the Inspector General.

SEC. 5. STEM EDUCATION.

(a) PREK-12 STEM EDUCATION.—

(1) DECADAL SURVEY OF STEM EDUCATION RESEARCH.—Not later than 45 days after the date of enactment of this Act, the Director shall enter into a contract with the Academies to review and assess

1 the status and opportunities for PreK–12 STEM
2 education research and make recommendations for
3 research priorities over the next decade.
4 (2) SCALING INNOVATIONS IN PREK-12 STEM
5 EDUCATION.—
6 (A) IN GENERAL.—The Director shall es-
7 tablish a program to award grants, on a com-
8 petitive basis, to institutions of higher edu-
9 cation or non-profit organizations (or consortia
10 of such institutions or organizations) to estab-
11 lish no fewer than 3 multidisciplinary Centers
12 for Transformative Education Research and
13 Translation (in this section referred to as "Cen-
14 ters") to support research and development on
15 widespread and sustained implementation of
16 STEM education innovations.
17 (B) APPLICATION.—An institution of high-
18 er education or non-profit organization (or a
19 consortium of such institutions or organiza-
20 tions) seeking funding under subparagraph (A)
21 shall submit an application to the Director at
22 such time, in such manner, and containing such
23 information as the Director may require. The
24 application shall include, at a minimum, a de-
25 scription of how the proposed Center will—

1 (i) establish partnerships among aca-
2 demic institutions, local or State education
3 agencies, and other relevant stakeholders
4 in supporting programs and activities to
5 facilitate the widespread and sustained im-
6 plementation of promising, evidence-based
7 STEM education practices, models, pro-
8 grams, curriculum, and technologies;
9 (ii) support enhanced STEM edu-
10 cation infrastructure, including
11 cyberlearning technologies, to facilitate the
12 widespread adoption of promising, evi-
13 dence-based practices;
14 (iii) support research and development
15 on scaling practices, partnerships, and al-
16 ternative models to current approaches, in-
17 cluding approaches sensitive to the unique
18 combinations of capabilities, resources, and
19 needs of varying localities, educators, and
20 learners;
21 (iv) include a focus on the learning
22 needs of under resourced schools and
23 learners in low-resource or underachieving
24 local education agencies in urban and rural
25 communities and the development of high-

1 quality curriculum that engages these
2 learners in the knowledge and practices of
3 STEM fields;
4 (v) include a focus on the learning
5 needs and unique challenges facing stu-
6 dents with disabilities; and
7 (vi) support research and development
8 on scaling practices and models to support
9 and sustain highly-qualified STEM edu-
10 cators in urban and rural communities.
11 (C) ADDITIONAL CONSIDERATIONS.—In
12 awarding a grant under this paragraph, the Di-
13 rector may also consider the extent to which the
14 proposed Center will—
15 (i) leverage existing collaborations,
16 tools, and strategies supported by the
17 Foundation, including NSF INCLUDES
18 and the Convergence Accelerators;
19 (ii) support research on and the devel-
20 opment and scaling of innovative ap-
21 proaches to distance learning and edu-
22 cation for various student populations;
23 (iii) support education innovations
24 that leverage new technologies or deepen

1 understanding of the impact of technology
2 on educational systems; and
3 (iv) include a commitment from local
4 or State education administrators to mak-
5 ing the proposed reforms and activities a
6 priority.
7 (D) PARTNERSHIP.—In carrying out the
8 program under subparagraph (A), the Director
9 shall explore opportunities to partner with the
10 Department of Education, including through
11 jointly funding activities under this paragraph.
12 (E) ANNUAL MEETING.—The Director
13 shall encourage and facilitate an annual meet-
14 ing of the Centers to foster collaboration among
15 the Centers and to further disseminate the re-
16 sults of the Centers' activities.
17 (F) REPORT.—Not later than 5 years after
18 the date of enactment of this Act, the Director
19 shall submit to Congress a report describing the
20 activities carried out pursuant to this para-
21 graph that includes—
22 (i) a description of the focus and pro-
23 posed goals of each Center; and

1 (ii) an assessment of the program's
2 success in helping to promote scalable solu-
3 tions in PreK-12 STEM education.
4 (3) NATIONAL ACADEMIES STUDY.—Not later
5 than 45 days after the date of enactment of this
6 Act, the Director shall enter into an agreement with
7 the Academies to conduct a study to—
8 (A) review the research literature and iden-
9 tify research gaps regarding the interconnected
10 factors that foster and hinder successful imple-
11 mentation of promising, evidence-based PreK-
12 12 STEM education innovations at the local,
13 regional, and national level;
14 (B) present a compendium of promising,
15 evidence-based PreK-12 STEM education prac-
16 tices, models, programs, and technologies;
17 (C) identify barriers to widespread and
18 sustained implementation of such innovations;
19 and
20 (D) make recommendations to the Founda-
21 tion, the Department of Education, the Na-
22 tional Science and Technology Council's Com-
23 mittee on Science, Technology, Engineering,
24 and Mathematics Education, State and local

1 educational agencies, and other relevant stake-
2 holders on measures to address such barriers.
3 (4) SUPPORTING PRE-K–8 INFORMAL STEM OP-
4 PORTUNITIES.—Section 3 of the STEM Education
5 Act of 2015 (42 U.S.C. 1862q) is amended by add-
6 ing at the end the following:
7 "(c) PRE-K–8 INFORMAL STEM PROGRAM.—
8 "(1) IN GENERAL.—The Director of the Na-
9 tional Science Foundation shall provide grants to in-
10 stitutions of higher education or a non-profit organi-
11 zations (or a consortia of such intuitions or organi-
12 zation) on a merit-reviewed, competitive basis for re-
13 search on programming that engages students in
14 grades PREK-8, including underrepresented and
15 rural students, in STEM in order to prepare such
16 students to pursue degrees or careers in STEM.
17 "(2) USE OF FUNDS.—
18 "(A) IN GENERAL.—Grants awarded under
19 this section shall be used toward research to ad-
20 vance the engagement of students, including
21 underrepresented and rural students, in grades
22 PREK-8 in STEM through providing before-
23 school, after-school, out-of-school, or summer
24 activities, including in single-gender environ-
25 ments or programming, that are designed to en-

1 courage interest, engagement, and skills devel-
2 opment for students in STEM.
3 "(B) PERMITTED ACTIVITIES.—The activi-
4 ties described in subparagraph (A) may in-
5 clude—
6 "(i) the provision of programming de-
7 scribed in such subparagraph for the pur-
8 pose of research described in such subpara-
9 graph;
10 "(ii) the use of a variety of engage-
11 ment methods, including cooperative and
12 hands-on learning;
13 "(iii) exposure of students to role
14 models in the fields of STEM and near-
15 peer mentors;
16 "(iv) training of informal learning
17 educators, youth-serving professionals, and
18 volunteers who lead informal STEM pro-
19 grams in using evidence-based methods
20 consistent with the target student popu-
21 lation being served;
22 "(v) education of students on the rel-
23 evance and significance of STEM careers,
24 provision of academic advice and assist-
25 ance, and activities designed to help stu-

1 dents make real-world connections to
2 STEM content;
3 "(vi) the attendance of students at
4 events, competitions, and academic pro-
5 grams to provide content expertise and en-
6 courage career exposure in STEM, which
7 may include the purchase of parts and sup-
8 plies needed to participate in such competi-
9 tions;
10 "(vii) activities designed to engage
11 parents and families of students in grades
12 PREK-8 in STEM;
13 "(viii) innovative strategies to engage
14 students, such as using leadership skills
15 and outcome measures to impart youth
16 with the confidence to pursue STEM
17 coursework and academic study;
18 "(ix) coordination with STEM-rich
19 environments, including other nonprofit,
20 nongovernmental organizations, out-of-
21 classroom settings, single-gender environ-
22 ments, institutions of higher education, vo-
23 cational facilities, corporations, museums,
24 or science centers; and

1 "(x) the acquisition of instructional
2 materials or technology-based tools to con-
3 duct applicable grant activity.
4 "(3) APPLICATION.—An applicant seeking
5 funding under the section shall submit an applica-
6 tion at such time, in such manner, and containing
7 such information as may be required. Applications
8 that include or partner with a nonprofit, nongovern-
9 mental organization that has extensive experience
10 and expertise in increasing the participation of stu-
11 dents in PREK-8 in STEM are encouraged. The ap-
12 plication may include the following:
13 "(A) A description of the target audience
14 to be served by the research activity or activi-
15 ties for which such funding is sought.
16 "(B) A description of the process for re-
17 cruitment and selection of students to partici-
18 pate in such activities.
19 "(C) A description of how such activity or
20 activities may inform programming that en-
21 gages students in grades PREK-8 in STEM.
22 "(D) A description of how such activity or
23 activities may inform programming that pro-
24 motes student academic achievement in STEM.

1 "(E) An evaluation plan that includes, at
2 a minimum, the use of outcome-oriented meas-
3 ures to determine the impact and efficacy of
4 programming being researched.
5 "(4) EVALUATIONS.—Each recipient of a grant
6 under this section shall provide, at the conclusion of
7 every year during which the grant funds are re-
8 ceived, an evaluation in a form prescribed by the Di-
9 rector.
10 "(5) ACCOUNTABILITY AND DISSEMINATION.—
11 "(A) EVALUATION REQUIRED.—The Direc-
12 tor shall evaluate the activities established
13 under this section. Such evaluation shall—
14 "(i) use a common set of benchmarks
15 and tools to assess the results of research
16 conducted under such grants; and
17 "(ii) to the extent practicable, inte-
18 grate the findings of the research resulting
19 from the activity or activities funded
20 through the grant with the current re-
21 search on serving students with respect to
22 the pursuit of degrees or careers in STEM,
23 including underrepresented and rural stu-
24 dents, in grades PREK-8.

"(B) REPORT ON EVALUATIONS.—Not later than 180 days after the completion of the evaluation under subparagraph (A), the Director shall submit to Congress and make widely available to the public a report that includes—

"(i) the results of the evaluation; and

"(ii) any recommendations for administrative and legislative action that could optimize the effectiveness of the program under this section.

"(6) COORDINATION.—In carrying out this section, the Director shall, for purposes of enhancing program effectiveness and avoiding duplication of activities, consult, cooperate, and coordinate with the programs and policies of other relevant Federal agencies.".

(b) UNDERGRADUATE STEM EDUCATION.—

(1) RESEARCH ON STEM EDUCATION AND WORKFORCE NEEDS.—The Director shall award grants, on a competitive basis, to four-year institutions of higher education or non-profit organizations (or consortia of such institutions or organizations) to support research and development activities to—

(A) encourage greater collaboration and coordination between institutions of higher edu-

1 cation and industry to enhance education, foster
2 hands-on learn experiences, and improve align-
3 ment with workforce needs;
4 (B) understand the current composition of
5 the STEM workforce and the factors that influ-
6 ence growth, retention, and development of that
7 workforce;
8 (C) increase the size, diversity, capability,
9 and flexibility of the STEM workforce; and
10 (D) increase dissemination and widespread
11 adoption of effective practices in undergraduate
12 education and workforce development.
13 (2) ADVANCED TECHNOLOGICAL EDUCATION
14 PROGRAM UPDATE.—Section 3(b) of the Scientific
15 and Advanced Technology Act of 1992 (42 U.S.C.
16 1862i(b)) is amended to read as follows:
17 "(b) NATIONAL COORDINATION NETWORK FOR
18 SCIENCE AND TECHNICAL EDUCATION.—The Director
19 shall award grants to institutions of higher education,
20 non-profit organizations, and associate-degree granting
21 colleges (or consortia of such institutions or organizations)
22 to establish a network of centers for science and technical
23 education. The centers shall—
24 "(1) coordinate research, training, and edu-
25 cation activities funded by awards under subsection

1 (a) and share information and best practices across
2 the network of awardees;
3 "(2) serve as a national and regional clearing-
4 house and resource to communicate and coordinate
5 research, training, and educational activities across
6 disciplinary, organizational, geographic, and inter-
7 national boundaries and disseminate best practices;
8 and
9 "(3) develop national and regional partnerships
10 between PreK–12 schools, two-year colleges, institu-
11 tions of higher education, workforce development
12 programs, labor organizations, and industry to meet
13 workforce needs.".
14 (3) INNOVATIONS IN STEM EDUCATION AT COM-
15 MUNITY COLLEGES.—
16 (A) IN GENERAL.—The Director shall
17 award grants on a merit-reviewed, competitive
18 basis to institutions of higher education or non-
19 profit organizations (or consortia of such insti-
20 tutions or organizations) to advance research on
21 the nature of learning and teaching at commu-
22 nity colleges and to improve outcomes for stu-
23 dents who enter the workforce upon completion
24 of their STEM degree or credential or transfer
25 to 4-year institutions, including by—

1 (i) examining how to scale up success-
2 ful programs at Community Colleges that
3 are improving student outcomes in
4 foundational STEM courses;
5 (ii) supporting research on effective
6 STEM teaching practices in community
7 college settings;
8 (iii) designing and developing new
9 STEM curricula;
10 (iv) providing STEM students with
11 hands-on training and research experi-
12 ences, internships, and other experiential
13 learning opportunities;
14 (v) increasing access to high quality
15 STEM education through new tech-
16 nologies;
17 (vi) re-skilling or up-skilling incum-
18 bent workers for new STEM jobs;
19 (vii) building STEM career and seam-
20 less transfer pathways; and
21 (viii) developing novel mechanisms to
22 identify and recruit talent into STEM pro-
23 grams, in particular talent from groups
24 historically underrepresented in STEM.

1 (B) PARTNERSHIPS.—In carrying out ac-
2 tivities under this paragraph, the Director shall
3 encourage applications to develop, enhance, or
4 expand cooperative STEM education and train-
5 ing partnerships between institutions of higher
6 education, industry, and labor organizations.
7 (c) ADVANCED TECHNOLOGICAL MANUFACTURING
8 ACT.—
9 (1) FINDINGS AND PURPOSE.—Section 2 of the
10 Scientific and Advanced-Technology Act of 1992 (42
11 U.S.C. 1862h) is amended—
12 (A) in subsection (a)—
13 (i) in paragraph (3), by striking
14 "science, mathematics, and technology"
15 and inserting "science, technology, engi-
16 neering, and mathematics or STEM";
17 (ii) in paragraph (4), by inserting
18 "educated" and before "trained"; and
19 (iii) in paragraph (5), by striking
20 "scientific and technical education and
21 training" and inserting "STEM education
22 and training"; and
23 (B) in subsection (b)—

(i) in paragraph (2), by striking "mathematics and science" and inserting "STEM fields"; and

(ii) in paragraph (4), by striking "mathematics and science instruction" and inserting "STEM instruction".

(2) MODERNIZING REFERENCES TO STEM.—Section 3 of the Scientific and Advanced-Technology Act of 1992 (42 U.S.C. 1862i) is amended—

(A) in the section heading, by striking "**SCIENTIFIC AND TECHNICAL EDUCATION** " and inserting "**STEM EDUCATION**";

(B) in subsection (a)—

(i) in the subsection heading, by striking "SCIENTIFIC AND TECHNICAL EDUCATION " and inserting "STEM EDUCATION";

(ii) in the matter preceding paragraph (1)—

(I) by inserting "and education to prepare the skilled technical workforce to meet workforce demands" before ", and to improve";

(II) by striking "core education courses in science and mathematics"

and inserting "core education courses in STEM fields";

(III) by inserting "veterans and individuals engaged in" before "work in the home"; and

(IV) by inserting "and on building a pathway from secondary schools, to associate-degree-granting institutions, to careers that require technical training" before ", and shall be designed";

(iii) in paragraph (1)—

(I) by inserting "and study" after "development"; and

(II) by striking "core science and mathematics courses" and inserting "core STEM courses";

(iv) in paragraph (2), by striking "science, mathematics, and advanced-technology fields" and inserting "STEM and advanced-technology fields";

(v) in paragraph (3)(A), by inserting "to support the advanced-technology industries that drive the competitiveness of the

1 United States in the global economy" be-
2 fore the semicolon at the end;
3 (vi) in paragraph (4), by striking "sci-
4 entific and advanced-technology fields" and
5 inserting "STEM and advanced-technology
6 fields"; and
7 (vii) in paragraph (5), by striking
8 "advanced scientific and technical edu-
9 cation" and inserting "advanced STEM
10 and advanced-technology";
11 (C) in subsection (b)—
12 (i) by striking the subsection heading
13 and inserting the following: "CENTERS OF
14 SCIENTIFIC AND TECHNICAL EDU-
15 CATION.—";
16 (ii) in the matter preceding paragraph
17 (1), by striking "not to exceed 12 in num-
18 ber" and inserting "in advanced-technology
19 fields";
20 (iii) in paragraph (2), by striking
21 "education in mathematics and science"
22 and inserting "STEM education"; and
23 (iv) in the flush matter following
24 paragraph (2), by striking "in the geo-
25 graphic region served by the center";

1 (D) in subsection (c)—

2 (i) in paragraph (1)—

3 (I) in subparagraph (A)—

4 (aa) in the matter preceding

5 clause (i), by striking "to encour-

6 age" and all that follows through

7 "such means as—" and inserting

8 "to encourage the development of

9 career and educational pathways

10 with multiple entry and exit

11 points leading to credentials and

12 degrees, and to assist students

13 pursuing pathways in STEM

14 fields to transition from asso-

15 ciate-degree-granting colleges to

16 bachelor-degree-granting institu-

17 tions, through such means as—";

18 (bb) in clause (i), by striking

19 "to ensure" and inserting "to de-

20 velop articulation agreements

21 that ensure"; and

22 (cc) in clause (ii), by strik-

23 ing "courses at the bachelor-de-

24 gree-granting institution" and in-

25 serting "the career and edu-

1 cational pathways supported by
2 the articulation agreements";
3 (II) in subparagraph (B)—
4 (aa) in clause (i), by insert-
5 ing "veterans and individuals en-
6 gaged in" before "work in the
7 home";
8 (bb) in clause (iii)—
9 (AA) by striking "bach-
10 elor's-degree-granting insti-
11 tutions" and inserting "in-
12 stitutions or work sites";
13 and
14 (BB) by inserting "or
15 industry internships" after
16 "summer programs"; and
17 (cc) by striking the flush
18 text following clause (iv); and
19 (III) by striking subparagraph
20 (C);
21 (ii) in paragraph (2)—
22 (I) by striking "mathematics and
23 science programs" and inserting
24 "STEM programs";

(II) by inserting "and, as appropriate, elementary schools," after "with secondary schools";

(III) by striking "mathematics and science education" and inserting "STEM education";

(IV) by striking "secondary school students" and inserting "students at these schools";

(V) by striking "science and advanced-technology fields" and inserting "STEM and advanced-technology fields"; and

(VI) by striking "agreements with local educational agencies" and inserting "articulation agreements or dual credit courses with local secondary schools, or other means as the Director determines appropriate,"; and

(iii) in paragraph (3)—

(I) by striking subparagraph (B);

(II) by striking "shall—"and all that follows through "establish a" and inserting "shall establish a";

(III) by striking "the fields of science, technology, engineering, and mathematics" and inserting "STEM fields"; and

(IV) by striking "; and" and inserting ", including jobs at Federal and academic laboratories.";

(E) in subsection (d)(2)—

(i) in subparagraph (D), by striking "and" after the semicolon;

(ii) in subparagraph (E), by striking the period at the end and inserting a semicolon; and

(iii) by adding at the end the following:

"(F) as appropriate, applications that apply the best practices for STEM education and technical skills education through distance learning or in a simulated work environment, as determined by research described in subsection (f); and";

(F) in subsection (g), by striking the second sentence;

(G) in subsection (h)(1)—

(i) in subparagraph (A), by striking "2022" and inserting "2026";

(ii) in subparagraph (B), by striking "2022" and inserting "2026"; and

(iii) in subparagraph (C)—

(I) by striking "up to $2,500,000" and inserting "not less than $3,000,000"; and

(II) by striking "2022" and inserting "2026";

(H) in subsection (i)—

(i) by striking paragraph (3); and

(ii) by redesignating paragraphs (4) and (5) as paragraphs (3) and (4), respectively; and

(I) in subsection (j)—

(i) by striking paragraph (1) and inserting the following:

"(1) the term advanced-technology includes technological fields such as advanced manufacturing, agricultural-, biological- and chemical-technologies, energy and environmental technologies, engineering technologies, information technologies, micro and nano-technologies, cybersecurity technologies,

1 geospatial technologies, and new, emerging tech-
2 nology areas;";
3 (ii) in paragraph (4), by striking
4 "separate bachelor-degree-granting institu-
5 tions" and inserting "other entities";
6 (iii) by striking paragraph (7);
7 (iv) by redesignating paragraphs (8)
8 and (9) as paragraphs (7) and (8), respec-
9 tively;
10 (v) in paragraph (7), as redesignated
11 by subparagraph (D), by striking "and"
12 after the semicolon;
13 (vi) in paragraph (8), as redesignated
14 by subparagraph (D)—
15 (I) by striking "mathematics,
16 science, engineering, or technology"
17 and inserting "science, technology, en-
18 gineering, or mathematics"; and
19 (II) by striking the period at the
20 end and inserting "; and"; and
21 (vii) by adding at the end the fol-
22 lowing:
23 "(9) the term skilled technical workforce means
24 workers—

"(A) in occupations that use significant levels of science and engineering expertise and technical knowledge; and

"(B) whose level of educational attainment is less than a bachelor degree.".

(3) AUTHORIZATION OF APPROPRIATIONS.—Section 5 of the Scientific and Advanced-Technology Act of 1992 (42 U.S.C. 1862j) is amended to read as follows:

"SEC. 5. AUTHORIZATION OF APPROPRIATIONS.

"There are authorized to be appropriated to the Director for carrying out sections 2 through 4, $150,000,000 for fiscal years 2022 through 2026.".

(d) GRADUATE STEM EDUCATION.—

(1) MENTORING AND PROFESSIONAL DEVELOPMENT.—

(A) MENTORING PLANS.—

(i) UPDATE.—Section 7008 of the America Creating Opportunities to Meaningfully Promote Excellence in Technology, Education, and Science Act (42 U.S.C. 1862o) is amended by—

(I) inserting "and graduate student" after "postdoctoral"; and

1 (II) inserting "The requirement
2 may be satisfied by providing such in-
3 dividuals with access to mentors, in-
4 cluding individuals not listed on the
5 grant." after "review criterion.".
6 (ii) EVALUATION.—Not later than 45
7 days after the date of enactment of this
8 Act, the Director shall enter into an agree-
9 ment with a qualified independent organi-
10 zation to evaluate the effectiveness of the
11 postdoctoral mentoring plan requirement
12 for improving mentoring for Foundation-
13 supported postdoctoral researchers.
14 (B) CAREER EXPLORATION.—
15 (i) IN GENERAL.—The Director shall
16 award grants, on a competitive basis, to in-
17 stitutions of higher education and non-
18 profit organizations (or consortia of such
19 institutions or organizations) to develop in-
20 novative approaches for facilitating career
21 exploration of academic and non-academic
22 career options and for providing oppor-
23 tunity-broadening experiences, including
24 work-integrated opportunities, for graduate
25 students and postdoctoral scholars that

1 can then be considered, adopted, or adapt-
2 ed by other institutions and to carry out
3 research on the impact and outcomes of
4 such activities.
5 (ii) REVIEW OF PROPOSALS.—In se-
6 lecting grant recipients under this subpara-
7 graph, the Director shall consider, at a
8 minimum—
9 (I) the extent to which the ad-
10 ministrators of the institution are
11 committed to making the proposed ac-
12 tivity a priority; and
13 (II) the likelihood that the insti-
14 tution or organization will sustain or
15 expand the proposed activity effort be-
16 yond the period of the grant.
17 (C) DEVELOPMENT PLANS.—The Director
18 shall require that annual project reports for
19 awards that support graduate students and
20 postdoctoral scholars include certification by the
21 principal investigator that each graduate stu-
22 dent and postdoctoral scholar receiving substan-
23 tial support from such award, as determined by
24 the Director, in consultation with faculty advi-
25 sors, has developed and annually updated an in-

1 dividual development plan to map educational
2 goals, career exploration, and professional de-
3 velopment.
4 (D) PROFESSIONAL DEVELOPMENT SUP-
5 PLEMENT.—The Director shall carry out a five-
6 year pilot initiative to award up to 2,500 ad-
7 ministrative supplements of up to $2,000 to ex-
8 isting research grants annually, on a competi-
9 tive basis, to support graduate student profes-
10 sional development experiences for graduate
11 students who receive a substantial portion of
12 their support under such grants, as determined
13 by the Director.
14 (E) GRADUATE EDUCATION RESEARCH.—
15 The Director shall award grants, on a competi-
16 tive basis, to institutions of higher education or
17 non-profit organizations (or consortia of such
18 institutions or organizations) to support re-
19 search on the graduate education system and
20 outcomes of various interventions and policies,
21 including—
22 (i) the effects of traineeships, fellow-
23 ships, internships, and teaching and re-
24 search assistantships on outcomes for
25 graduate students;

1 (ii) the effects of graduate education
2 and mentoring policies and procedures on
3 degree completion, including differences
4 by—
5 (I) gender, race and ethnicity,
6 sexual orientation, gender identity,
7 and citizenship; and
8 (II) student debt load; and
9 (iii) the development and assessment
10 of new or adapted interventions, including
11 approaches that improve mentoring rela-
12 tionships, develop conflict management
13 skills, and promote healthy research teams.
14 (2) GRADUATE RESEARCH FELLOWSHIP PRO-
15 GRAM UPDATE.—
16 (A) SENSE OF CONGRESS.—It is the sense
17 of Congress that the Foundation should in-
18 crease the number of new graduate research fel-
19 lows supported annually over the next 5 years
20 to no fewer than 3,000 fellows.
21 (B) PROGRAM UPDATE.—Section 10 of the
22 National Science Foundation Act of 1950 (42
23 U.S.C. 1869) is amended—
24 (i) in subsection (a), by inserting
25 "and as will address national workforce de-

1 mand in critical STEM fields" after
2 "throughout the United States";
3 (ii) in subsection (b), by striking "of
4 $12,000" and inserting "of at least
5 $16,000"; and
6 (iii) by adding at the end the fol-
7 lowing:
8 "(c) OUTREACH.—The Director shall ensure program
9 outreach to recruit fellowship applicants from fields of
10 study that are in areas of critical national need, from all
11 regions of the country, and from historically underrep-
12 resented populations in STEM.".
13 (C) CYBERSECURITY SCHOLARSHIPS AND
14 GRADUATE FELLOWSHIPS.—The Director shall
15 ensure that students pursuing master's degrees
16 and doctoral degrees in fields relating to cyber-
17 security are considered as applicants for schol-
18 arships and graduate fellowships under the
19 Graduate Research Fellowship Program under
20 section 10 of the National Science Foundation
21 Act of 1950 (42 U.S.C. 1869).
22 (3) STUDY ON GRADUATE STUDENT FUND-
23 ING.—
24 (A) IN GENERAL.—Not later than 45 days
25 after the date of enactment of this Act, the Di-

1 rector shall enter into an agreement with a
2 qualified independent organization to evalu-
3 ate—
4 (i) the role of the Foundation in sup-
5 porting graduate student education and
6 training through fellowships, traineeships,
7 and other funding models; and
8 (ii) the impact of different funding
9 mechanisms on graduate student experi-
10 ences and outcomes, including whether
11 such mechanisms have differential impacts
12 on subsets of the student population.
13 (B) REPORT.—Not later than 1 year after
14 the date of enactment of this Act, the organiza-
15 tion charged with carrying out the study under
16 subparagraph (A) shall publish the results of its
17 evaluation, including a recommendation for the
18 appropriate balance between fellowships,
19 traineeships, and other funding models.
20 (4) FELLOWSHIPS AND TRAINEESHIPS FOR
21 EARLY-CAREER AI RESEARCHERS.—
22 (A) ARTIFICIAL INTELLIGENCE
23 TRAINEESHIPS.—
24 (i) IN GENERAL.—The Director of the
25 National Science Foundation shall award

1 grants to institutions of higher education
2 to establish traineeship programs for grad-
3 uate students who pursue artificial intel-
4 ligence-related research leading to a mas-
5 ters or doctorate degree by providing fund-
6 ing and other assistance, and by providing
7 graduate students opportunities for re-
8 search experiences in government or indus-
9 try related to the students' artificial intel-
10 ligence studies.
11 (ii) USE OF FUNDS.—A institution of
12 higher education shall use grant funds pro-
13 vided under clause (i) for the purposes
14 of—
15 (I) providing traineeships to stu-
16 dents who are pursuing research in
17 artificial intelligence leading to a mas-
18 ters or doctorate degree;
19 (II) paying tuition and fees for
20 students receiving traineeships;
21 (III) creating and requiring
22 courses or training programs in tech-
23 nology ethics for students receiving
24 traineeships;

(IV) creating opportunities for research in technology ethics for students receiving traineeships;

(V) establishing scientific internship programs for students receiving traineeships in artificial intelligence at for-profit institutions, nonprofit research institutions, or government laboratories; and

(VI) other costs associated with the administration of the program.

(B) ARTIFICIAL INTELLIGENCE FELLOWSHIPS.—The Director of the National Science Foundation shall award fellowships to masters and doctoral students and postdoctoral researchers who are pursuing degrees or research in artificial intelligence and related fields, including in the field of technology ethics. In making such awards, the Director shall conduct outreach, including through formal solicitations, to solicit proposals from students and postdoctoral researchers seeking to carry out research in aspects of technology ethics with relevance to artificial intelligence systems.

(e) STEM WORKFORCE DATA.—

1 (1) SKILLED TECHNICAL WORKFORCE PORT-
2 FOLIO REVIEW.—
3 (A) IN GENERAL.—Not later than 1 year
4 after the date of enactment of this Act, the Di-
5 rector shall conduct a full portfolio analysis of
6 the Foundation's skilled technical workforce in-
7 vestments across all Directorates in the areas of
8 education, research, infrastructure, data collec-
9 tion, and analysis.
10 (B) REPORT.—Not later than 180 days
11 after the date of the review under subparagraph
12 (A) is complete, the Director shall submit to
13 Congress and make widely available to the pub-
14 lic a summary report of the portfolio review.
15 (2) SURVEY DATA.—
16 (A) ROTATING TOPIC MODULES.—To meet
17 evolving needs for data on the state of the
18 science and engineering workforce, the Director
19 shall assess, through coordination with other
20 Federal statistical agencies and drawing on
21 input from relevant stakeholders, the feasibility
22 and benefits of incorporating questions or topic
23 modules to existing National Center for Science
24 and Engineering Statistics surveys that would
25 vary from cycle to cycle.

1 (B) NEW DATA.—Not later than 1 year
2 after the date of enactment of this Act, the Di-
3 rector shall submit to Congress and the Board
4 the results of an assessment, carried out in co-
5 ordination with other Federal agencies and with
6 input from relevant stakeholders, of the feasi-
7 bility and benefits of incorporating new ques-
8 tions or topic modules to existing National Cen-
9 ter for Science and Engineering Statistics sur-
10 veys on—
11 (i) the skilled technical workforce;
12 (ii) working conditions and work-life
13 balance;
14 (iii) harassment and discrimination;
15 (iv) sexual orientation and gender
16 identity;
17 (v) immigration and emigration; and
18 (vi) any other topics at the discretion
19 of the Director.
20 (C) LONGITUDINAL DESIGN.—The Direc-
21 tor shall continue and accelerate efforts to en-
22 hance the usefulness of National Center for
23 Science and Engineering Statistics survey data
24 for longitudinal research and analysis.

1 (D) GOVERNMENT ACCOUNTABILITY OF-
2 FICE REVIEW.—Not later than 1 year after the
3 date of enactment of this Act, the Comptroller
4 General of the United States shall submit a re-
5 port to Congress that—
6 (i) evaluates Foundation processes for
7 ensuring the data and analysis produced
8 by the National Center for Science and
9 Engineering Statistics meets current and
10 future needs; and
11 (ii) includes such recommendations as
12 the Comptroller General determines are
13 appropriate to improve such processes.
14 (f) CYBER WORKFORCE DEVELOPMENT RESEARCH
15 AND DEVELOPMENT.—
16 (1) IN GENERAL.—The Director shall award
17 grants on a merit-reviewed, competitive basis to in-
18 stitutions of higher education or non-profit organiza-
19 tions (or a consortia of such institutions or organiza-
20 tions) to carry out research on the cyber workforce.
21 (2) RESEARCH.—In carrying out research pur-
22 suant to paragraph (1), the Director shall support
23 research and development activities to—
24 (A) Understand the current state of the
25 cyber workforce, including factors that influence

1 growth, retention, and development of that
2 workforce;
3 (B) examine paths to entry and re-entry
4 into the cyber workforce;
5 (C) understand trends of the cyber work-
6 force, including demographic representation,
7 educational and professional backgrounds
8 present, competencies available, and factors
9 that shape employee recruitment, development,
10 and retention and how to increase the size, di-
11 versity, and capability of the cyber workforce;
12 (D) examine and evaluate training prac-
13 tices, models, programs, and technologies; and
14 (E) other closely related topics as the Di-
15 rector determines appropriate.
16 (3) REQUIREMENTS.—In carrying out the ac-
17 tivities described in paragraph (1), the Director
18 shall—
19 (A) collaborate with the National Institute
20 for Standards and Technology, including the
21 National Initiative for Cybersecurity Education,
22 the Department of Homeland Security, the De-
23 partment of Defense, the Office of Personnel
24 Management, and other Federal departments
25 and agencies, as appropriate;

(B) align with or build on the National Initiative on Cybersecurity Education Cybersecurity Workforce Framework wherever practicable and applicable;

(C) leverage the collective body of knowledge from existing cyber workforce development research and education activities; and

(D) engage with other Federal departments and agencies, research communities, and potential users of information produced under this subsection.

SEC. 6. BROADENING PARTICIPATION.

(a) PRESIDENTIAL AWARDS FOR EXCELLENCE IN MATHEMATICS AND SCIENCE TEACHING.—

(1) IN GENERAL.—Section 117(a) of the National Science Foundation Authorization Act of 1988 (42 U.S.C.1881b(a)) is amended—

(A) in subparagraph (B)—

(i) by striking "108" and inserting "110";

(ii) by striking clause (iv);

(iii) in clause (v), by striking the period at the end and inserting "; and";

(iv) by redesignating clauses (i), (ii), (iii), and (v) as subclauses (I), (II), (III),

1 and (IV), respectively, and moving the
2 margins of such subclauses (as so redesig-
3 nated) two ems to the right; and
4 (v) by striking "In selecting teachers"
5 and all that follows through "two teach-
6 ers—" and inserting the following:
7 "(C) In selecting teachers for an award au-
8 thorized by this subsection, the President shall
9 select—
10 "(i) at least two teachers—"; and
11 (B) in subparagraph (C), as designated by
12 paragraph (1)(A)(v), by adding at the end the
13 following:
14 "(ii) at least one teacher—
15 "(I) from the Commonwealth of
16 the Northern Mariana Islands;
17 "(II) from American Samoa;
18 "(III) from the Virgin Islands of
19 the United States; and
20 "(IV) from Guam.".
21 (2) EFFECTIVE DATE.—The amendments made
22 by paragraph (1) shall apply with respect to awards
23 made on or after the date of the enactment of this
24 Act.

1 (b) ROBERT NOYCE TEACHER SCHOLARSHIP PRO-
2 GRAM UPDATE.—
3 (1) SENSE OF CONGRESS.—It is the sense of
4 Congress that over the next five years the Founda-
5 tion should increase the number of scholarships
6 awarded under the Robert Noyce Teacher Scholar-
7 ship program established under section 10 of the
8 National Science Foundation Authorization Act of
9 2002 (42 U.S.C. 1862n–1) by 50 percent.
10 (2) OUTREACH.—To increase the diversity of
11 participants, the Director shall support symposia, fo-
12 rums, conferences, and other activities to expand
13 and enhance outreach to—
14 (A) historically Black colleges and univer-
15 sities that are part B institutions, as defined in
16 section 322(2) of the Higher Education Act of
17 1965 (20 U.S.C. 1061(2));
18 (B) minority institutions, as defined in sec-
19 tion 365(3) of the Higher Education Act of
20 1965 (20 U.S.C. 1067k(3));
21 (C) institutions of higher education that
22 are located near or serve rural communities;
23 (D) labor organizations;
24 (E) emerging research institutions; and

1 (F) higher education programs that serve
2 or support veterans.
3 (c) NSF INCLUDES INITIATIVE.—The Director
4 shall award grants and cooperative agreements, on a com-
5 petitive basis, to institutions of higher education or non-
6 profit organizations (or consortia of such institutions or
7 organizations) to carry out a comprehensive national ini-
8 tiative to facilitate the development of networks and part-
9 nerships to build on and scale up effective practices in
10 broadening participation in STEM studies and careers of
11 groups historically underrepresented in such studies and
12 careers.
13 (d) BROADENING PARTICIPATION ON MAJOR FACILI-
14 TIES AWARDS.—The Director shall require organizations
15 seeking a cooperative agreement for the management of
16 the operations and maintenance of a Foundation project
17 to demonstrate prior experience and current capabilities
18 in employing best practices in broadening participation in
19 science and engineering and ensure implementation of
20 such practices is considered in oversight of the award.
21 (e) PARTNERSHIPS WITH EMERGING RESEARCH IN-
22 STITUTIONS.—The Director shall establish a five-year
23 pilot program to enhance partnerships between emerging
24 research institutions and institutions classified as very
25 high research activity by the Carnegie Classification of In-

1 stitutions of Higher Education at the time of application.
2 In carrying out this program, the Director shall—
3 (1) require that each proposal submitted by a
4 multi-institution collaboration for an award, includ-
5 ing those under section 9, that exceeds $1,000,000,
6 as appropriate, specify how the applicants will sup-
7 port substantive, meaningful, and mutually-bene-
8 ficial partnerships with one or more emerging re-
9 search institutions;
10 (2) require awardees funded under paragraph
11 (1) to direct no less than 25 percent of the total
12 award to one or more emerging research institutions
13 to build research capacity, including through support
14 for faculty salaries and training, field and laboratory
15 research experiences for undergraduate and grad-
16 uate students, and maintenance and repair of re-
17 search equipment and instrumentation;
18 (3) require awardees funded under paragraph
19 (1) to report on the partnership activities as part of
20 the annual reporting requirements of the Founda-
21 tion;
22 (4) solicit feedback on the partnership directly
23 from partner emerging research institutions, in such
24 form as the Director deems appropriate; and

1 (5) submit a report to Congress after the third
2 year of the pilot program that includes—
3 (A) an assessment, drawing on feedback
4 from the research community and other sources
5 of information, of the effectiveness of the pilot
6 program for improving the quality of partner-
7 ships with emerging research institutions; and
8 (B) if deemed effective, a plan for perma-
9 nent implementation of the pilot program.
10 (f) TRIBAL COLLEGES AND UNIVERSITIES PROGRAM
11 UPDATE.—
12 (1) IN GENERAL.—Section 525 of the America
13 COMPETES Reauthorization Act of 2010 (42
14 U.S.C. 1862p–13) is amended—
15 (A) in subsection (a) by—
16 (i) striking "Native American" and
17 inserting "American Indian, Alaska Na-
18 tive, and Native Hawaiian"; and
19 (ii) inserting "post-secondary creden-
20 tials and" before "associate's"; and
21 (iii) striking "or baccalaureate de-
22 grees" and inserting ", baccalaureate, and
23 graduate degrees"; and
24 (B) in subsection (b) by striking "under-
25 graduate"; and

1 (C) in subsection (c) by inserting "and
2 STEM" after "laboratory".
3 (2) AUTHORIZATION OF APPROPRIATIONS.—
4 There is authorized to be appropriated to the Direc-
5 tor to carry out this program $107,250,000 for fis-
6 cal year 2022 through fiscal year 2026.
7 (g) DIVERSITY IN TECH RESEARCH.—The Director
8 shall award grants, on a competitive basis, to institutions
9 of higher education or non-profit organizations (or con-
10 sortia of such institutions or organizations) to support
11 basic and applied research that yields a scientific evidence
12 base for improving the design and emergence, development
13 and deployment, and management and ultimate effective-
14 ness of organizations of all kinds, including research re-
15 lated to diversity, equity, and inclusion in the technology
16 sector.
17 (h) CONTINUING SUPPORT FOR EPSCoR.—
18 (1) SENSE OF CONGRESS.—
19 (A) IN GENERAL.—It is the sense of Con-
20 gress that—
21 (i) since maintaining the Nation's sci-
22 entific and economic leadership requires
23 the participation of talented individuals na-
24 tionwide, EPSCoR investments into State
25 research and education capacities are in

1 the Federal interest and should be sus-
2 tained; and
3 (ii) EPSCoR should maintain its ex-
4 perimental component by supporting inno-
5 vative methods for improving research ca-
6 pacity and competitiveness.
7 (B) DEFINITION OF EPSCOR.—In this sub-
8 section, the term "EPSCoR" has the meaning
9 given the term in section 502 of the America
10 COMPETES Reauthorization Act of 2010 (42
11 U.S.C. 1862p note).
12 (2) UPDATE OF EPSCOR.—Section 517(f)(2) of
13 the America COMPETES Reauthorization Act of
14 2010 (42 U.S.C. 1862p–9(f)(2)) is amended—
15 (A) in subparagraph (A), by striking
16 "and" at the end; and
17 (B) by adding at the end the following:
18 "(C) to increase the capacity of rural com-
19 munities to provide quality STEM education
20 and STEM workforce development program-
21 ming to students, and teachers; and".
22 (i) FOSTERING STEM RESEARCH DIVERSITY AND
23 CAPACITY PROGRAM.—
24 (1) IN GENERAL.—The Director shall establish
25 a program to make awards on a competitive, merit-

1 reviewed basis to eligible institutions to implement
2 and study innovative approaches for building re-
3 search capacity in order to engage and retain stu-
4 dents from a range of institutions and diverse back-
5 grounds in STEM.

6 (2) ELIGIBLE INSTITUTION DEFINED.—In this
7 subsection the term "eligible institution" means an
8 institution of higher education that, according to the
9 data published by the National Center for Science
10 and Engineering Statistics, is not, on average,
11 among the top 100 institutions in Federal research
12 and development expenditures during the 3 year pe-
13 riod prior to the year of the award.

14 (3) PURPOSE.—The program established in
15 paragraph (1) shall be focused on achieving simulta-
16 neous impacts at the student, faculty, and institu-
17 tional levels by increasing the research capacity at
18 eligible institutions and the number of under-
19 graduate and graduate students pursuing STEM de-
20 grees from eligible institutions.

21 (4) REQUIREMENTS.—In carrying out this pro-
22 gram, the Director shall—

23 (A) require eligible institutions seeking
24 funding under this subsection to submit an ap-
25 plication to the Director at such time, in such

1 manner, containing such information and assur-
2 ances as the Director may require. The applica-
3 tion shall include, at a minimum a description
4 of how the eligible institution plans to sustain
5 the proposed activities beyond the duration of
6 the grant;
7 (B) require applicants to identify dis-
8 ciplines and focus areas in which the eligible in-
9 stitution can excel, and explain how the appli-
10 cant will use the award to build capacity to bol-
11 ster the institutional research competitiveness
12 of eligible entities to support grants awarded by
13 the Foundation and increase regional and na-
14 tional capacity in STEM;
15 (C) require the awards funded under this
16 subsection to support research and related ac-
17 tivities, which may include—
18 (i) development or expansion of re-
19 search programs in disciplines and focus
20 areas in subparagraph (B);
21 (ii) faculty recruitment and profes-
22 sional development in disciplines and focus
23 areas in subparagraph (B), including for
24 early-career researchers;

(iii) stipends for undergraduate and graduate students participating in research in disciplines and focus areas in subparagraph (B);

(iv) acquisition of instrumentation necessary to build research capacity at an eligible institution in disciplines and focus areas in subparagraph (B);

(v) an assessment of capacity-building and research infrastructure needs;

(vi) administrative research development support; and

(vii) other activities necessary to build research capacity; and

(D) require that no eligible institution should receive more than $10,000,000 in any single year of funds made available under this section.

(5) ADDITIONAL CONSIDERATIONS.—In awarding a grant under this subsection, the Director may also consider—

(A) the extent to which the applicant will support students from diverse backgrounds, including first-generation undergraduate students;

1 (B) the geographic and institutional diver-
2 sity of the applying institutions; and
3 (C) how the applicants can leverage public-
4 private partnerships and existing partnerships
5 with Federal Research Agencies.
6 (6) DUPLICATION.—The Director shall ensure
7 the awards made under this subsection are com-
8 plementary and not duplicative of existing program;
9 (7) REPORT.—The Director shall submit a re-
10 port to Congress after the third year of the program
11 that includes—
12 (A) an assessment of the effectiveness of
13 the program for growing the geographic and in-
14 stitutional diversity of Institutions of Higher
15 Education receiving research awards from the
16 Foundation;
17 (B) an assessment of the quality, quantity
18 and geographic and institutional diversity of In-
19 stitutions of Higher Education conducting
20 Foundation sponsored research since the estab-
21 lishment of the program in this subsection;
22 (C) an assessment of the quantity and di-
23 versity of undergraduate and graduate students
24 graduating from eligible institutions with
25 STEM degrees; and

1 (D) statistical summary data on the pro-
2 gram, including the geographic and institutional
3 allocation of award funding, the number and di-
4 versity of supported graduate and under-
5 graduate students, and how it contributes to ca-
6 pacity building at eligible entities.
7 (8) AUTHORIZATION OF APPROPRIATIONS.—
8 There is authorized to be appropriated to the Direc-
9 tor $150,000,000 for each of the fiscal years 2022
10 through 2026 to carry out the activities under this
11 subsection.
12 (j) CAPACITY-BUILDING PROGRAM FOR DEVELOPING
13 UNIVERSITIES.—
14 (1) IN GENERAL.—The Director of the National
15 Science Foundation shall make awards, on a com-
16 petitive basis, to eligible institutions described in
17 paragraph (2) to support the mission of the Founda-
18 tion and to build institutional research capacity at
19 eligible institutions.
20 (2) ELIGIBLE INSTITUTION.—
21 (A) IN GENERAL.—To be eligible to receive
22 an award under this subsection, an institu-
23 tion—
24 (i) shall be—

1 (I) a historically Black college or
2 university;
3 (II) a Tribal College or Univer-
4 sity;
5 (III) a minority-serving institu-
6 tion; or
7 (IV) an institution of higher edu-
8 cation with an established STEM ca-
9 pacity building program focused on
10 traditionally underrepresented popu-
11 lations in STEM, including Native
12 Hawaiians, Alaska Natives, and Indi-
13 ans; and
14 (ii) shall have not more than
15 $50,000,000 in annual federally-financed
16 research and development expenditures for
17 science and engineering as reported
18 through the National Science Foundation
19 Higher Education Research and Develop-
20 ment Survey.
21 (B) PARTNERSHIPS.—An eligible institu-
22 tion receiving a grant under this subsection
23 may carry out the activities of the grant
24 through a partnership with other entities, in-

1 cluding community colleges and other eligible
2 institutions.
3 (3) PROPOSALS.—To receive an award under
4 this subsection, an eligible institution shall submit
5 an application to the Director at such time, in such
6 manner, and containing such information as the Di-
7 rector may require, including a plan that describes
8 how the eligible institution will establish or expand
9 research office capacity and how such award would
10 be used to—
11 (A) conduct an assessment of capacity-
12 building and research infrastructure needs of
13 an eligible institution;
14 (B) enhance institutional resources to pro-
15 vide administrative research development sup-
16 port to faculty at an eligible institution;
17 (C) bolster the institutional research com-
18 petitiveness of an eligible institution to support
19 grants awarded by the Foundation;
20 (D) support the acquisition of instrumen-
21 tation necessary to build research capacity at
22 an eligible institution in research areas directly
23 associated with the Foundation;
24 (E) increase capability of an eligible insti-
25 tution to move technology into the marketplace;

1 (F) increase engagement with industry to
2 execute research through the SBIR and STTR
3 programs (as defined in section 9(e) of the
4 Small Business Act (15 U.S.C. 638(e)) and di-
5 rect contracts at an eligible institution;
6 (G) provide student engagement and re-
7 search training opportunities at the under-
8 graduate, graduate, and postdoctoral levels at
9 an eligible institution;
10 (H) further faculty development initiatives
11 and strengthen institutional research training
12 infrastructure, capacity, and competitiveness of
13 an eligible institution; or
14 (I) address plans and prospects for long-
15 term sustainability of institutional enhance-
16 ments at an eligible institution resulting from
17 the award including, if applicable, how the
18 award may be leveraged by an eligible institu-
19 tion to build a broader base of support.
20 (4) AWARDS.—Awards made under this sub-
21 section shall be for periods of 3 years, and may be
22 extended for periods of not more than 5 years.
23 (5) DEFINITIONS.—In this subsection:
24 (A) HISTORICALLY BLACK COLLEGE OR
25 UNIVERSITY.—The term "historically Black col-

1 lege or university" has the meaning given the
2 term "part B institution" in section 322 of the
3 Higher Education Act of 1965 (20 U.S.C.
4 1061).
5 (B) MINORITY-SERVING INSTITUTION.—
6 The term "minority-serving institution" or
7 "MSI" means—
8 (i) a Hispanic-serving institution as
9 defined in section 502 of the Higher Edu-
10 cation Act of 1965 (20 U.S.C. 1101a);
11 (ii) an Alaska Native-serving Institu-
12 tion or a Native Hawaiian-serving institu-
13 tion as such terms are defined in section
14 317 of the Higher Education Act of 1965
15 (20 U.S.C. 1059d); and
16 (iii) a Predominantly Black institu-
17 tion, an Asian American and Native Amer-
18 ican Pacific Islander-serving institution, or
19 a Native American-serving nontribal insti-
20 tution as such terms are defined in section
21 371 of the Higher Education Act of 1965
22 (20 U.S.C. 1067q(c)).
23 (C) TRIBAL COLLEGE OR UNIVERSITY.—
24 The term "Tribal College or University" has
25 the meaning given such term in section 316 of

1 the Higher Education Act of 1965 (20 U.S.C.
2 1059c).
3 (6) AUTHORIZATION OF APPROPRIATIONS.—
4 There are authorized to be appropriated to the Di-
5 rector of the National Science Foundation
6 $100,000,000 for each of fiscal years 2022 through
7 2026 to carry out the activities in this Act.
8 (k) CHIEF DIVERSITY OFFICER OF THE NSF.—
9 (1) CHIEF DIVERSITY OFFICER.—
10 (A) APPOINTMENT.—The Director shall
11 appoint a senior agency official within the Of-
12 fice of the Director as a Chief Diversity Officer.
13 (B) QUALIFICATIONS.—The Chief Diver-
14 sity Officer shall have significant experience,
15 within the Federal Government and the science
16 community, with diversity- and inclusion-related
17 matters, including—
18 (i) civil rights compliance;
19 (ii) harassment policy, reviews, and
20 investigations;
21 (iii) equal employment opportunity;
22 and
23 (iv) disability policy.
24 (C) OVERSIGHT.—The Chief Diversity Of-
25 ficer shall direct the Office of Diversity and In-

1 clusion of the Foundation and report directly to
2 the Director in the performance of the duties of
3 the Chief Diversity Officer under this sub-
4 section.
5 (2) DUTIES.—The Chief Diversity Officer is re-
6 sponsible for providing advice on policy, oversight,
7 guidance, and coordination with respect to matters
8 of the Foundation related to diversity and inclusion,
9 including ensuring the geographic diversity of the
10 Foundation programs. Other duties may include—
11 (A) establishing and maintaining a stra-
12 tegic plan that publicly states a diversity defini-
13 tion, vision, and goals for the Foundation;
14 (B) defining a set of strategic metrics that
15 are—
16 (i) directly linked to key organiza-
17 tional priorities and goals;
18 (ii) actionable; and
19 (iii) actively used to implement the
20 strategic plan under paragraph (1);
21 (C) advising in the establishment of a stra-
22 tegic plan for diverse participation by individ-
23 uals and institutions of higher education, in-
24 cluding community colleges, historically Black
25 colleges and universities, Tribal colleges or uni-

1 versities, minority-serving institutions, institu-
2 tions of higher education with an established
3 STEM capacity building program focused on
4 traditionally underrepresented populations in
5 STEM, including Native Hawaiians, Alaska
6 Natives, and Indians, and institutions from ju-
7 risdictions eligible to participate under section
8 113 of the National Science Foundation Au-
9 thorization Act of 1988 (42 U.S.C. 1862g);
10 (D) advising in the establishment of a
11 strategic plan for outreach to, and recruiting
12 from, untapped locations and underrepresented
13 populations;
14 (E) advising on a diversity and inclusion
15 strategy for the Foundation's portfolio of PreK-
16 12 STEM education focused programs and ac-
17 tivities, including goals for addressing barriers
18 to participation;
19 (F) advising on the application of the
20 Foundation's broader impacts review criterion;
21 and
22 (G) performing such additional duties and
23 exercise such powers as the Director may pre-
24 scribe.

1 (3) FUNDING.—From any amounts appro-
2 priated for the Foundation for each of fiscal years
3 2022 through 2026, the Director shall allocate
4 $5,000,000 to carry out this subsection for each
5 such year.

6 **SEC. 7. FUNDAMENTAL RESEARCH.**

7 (a) BROADER IMPACTS.—

8 (1) ASSESSMENT.—Not later than 45 days
9 after the date of enactment of this Act, the Director
10 shall enter into an agreement with a qualified inde-
11 pendent organization to assess how the Broader Im-
12 pacts review criterion is applied across the Founda-
13 tion and make recommendations for improving the
14 effectiveness for meeting the goals established in sec-
15 tion 526 of the America Creating Opportunities to
16 Meaningfully Promote Excellence in Technology,
17 Education, and Science Reauthorization Act of 2010
18 (42 U.S.C. 1862p-14).

19 (2) ACTIVITIES.—The Director shall award
20 grants on a competitive basis, to institutions of high-
21 er education or non-profit organizations (or con-
22 sortia of such institutions or organizations) to sup-
23 port activities to increase the efficiency, effective-
24 ness, and availability of resources for implementing
25 the Broader Impacts review criterion, including—

1 (A) training and workshops for program
2 officers, merit review panelists, grant office ad-
3 ministrators, faculty, and students to improve
4 understanding of the goals and the full range of
5 potential broader impacts available to research-
6 ers to satisfy this criterion;
7 (B) repositories and clearinghouses for
8 sharing best practices and facilitating collabora-
9 tion; and
10 (C) tools for evaluating and documenting
11 societal impacts of research.
12 (b) SENSE OF CONGRESS.—It is the sense of Con-
13 gress that the Director should continue to identify oppor-
14 tunities to reduce the administrative burden on research-
15 ers.
16 (c) RESEARCH INTEGRITY AND SECURITY.—
17 (1) OFFICE OF RESEARCH SECURITY AND POL-
18 ICY.—The Director shall maintain a Research Secu-
19 rity and Policy office within the Office of the Direc-
20 tor with no fewer than 4 full time equivalent posi-
21 tions, in addition to the Chief of Research Security
22 established in paragraph (2) of this subsection. The
23 functions of the Research Security and Policy office
24 shall be to coordinate all research security policy
25 issues across the Foundation, including by—

1 (A) consulting and coordinating with the
2 Foundation Office of Inspector General and
3 with other Federal science agencies and intel-
4 ligence and law enforcement agencies, as appro-
5 priate, through the National Science and Tech-
6 nology Council in accordance with the authority
7 provided under section 1746 of the National
8 Defense Authorization Act for Fiscal Year 2020
9 (Public Law 116–92; 42 U.S.C. 6601 note), to
10 identify and address potential security risks
11 that threaten research integrity and other risks
12 to the research enterprise;
13 (B) serving as the Foundation's primary
14 resource for all issues related to the security
15 and integrity of the conduct of Foundation-sup-
16 ported research;
17 (C) conducting outreach and education ac-
18 tivities for awardees on research policies and
19 potential security risks;
20 (D) educating Foundation program man-
21 agers and other directorate staff on evaluating
22 Foundation awards and awardees for potential
23 security risks; and

1 (E) communicating reporting and disclo-
2 sure requirements to awardees and applicants
3 for funding.
4 (2) CHIEF OF RESEARCH SECURITY.—The Di-
5 rector shall appoint a senior agency official within
6 the Office of the Director as a Chief of Research Se-
7 curity, whose primary responsibility is to manage the
8 office established under paragraph (1).
9 (3) REPORT TO CONGRESS.—No later than 180
10 days after the date of enactment of this Act, the Di-
11 rector shall provide a report to the Committee on
12 Science, Space, and Technology of the House of
13 Representatives, the Committee on Commerce,
14 Science, and Transportation of the Senate, the Com-
15 mittee on Appropriations of the House of Represent-
16 atives, and the Committee on Appropriations of the
17 Senate on the resources and the number of full time
18 employees needed to carry out the functions of the
19 Office established in paragraph (1).
20 (4) ONLINE RESOURCE.—The Director shall de-
21 velop an online resource hosted on the Foundation's
22 website containing up-to-date information, tailored
23 for institutions and individual researchers, includ-
24 ing—

1 (A) an explanation of Foundation research
2 security policies;
3 (B) unclassified guidance on potential se-
4 curity risks that threaten scientific integrity
5 and other risks to the research enterprise;
6 (C) examples of beneficial international
7 collaborations and how such collaborations dif-
8 fer from foreign government interference efforts
9 that threaten research integrity;
10 (D) promising practices for mitigating se-
11 curity risks that threaten research integrity;
12 and
13 (E) additional reference materials, includ-
14 ing tools that assist organizations seeking
15 Foundation funding and awardees in informa-
16 tion disclosure to the Foundation.
17 (5) RISK ASSESSMENT CENTER.—The Director
18 shall enter into an agreement with a qualified inde-
19 pendent organization to create a new risk assess-
20 ment center to—
21 (A) help the Foundation develop the online
22 resources under paragraph (4); and
23 (B) help awardees in assessing and identi-
24 fying issues related to nondisclosure of current
25 and pending research funding, risks to the

1 Foundation merit review process, and other
2 issues that may negatively affect the Founda-
3 tion proposal and award process due to undue
4 foreign interference.
5 (6) RESEARCH GRANTS.—The Director shall
6 continue to award grants, on a competitive basis, to
7 institutions of higher education or non-profit organi-
8 zations (or consortia of such institutions or organi-
9 zations) to support research on the conduct of re-
10 search and the research environment, including re-
11 search on research misconduct or breaches of re-
12 search integrity and detrimental research practices.
13 (7) AUTHORITIES.—
14 (A) IN GENERAL.—In addition to existing
15 authorities for preventing waste, fraud, abuse,
16 and mismanagement of federal funds, the Di-
17 rector, acting through the Office of Research
18 Security and Policy and in coordination with
19 the Foundation's Office of Inspector General,
20 shall have the authority to—
21 (i) conduct risk assessments, including
22 through the use of open-source analysis
23 and analytical tools, of research and devel-
24 opment award applications and disclosures
25 to the Foundation, in coordination with the

1 Risk Assessment Center established in
2 paragraph (5);
3 (ii) request the submission to the
4 Foundation, by an institution of higher
5 education or other organization applying
6 for a research and development award, of
7 supporting documentation, including copies
8 of contracts, grants, or any other agree-
9 ment specific to foreign appointments, em-
10 ployment with a foreign institution, partici-
11 pation in a foreign talent program and
12 other information reported as current and
13 pending support for all covered individuals
14 in a research and development award ap-
15 plication; and
16 (iii) upon receipt and review of the in-
17 formation provided under clause (ii) and in
18 consultation with the institution of higher
19 education or other organization submitting
20 such information, initiate the substitution
21 or removal of a covered individual from a
22 research and development award, reduce
23 the award funding amount, or suspend or
24 terminate the award if the Director deter-

1 mines such contracts, grants, or agree-
2 ments include obligations that—
3 (I) interfere with the capacity for
4 Foundation-supported activities to be
5 carried out; or
6 (II) create duplication with
7 Foundation-supported activities.
8 (B) LIMITATIONS.—In exercising the au-
9 thorities under this paragraph, the Director
10 shall—
11 (i) take necessary steps, as prac-
12 ticable, to protect the privacy of all covered
13 individuals and other parties involved in
14 the application and disclosure assessments
15 under clause (A)(i);
16 (ii) endeavor to provide justification
17 for requests for supporting documentation
18 made under clause (A)(ii);
19 (iii) require that allegations be proven
20 by a preponderance of evidence; and
21 (iv) as practicable, afford subjects an
22 opportunity to provide comments and re-
23 buttal and an opportunity to appeal before
24 final administrative action is taken.
25 (8) SECURITY TRAINING MODULES.—

1 (A) IN GENERAL.—Not later than 90 days
2 after the date of enactment of this Act, the Di-
3 rector, in collaboration with the Director of the
4 National Institutes of Health and other relevant
5 Federal research agencies, shall enter into an
6 agreement or contract with a qualified entity
7 for the development of online research security
8 training modules for the research community,
9 including modules focused on international col-
10 laboration and international travel, foreign in-
11 terference, and rules for proper use of funds,
12 disclosure, conflict of commitment, and conflict
13 of interest.
14 (B) STAKEHOLDER INPUT.—Prior to en-
15 tering into the agreement under clause (A), the
16 Director shall seek input from academic, private
17 sector, intelligence, and law enforcement stake-
18 holders regarding the scope and content of
19 training modules, including the diversity of
20 needs across institutions of higher education
21 and other grantees of different sizes and types,
22 and recommendations for minimizing adminis-
23 trative burden on institutions of higher edu-
24 cation and researchers.

1 (C) DEVELOPMENT.—The Director shall
2 ensure that the entity identified in (A)—
3 (i) develops modules that can be
4 adapted and utilized across Federal science
5 agencies; and
6 (ii) develops and implements a plan
7 for regularly updating the modules as
8 needed.
9 (D) GUIDELINES.—The Director, in col-
10 laboration with the Director of the National In-
11 stitutes of Health, shall develop guidelines for
12 institutions of higher education and other orga-
13 nizations receiving Federal research and devel-
14 opment funds to use in developing their own
15 training programs to address the unique needs,
16 challenges, and risk profiles of such institu-
17 tions, including adoption of training modules
18 developed under this paragraph.
19 (E) IMPLEMENTATION.—Drawing on
20 stakeholder input under subparagraph (B), not
21 later than 12 months after the date of enact-
22 ment of this Act, the Director shall establish a
23 requirement that, as part of an application for
24 a research and development award from the
25 Foundation—

1 (i) each covered individual listed on
2 the application for a research and develop-
3 ment award certify that they have com-
4 pleted research security training that
5 meets the guidelines developed under
6 clause (D) within one year of the applica-
7 tion; and
8 (ii) each institution of higher edu-
9 cation or other organization applying for
10 such award certify that each covered indi-
11 vidual who is employed by the institution
12 or organization and listed on the applica-
13 tion has been made aware of the require-
14 ment under this subparagraph.
15 (F) DEFINITIONS.—In this subsection:
16 (i) COVERED INDIVIDUAL.—The term
17 "covered individual" means the principal
18 investigator, co-principal investigators, and
19 any other person at the institution who is
20 responsible for the design, conduct, or re-
21 porting of research or educational activities
22 funded or proposed for funding by the
23 Foundation.
24 (ii) FEDERAL RESEARCH AGENCY.—
25 The term "Federal research agency"

1 means any Federal agency with an annual
2 extramural research expenditure of over
3 $100,000,000.
4 (iii) RESEARCH AND DEVELOPMENT
5 AWARD.—The term "research and develop-
6 ment award" means support provided to
7 an individual or entity by a Federal re-
8 search agency to carry out research and
9 development activities, which may include
10 support in the form of a grant, contract,
11 cooperative agreement, or other such
12 transaction. The term does not include a
13 grant, contract, agreement or other trans-
14 action for the procurement of goods or
15 services to meet the administrative needs
16 of a Federal research agency.
17 (9) RESPONSIBLE CONDUCT IN RESEARCH
18 TRAINING.—Section 7009 of the America Creating
19 Opportunities to Meaningfully Promote Excellence in
20 Technology, Education, and Science Act (42 U.S.C.
21 1862o-1) is amended by—
22 (A) striking "and postdoctoral research-
23 ers" and inserting "postdoctoral researchers,
24 faculty, and other senior personnel"; and

1 (B) inserting the following at the end: ",
2 including mentor training".
3 (10) NATIONAL ACADEMIES GUIDE TO RESPON-
4 SIBLE CONDUCT IN RESEARCH.—
5 (A) IN GENERAL.—Not later than 180
6 days after the date of enactment of this Act,
7 the Director shall enter into an agreement with
8 the Academies to update the report entitled
9 "On Being a Scientist: A Guide to Responsible
10 Conduct in Research" issued by the Academies.
11 The report, as so updated, shall include—
12 (i) updated professional standards of
13 conduct in research;
14 (ii) promising practices for preventing,
15 addressing, and mitigating the negative
16 impact of harassment, including sexual
17 harassment and gender harassment as de-
18 fined in the 2018 Academies report enti-
19 tled "Sexual Harassment of Women: Cli-
20 mate, Culture, and Consequences in Aca-
21 demic Sciences, Engineering, and Medi-
22 cine"; and
23 (iii) promising practices for mitigating
24 potential security risks that threaten re-
25 search integrity.

1 (B) REPORT.—Not later than 18 months
2 after the effective date of the agreement under
3 subparagraph (A), the Academies, as part of
4 such agreement, shall submit to the Director
5 and the Committee on Science, Space, and
6 Technology of the House of Representatives
7 and the Committee on Commerce, Science, and
8 Transportation of the Senate the report re-
9 ferred to in such subparagraph, as updated pur-
10 suant to such subparagraph.
11 (d) RESEARCH ETHICS.—
12 (1) SENSE OF CONGRESS.—It is the sense of
13 Congress that—
14 (A) a number of emerging areas of re-
15 search have potential ethical, social, safety, and
16 security implications that might be apparent as
17 early as the basic research stage;
18 (B) the incorporation of ethical, social,
19 safety, and security considerations into the re-
20 search design and review process for Federal
21 awards, may help mitigate potential harms be-
22 fore they happen;
23 (C) the Foundation's agreement with the
24 Academies to conduct a study and make rec-
25 ommendations with respect to governance of re-

search in emerging technologies is a positive step toward accomplishing this goal; and

(D) the Foundation should continue to work with stakeholders to understand and adopt policies that promote best practices for governance of research in emerging technologies at every stage of research.

(2) ETHICS STATEMENTS.—Drawing on stakeholder input, not later than 18 months after the date of enactment of this Act, the Director shall amend award proposal instructions to include a requirement for an ethics statement to be included as part of any proposal for funding prior to making the award. Such statement shall be considered by the Director in the review of proposals, taking into consideration any relevant input from the peer-reviewers for the proposal, and shall factor into award decisions as deemed necessary by the Director. Such statements may include, as appropriate—

(A) any foreseeable or quantifiable risks to society, including how the research could enable products, technologies, or other outcomes that could intentionally or unintentionally cause significant societal harm;

1 (B) how technical or social solutions can
2 mitigate such risks and, as appropriate, a plan
3 to implement such mitigation measures; and
4 (C) how partnerships and collaborations in
5 the research can help mitigate potential harm
6 and amplify potential societal benefits.
7 (3) GUIDANCE.—The Director shall solicit
8 stakeholder input to develop clear guidance on what
9 constitutes a foreseeable or quantifiable risk as de-
10 scribed in paragraph (2)(A), and to the extent prac-
11 ticable harmonize this policy with existing ethical
12 policies or related requirements for human subjects.
13 (4) RESEARCH.—The Director shall award
14 grants, on a competitive basis, to institutions of
15 higher education or non-profit organizations (or con-
16 sortia of such institutions or organizations) to sup-
17 port—
18 (A) research to assess the potential ethical
19 and societal implications of Foundation-sup-
20 ported research and products or technologies
21 enabled by such research, including the benefits
22 and risks identified pursuant to paragraph
23 (2)(A); and
24 (B) the development and verification of ap-
25 proaches to proactively mitigate foreseeable

1 risks to society, including the technical and so-
2 cial solutions identified pursuant to paragraph
3 (2)(B).
4 (5) ANNUAL REPORT.—The Director shall en-
5 courage awardees to update their ethics statements
6 as appropriate as part of the annual reports re-
7 quired by all awardees under the award terms and
8 conditions.
9 (e) RESEARCH REPRODUCIBILITY AND
10 REPLICABILITY.—Consistent with existing Federal law for
11 privacy, intellectual property, and security, the Director
12 shall facilitate the public access to research products, in-
13 cluding data, software, and code, developed as part of
14 Foundation-supported projects.
15 (1) DATA MANAGEMENT PLANS.—
16 (A) The Director shall require that every
17 proposal for funding for research include a ma-
18 chine-readable data management plan that in-
19 cludes a description of how the awardee will ar-
20 chive and preserve public access to data, soft-
21 ware, and code developed as part of the pro-
22 posed project.
23 (B) In carrying out the requirement in
24 subparagraph (A), the Director shall—

1 (i) provide necessary resources, in-
2 cluding trainings and workshops, to edu-
3 cate researchers and students on how to
4 develop and review high quality data man-
5 agement plans;
6 (ii) ensure program officers and merit
7 review panels are equipped with the re-
8 sources and training necessary to review
9 the quality of data management plans; and
10 (iii) ensure program officers and
11 merit review panels treat data management
12 plans as essential elements of grant pro-
13 posals, where appropriate.
14 (2) OPEN REPOSITORIES.—The Director
15 shall—
16 (A) coordinate with the heads of other
17 Federal science agencies, and solicit input from
18 the scientific community, to develop and widely
19 disseminate a set of criteria for trusted open re-
20 positories, accounting for discipline-specific
21 needs and necessary protections for sensitive in-
22 formation, to be used by Federally funded re-
23 searchers for the sharing of data, software, and
24 code;

1 (B) work with stakeholders to identify sig-
2 nificant gaps in available repositories meeting
3 the criteria developed under subparagraph (A)
4 and options for supporting the development of
5 additional or enhanced repositories;
6 (C) award grants on a competitive basis to
7 institutions of higher education or non-profit
8 organizations (or consortia of such institutions
9 or organizations) for the development, up-
10 grades, and maintenance of open data reposi-
11 tories that meet the criteria developed under
12 subparagraph (A);
13 (D) work with stakeholders and build on
14 existing models, where appropriate, to establish
15 a single, public, web-based point of access to
16 help users locate repositories storing data, soft-
17 ware, and code resulting from or used in Foun-
18 dation-supported projects;
19 (E) work with stakeholders to establish the
20 necessary policies and procedures and allocate
21 the necessary resources to ensure, as prac-
22 ticable, data underlying published findings re-
23 sulting from Foundation-supported projects are
24 deposited in repositories meeting the criteria

1 developed under subparagraph (A) at the time
2 of publication;
3 (F) incentivize the deposition of data, soft-
4 ware, and code into repositories that meet the
5 criteria developed under subparagraph (A); and
6 (G) coordinate with the scientific pub-
7 lishing community to develop uniform consensus
8 standards around data archiving and sharing.
9 (3) RESEARCH, DEVELOPMENT, AND EDU-
10 CATION.—The Director shall award grants, on a
11 competitive basis to institutions of higher education
12 or non-profit organizations (or consortia of such in-
13 stitutions or organizations) to—
14 (A) support research and development of
15 open source, sustainable, usable tools and infra-
16 structure that support reproducibility for a
17 broad range of studies across different dis-
18 ciplines;
19 (B) support research on computational re-
20 producibility, including the limits of reproduc-
21 ibility and the consistency of computational re-
22 sults in the development of new computation
23 hardware, tools, and methods; and
24 (C) support the education and training of
25 students, faculty, and researchers on computa-

1 tional methods, tools, and techniques to improve
2 the quality and sharing of data, code, and sup-
3 porting metadata to produce reproducible re-
4 search.
5 (f) CLIMATE CHANGE RESEARCH.—
6 (1) IN GENERAL.—The Director shall award
7 grants, on a competitive basis, to institutions of
8 higher education or non-profit organizations (or con-
9 sortia of such institutions or organizations) to sup-
10 port research to improve our understanding of the
11 climate system and related human and environ-
12 mental systems.
13 (2) USE OF FUNDS.—Activities funded by a
14 grant under this subsection may include—
15 (A) fundamental research on climate
16 forcings, feedbacks, responses, and thresholds
17 in the earth system, including impacts on and
18 contributions from local and regional systems;
19 (B) research on climate-related human be-
20 haviors and institutions;
21 (C) research on climate-related risk, vul-
22 nerability, resilience, and adaptive capacity of
23 coupled human-environment systems, including
24 risks to ecosystem stability and risks to vulner-
25 able populations;

1 (D) research to support the development
2 and implementation of effective strategies and
3 tools for mitigating and adapting to climate
4 change, including social strategies and research
5 focused on local level forecasting, impacts, and
6 challenges;
7 (E) research on the design, development,
8 and assessment of effective information and de-
9 cision-support systems, including understanding
10 and developing effective dissemination path-
11 ways;
12 (F) improved modeling, projections, anal-
13 yses, and assessments of climate and other
14 Earth system changes;
15 (G) the development of effective strategies
16 for educating and training future climate
17 change researchers, and climate change re-
18 sponse and mitigation professionals, in both re-
19 search and development methods, as well as
20 community engagement and science commu-
21 nication;
22 (H) the development of effective strategies
23 for public and community engagement in the all
24 stages of the research and development process;
25 and

1 (I) partnerships with other agencies to ad-
2 dress climate related challenges for specific
3 agency missions.
4 (g) VIOLENCE RESEARCH.—
5 (1) IN GENERAL.—The Director shall award
6 grants, on a competitive basis, to institutions of
7 higher education or non-profit organizations (or con-
8 sortia of such institutions or organizations) to sup-
9 port research to improve our understanding of the
10 nature, scope, causes, consequences, prevention, and
11 response to all forms of violence.
12 (2) USE OF FUNDS.—Activities funded by a
13 grant under this subsection may include—
14 (A) research on the magnitude and dis-
15 tribution of fatal and nonfatal violence;
16 (B) research on risk and protective factors;
17 (C) research on the design, development,
18 implementation, and evaluation of interventions
19 for preventing and responding to violence;
20 (D) research on scaling up effective inter-
21 ventions; and
22 (E) one or more interdisciplinary research
23 centers to conduct violence research, foster new
24 and expanded collaborations, and support ca-
25 pacity building activities to increase the number

1 and diversity of new researchers trained in
2 cross-disciplinary violence research.
3 (h) SOCIAL, BEHAVIORAL, AND ECONOMIC
4 SCIENCES.—The Director shall—
5 (1) actively communicate opportunities and so-
6 licit proposals for social, behavioral, and economic
7 science researchers to participate in cross-cutting
8 and interdisciplinary programs, including the Con-
9 vergence Accelerator and Big Ideas activities, and
10 the Mid-Scale Research Infrastructure program; and
11 (2) ensure social, behavioral, and economic
12 science researchers are represented on relevant merit
13 review panels for such activities.
14 (i) MEASURING IMPACTS OF FEDERALLY FUNDED
15 R&D.——The Director shall award grants on a competi-
16 tive, merit-reviewed basis to institutions of higher edu-
17 cation or non-profit organizations (or consortia of such in-
18 stitutions or organizations) to support research and devel-
19 opment of data, models, indicators, and associated analyt-
20 ical tools to improve our understanding of the impacts of
21 Federally funded research on society, the economy, and
22 the workforce, including domestic job creation.
23 (j) FOOD-ENERGY-WATER RESEARCH.—The Director
24 shall award grants on a competitive basis to institutions

1 of higher education or non-profit organizations (or con-
2 sortia of such institutions or organizations) to—
3 (1) support research to significantly advance
4 our understanding of the food-energy-water system
5 through quantitative and computational modeling,
6 including support for relevant cyberinfrastructure;
7 (2) develop real-time, cyber-enabled interfaces
8 that improve understanding of the behavior of food-
9 energy-water systems and increase decision support
10 capability;
11 (3) support research that will lead to innovative
12 solutions to critical food-energy-water system prob-
13 lems; and
14 (4) grow the scientific workforce capable of
15 studying and managing the food-energy-water sys-
16 tem, through education and other professional devel-
17 opment.
18 (k) BIOLOGICAL FIELD STATIONS AND MARINE LAB-
19 ORATORIES.—The Director shall continue to support en-
20 hancing, repairing and maintaining research instrumenta-
21 tion, laboratories, telecommunications and housing at bio-
22 logical field stations and marine laboratories.
23 (l) SUSTAINABLE CHEMISTRY RESEARCH AND EDU-
24 CATION.—In accordance with section 263 of the National
25 Defense Authorization Act for Fiscal Year 2021, the Di-

1 rector shall carry out activities in support of sustainable
2 chemistry, including—
3 (1) establishing a program to award grants, on
4 a competitive basis, to institutions of higher edu-
5 cation or non-profit organizations (or consortia of
6 such institutions or organizations) to support—
7 (A) individual investigators and teams of
8 investigators, including to the extent prac-
9 ticable, early career investigators for research
10 and development;
11 (B) collaborative research and development
12 partnerships among universities, industry, and
13 non-profit organizations; and
14 (C) integrating sustainable chemistry prin-
15 ciples into elementary, secondary, under-
16 graduate, and graduate chemistry and chemical
17 engineering curriculum and research training,
18 as appropriate to that level of education and
19 training; and
20 (2) incorporating sustainable chemistry into ex-
21 isting Foundation research and development pro-
22 grams.
23 (m) RISK AND RESILIENCE RESEARCH.—The Direc-
24 tor shall award grants on a competitive basis to institu-
25 tions of higher education or non-profit organizations (or

1 consortia of such institutions or organizations) to advance
2 knowledge of risk assessment and predictability and to
3 support the creation of tools and technologies, including
4 advancing data analytics and utilization of artificial intel-
5 ligence, for increased resilience through—

6 (1) improvements in our ability to understand,
7 model, and predict extreme events and natural haz-
8 ards, including pandemics;

9 (2) the creation of novel engineered systems so-
10 lutions for resilient complex infrastructures, particu-
11 larly those that address critical interdependence
12 among infrastructures and leverage the growing in-
13 fusion of cyber-physical-social components into the
14 infrastructures;

15 (3) development of equipment and instrumenta-
16 tion for innovation in resilient engineered infrastruc-
17 tures; and

18 (4) multidisciplinary research on the behaviors
19 individuals and communities engage in to detect,
20 perceive, understand, predict, assess, mitigate, and
21 prevent risks and to improve and increase resilience.

22 (n) UAV TECHNOLOGIES.—The Director shall carry
23 out a program of research and related activities for un-
24 manned aerial vehicle technologies, which may include a
25 prize competition pursuant to section 24 of the Stevenson-

1 Wydler Technology Innovation Act of 1980 (15 U.S.C.
2 3719) and support for undergraduate and graduate cur-
3 riculum development.

4 (o) LEVERAGING INTERNATIONAL EXPERTISE IN RE-
5 SEARCH.—The Director shall explore and advance oppor-
6 tunities for leveraging international capabilities and re-
7 sources that align with the Foundation and United States
8 research community priorities and have the potential to
9 benefit United States prosperity, security, health, and
10 well-being, including by sending teams of Foundation sci-
11 entific staff for site visits of scientific facilities and agen-
12 cies in other countries.

13 (p) BIOLOGICAL RESEARCH COLLECTIONS.—

14 (1) IN GENERAL.—The Director shall continue
15 to support databases, tools, methods, and other ac-
16 tivities that secure and improve existing physical and
17 digital biological research collections, improve the ac-
18 cessibility of collections and collection-related data
19 for research and educational purposes, develop ca-
20 pacity for curation and collection management, and
21 to transfer ownership of collections that are signifi-
22 cant to the biological research community, including
23 to museums and universities.

24 (2) SPECIMEN MANAGEMENT PLAN.—In con-
25 sultation with other relevant Federal science agen-

1 cies, the Director shall require that every proposal
2 for funding for research that involves collecting or
3 generating specimens include a specimen manage-
4 ment plan that includes a description of how the
5 specimens and associated data will be accessioned
6 into and permanently maintained in an established
7 biological collection.

8 (3) ACTION CENTER FOR BIOLOGICAL COLLEC-
9 TIONS.—The Director shall award grants on a com-
10 petitive basis to institutions of higher education or
11 non-profit organizations (or consortia of such insti-
12 tutions or organizations) to establish an Action Cen-
13 ter for Biological Collections to facilitate coordina-
14 tion and data sharing among communities of prac-
15 tice for research, education, workforce training, eval-
16 uation, and business model development.

17 (q) CLEAN WATER RESEARCH AND TECHNOLOGY
18 ACCELERATION.—The Director shall award grants on a
19 competitive, merit-reviewed basis to institutions of higher
20 education or non-profit organizations (or consortia of such
21 institutions or organizations) to—

22 (1) support transdisciplinary research to signifi-
23 cantly advance our understanding of water avail-
24 ability, quality, and dynamics and the impact of

1 human activity and a changing climate on urban and
2 rural water and wastewater systems;
3 (2) develop, pilot and deploy innovative tech-
4 nologies, systems, and other approaches to identi-
5 fying and addressing challenges that affect water
6 availability, quality, and security, including through
7 direct engagement with affected communities and
8 partnerships with the private sector, State, tribal,
9 and local governments, non-profit organizations and
10 water management professionals; and
11 (3) grow the scientific workforce capable of
12 studying and managing water and wastewater sys-
13 tems, through education, training, and other profes-
14 sional development.
15 (r) TECHNOLOGY AND BEHAVIORAL SCIENCE RE-
16 SEARCH.—The Director shall award grants on a merit-
17 based, competitive basis for research to—
18 (1) increase understanding of social media and
19 consumer technology access and use patterns and re-
20 lated psychological and behavioral issues, particu-
21 larly for adolescents; and
22 (2) explore the role of social media and con-
23 sumer technology in rising rates of depressive symp-
24 toms, suicidal ideation, drug use, and deaths of de-

1 spair, particularly for communities experiencing
2 long-term economic distress.
3 (s) MANUFACTURING RESEARCH AMENDMENT.—
4 Section 506(a) of the America COMPETES Reauthoriza-
5 tion Act of 2010 (42 U.S.C. 1862p–1(a)) is amended—
6 (1) in paragraph (5), by striking "and" at the
7 end;
8 (2) in paragraph (6)—
9 (A) by striking "and" before "virtual man-
10 ufacturing"; and
11 (B) by striking the period at the end and
12 inserting "; and artificial intelligence and ma-
13 chine learning; and"; and
14 (3) by adding at the end the following:
15 "(7) additive manufacturing, including new ma-
16 terial designs, complex materials, rapid printing
17 techniques, and real-time process controls; and
18 "(8) continuous manufacturing of biological
19 products and similar innovating monitoring and con-
20 trol techniques.".
21 (t) CRITICAL MINERALS MINING RESEARCH AND DE-
22 VELOPMENT.—
23 (1) IN GENERAL.—The Director of the National
24 Science Foundation shall award grants, on a com-
25 petitive basis, to institutions of higher education or

1 nonprofit organizations (or consortium of such insti-
2 tutions or organizations) to support basic research
3 that will accelerate innovation to advance critical
4 minerals mining strategies and technologies for the
5 purpose of making better use of domestic resources
6 and eliminating national reliance on minerals and
7 mineral materials that are subject to supply disrup-
8 tions.

9 (2) USE OF FUNDS.—Activities funded by a
10 grant under this subsection may include—

11 (A) advancing mining research and devel-
12 opment activities to develop new mapping and
13 mining technologies and techniques, including
14 advanced critical mineral extraction, production,
15 separation, alloying, or processing techniques
16 and technologies that can decrease energy in-
17 tensity, potential environmental impact and
18 costs of those activities;

19 (B) conducting long-term earth observation
20 of reclaimed mine sites, including the study of
21 the evolution of microbial diversity at such
22 sites;

23 (C) examining the application of artificial
24 intelligence for geological exploration of critical

1 minerals, including what the size and diversity
2 of data sets would be required;
3 (D) examining the application of machine
4 learning for detection and sorting of critical
5 minerals, including what the size and diversity
6 of data sets would be required;
7 (E) conducting detailed isotope studies of
8 critical minerals and the development of more
9 refined geologic models;
10 (F) improved understanding of the geologi-
11 cal and geochemical processes through which
12 critical minerals form and are concentrated into
13 economically viable deposits; or
14 (G) providing training and researcher op-
15 portunities to undergraduate and graduate stu-
16 dents to prepare the next generation of mining
17 engineers and researchers.
18 (3) EXISTING PROGRAMS.—The Director shall
19 ensure awards made under this subsection are com-
20 plementary and not duplicative of existing programs
21 across the foundation and Federal Government.
22 (u) STUDY OF AI RESEARCH CAPACITY.—
23 (1) IN GENERAL.—The Director of the National
24 Science Foundation shall conduct a study, or sup-
25 port the development of a study through the Science

1 and Technology Policy Institute or by any other ap-
2 propriate organization as determined by the Direc-
3 tor, on artificial intelligence research capacity at
4 U.S. institutions of higher education.

5 (2) STUDY CONTENTS.—The Director shall en-
6 sure that, at a minimum, the study under subsection
7 (a) addresses the following topics:

8 (A) Which universities are putting out sig-
9 nificant peer-reviewed artificial intelligence re-
10 search, including based on quantity and number
11 of citations.

12 (B) For each of the universities described
13 in paragraph (1), what specific factors enable
14 their AI research, including computing power,
15 data sets and availability, specialized cur-
16 riculum, and industry and other partnerships.

17 (C) How universities not included in para-
18 graph (1) could implement the factors in para-
19 graph (2) to produce AI research, as well as
20 case studies that universities can look to as ex-
21 amples and potential pilot programs that the
22 Federal Government could develop or support
23 to help universities produce AI research.

1 (3) WORKSHOPS.—The Director may support
2 workshops to help inform the study required under
3 this subsection.
4 (4) PUBLICATION.—The Director shall ensure
5 that the study carried out under this subsection is
6 made publicly available not later than 12 months
7 after the date of enactment of this Act.
8 (v) ADVANCING IoT FOR PRECISION AGRI-
9 CULTURE.—
10 (1) NATIONAL SCIENCE FOUNDATION DIREC-
11 TIVE ON AGRICULTURAL SENSOR RESEARCH.—In
12 awarding grants under its sensor systems and
13 networked systems programs, the Director shall in-
14 clude in consideration of portfolio balance research
15 and development on sensor connectivity in environ-
16 ments of intermittent connectivity and intermittent
17 computation—
18 (A) to improve the reliable use of advance
19 sensing systems in rural and agricultural areas;
20 and
21 (B) that considers—
22 (i) direct gateway access for locally
23 stored data;
24 (ii) attenuation of signal transmission;
25 (iii) loss of signal transmission; and

(iv) at-scale performance for wireless power.

(2) UPDATING CONSIDERATIONS FOR PRECISION AGRICULTURE TECHNOLOGY WITHIN THE NSF ADVANCED TECHNICAL EDUCATION PROGRAM.—Section 3 of the Scientific and Advanced-Technology Act of 1992 (42 U.S.C. 1862i) is amended—

(A) in subsection (d)(2)—

(i) in subparagraph (D), by striking "and" after the semicolon;

(ii) in subparagraph (E), by striking the period at the end and inserting "; and"; and

(iii) by adding at the end the following:

"(F) applications that incorporate distance learning tools and approaches.";

(B) in subsection (e)(3)—

(i) in subparagraph (C), by striking "and" after the semicolon;

(ii) in subparagraph (D), by striking the period at the end and inserting "; and"; and

(iii) by adding at the end the following:

1 "(E) applications that incorporate distance
2 learning tools and approaches."; and
3 (C) in subsection (j)(1), by inserting "agri-
4 cultural," after "commercial,".
5 (3) GAO REVIEW.—Not later than 18 months
6 after the date of enactment of this Act, the Comp-
7 troller General of the United States shall provide—
8 (A) a technology assessment of precision
9 agriculture technologies, such as the existing
10 use of—
11 (i) sensors, scanners, radio-frequency
12 identification, and related technologies that
13 can monitor soil properties, irrigation con-
14 ditions, and plant physiology;
15 (ii) sensors, scanners, radio-frequency
16 identification, and related technologies that
17 can monitor livestock activity and health;
18 (iii) network connectivity and wireless
19 communications that can securely support
20 digital agriculture technologies in rural
21 and remote areas;
22 (iv) aerial imagery generated by sat-
23 ellites or unmanned aerial vehicles;
24 (v) ground-based robotics;

(vi) control systems design and connectivity, such as smart irrigation control systems; and

(vii) data management software and advanced analytics that can assist decision making and improve agricultural outcomes; and

(B) a review of Federal programs that provide support for precision agriculture research, development, adoption, education, or training, in existence on the date of enactment of this Act.

SEC. 8. RESEARCH INFRASTRUCTURE.

(a) FACILITY OPERATION AND MAINTENANCE.—

(1) IN GENERAL.—The Director shall continue the Facility Operation Transition pilot program for a total of five years.

(2) COST SHARING.—The Facility Operation Transition program shall provide funding for 10–50 percent of the operations and maintenance costs for major research facilities that are within the first five years of operation, where the share is determined based on—

(A) the operations and maintenance costs of the major research facility; and

1 (B) the capacity of the managing direc-
2 torate or division to absorb such costs.
3 (3) REPORT.—After the fifth year of the pilot
4 program, the Director shall transmit a report to
5 Congress that includes—
6 (A) an assessment, that includes feedback
7 from the research community, of the effective-
8 ness of the pilot program for—
9 (i) supporting research directorates
10 and divisions in balancing investments in
11 research grants and funding for the initial
12 operation and maintenance of major facili-
13 ties;
14 (ii) incentivizing the development of
15 new world-class facilities;
16 (iii) facilitating interagency and inter-
17 national partnerships;
18 (iv) funding core elements of multi-
19 disciplinary facilities; and
20 (v) supporting facility divestment
21 costs; and
22 (B) if deemed effective, a plan for perma-
23 nent implementation of the pilot program.
24 (b) REVIEWS.—The Director shall periodically carry
25 out reviews within each of the directorates and divisions

1 to assess the cost and benefits of extending the operations
2 of research facilities that have exceeded their planned
3 operational lifespan.

4 (c) HELIUM CONSERVATION.—

5 (1) MAJOR RESEARCH INSTRUMENTATION SUP-
6 PORT.—

7 (A) IN GENERAL.—The Director shall sup-
8 port, through the Major Research Instrumenta-
9 tion program, proposal requests that include
10 the purchase, installation, operation, and main-
11 tenance of equipment and instrumentation to
12 reduce consumption of helium.

13 (B) COST SHARING.—The Director may
14 waive the cost-sharing requirement for helium
15 conservation measures for non-Ph.D.-granting
16 institutions of higher education and Ph.D.-
17 granting institutions of higher education that
18 are not ranked among the top 100 institutions
19 receiving Federal research and development
20 funding, as documented by the National Center
21 for Science and Engineering Statistics.

22 (2) ANNUAL REPORT.—No later than 1 year
23 after the date of enactment of this Act and annually
24 for the subsequent two years, the Director shall sub-
25 mit an annual report to Congress on the use of

1 funding awarded by the Foundation for the purchase
2 and conservation of helium. The report should in-
3 clude—
4 (A) the volume and price of helium pur-
5 chased;
6 (B) changes in pricing and availability of
7 helium; and
8 (C) any supply disruptions impacting a
9 substantial number of institutions.
10 (d) ADVANCED COMPUTING.—
11 (1) COMPUTING NEEDS.—To gather informa-
12 tion about the computational needs of Foundation-
13 funded projects, the Director shall require grant pro-
14 posals submitted to the Foundation, as appropriate,
15 to include estimates of computational resource needs
16 for projects that require use of advanced computing.
17 The Director shall encourage and provide access to
18 tools that facilitate the inclusion of these measures,
19 including those identified in the 2016 Academies re-
20 port entitled "Future Directions for NSF Advanced
21 Computing Infrastructure to Support U.S. Science
22 and Engineering in 2017–2020".
23 (2) REPORTS.—The Director shall document
24 and publish every two years a summary of the
25 amount and types of advanced computing capabili-

1 ties that are needed to fully meet the Foundation's
2 project needs as identified under paragraph (1).
3 (3) ROADMAP.—To set priorities and guide
4 strategic decisions regarding investments in ad-
5 vanced computing capabilities, the Director shall de-
6 velop, publish, and regularly update a 5-year ad-
7 vanced computing roadmap that—
8 (A) describes the advanced computing re-
9 sources and capabilities that would fully meet
10 anticipated project needs, including through in-
11 vestments in the Mid-Scale Research Infra-
12 structure program and the Major Research
13 Equipment and Facilities Construction account;
14 (B) draws on community input, informa-
15 tion contained in research proposals, allocation
16 requests, insights from Foundation-funded
17 cyber-infrastructure operators, and Foundation-
18 wide information gathering regarding commu-
19 nity needs;
20 (C) considers computational needs of
21 planned major facilities;
22 (D) reflects anticipated technology trends;
23 (E) informs users and potential partners
24 about future facilities and services;

1 (F) addresses the needs of groups histori-
2 cally underrepresented in STEM and geo-
3 graphic regions with low availability and high
4 demand for advanced computing resources;
5 (G) considers how Foundation-supported
6 advanced computing capabilities can be lever-
7 aged for activities through the Directorate for
8 Science and Engineering Solutions; and
9 (H) provides an update to Congress about
10 the level of funding necessary to fully meet
11 computational resource needs for the research
12 community.
13 (4) SECURING AMERICAN RESEARCH FROM
14 CYBER THEFT.—
15 (A) NETWORKING AND INFORMATION
16 TECHNOLOGY RESEARCH AND DEVELOPMENT
17 UPDATE.—Section 101(a)(1) of the High-Per-
18 formance Computing Act of 1991 (15 U.S.C.
19 5511) is amended—
20 (i) by inserting after subparagraph (I)
21 the following:
22 "(J) provide for improving the security, re-
23 liability, and resiliency of computing and net-
24 working systems used by institutions of higher
25 education and other nonprofit research institu-

1 tions for the processing, storage and trans-
2 mission of sensitive federally funded research
3 and associated data;"; and
4 (ii) by redesignating subparagraphs
5 (J) through (O) as subparagraphs (K)
6 through (P), respectively.
7 (B) COMPUTING ENCLAVE PILOT PRO-
8 GRAM.—
9 (i) IN GENERAL.—The Director of the
10 National Science Foundation, in consulta-
11 tion with the Director of the National In-
12 stitute of Standards and Technology and
13 the Secretary of Energy, shall establish a
14 pilot program to award grants to ensure
15 the security of federally-supported research
16 data and to assist regional institutions of
17 higher education and their researchers in
18 compliance with regulations regarding the
19 safeguarding of sensitive information and
20 other relevant regulations and Federal
21 guidelines.
22 (ii) STRUCTURE.—In carrying out the
23 pilot program established pursuant to
24 clause (i), the Director shall select three
25 institutions of higher education from

1 among institutions classified under the In-
2 diana University Center for Postsecondary
3 Research Carnegie Classification as a doc-
4 torate-granting university with a very high
5 level of research activity, and with a his-
6 tory of working with secure information for
7 the development, installation, maintenance,
8 or sustainment of secure computing en-
9 claves.

10 (iii) REGIONALIZATION.—

11 (I) IN GENERAL.—In selecting
12 universities pursuant to clause (ii),
13 the Director shall give preference to
14 institutions of higher education with
15 the capability of serving other regional
16 universities.

17 (II) GEOGRAPHIC DISPERSAL.—
18 The enclaves should be geographically
19 dispersed to better meet the needs of
20 regional interests.

21 (iv) PROGRAM ELEMENTS.—The Di-
22 rector shall work with institutions of high-
23 er education selected pursuant to clause
24 (ii) to—

1 (I) develop an approved design
2 blueprint for compliance with Federal
3 data protection protocols;
4 (II) develop a comprehensive and
5 confidential list, or a bill of materials,
6 of each binary component of the soft-
7 ware, firmware, or product that is re-
8 quired to deploy additional secure
9 computing enclaves;
10 (III) develop templates for all
11 policies and procedures required to
12 operate the secure computing enclave
13 in a research setting;
14 (IV) develop a system security
15 plan template; and
16 (V) develop a process for man-
17 aging a plan of action and milestones
18 for the secure computing enclave.
19 (v) DURATION.—Subject to other
20 availability of appropriations, the pilot pro-
21 gram established pursuant to clause (i)
22 shall operate for not less than 3 years.
23 (vi) REPORT.—
24 (I) IN GENERAL.—The Director
25 of the National Science Foundation

1 shall report to Congress not later than
2 6 months after the completion of the
3 pilot program under clause (i).
4 (II) CONTENTS.—The report re-
5 quired under subclause (I) shall in-
6 clude—
7 (aa) an assessment of the
8 pilot program under clause (i),
9 including an assessment of the
10 security benefits provided by such
11 secure computing enclaves;
12 (bb) recommendations re-
13 lated to the value of expanding
14 the network of secure computing
15 enclaves; and
16 (cc) recommendations on the
17 efficacy of the use of secure com-
18 puting enclaves by other Federal
19 agencies in a broader effort to
20 expand security of Federal re-
21 search.
22 (vii) AUTHORIZATION OF APPROPRIA-
23 TIONS.—There is authorized to be appro-
24 priated to the Director, $38,000,000 for

1 fiscal years 2022 through 2024, to carry
2 out the activities outlined in this section.
3 (e) NATIONAL SECURE DATA SERVICE.—
4 (1) IN GENERAL.—The Director, in consulta-
5 tion with the Chief Statistician of the United States,
6 shall establish a demonstration project to develop,
7 refine and test models to inform the full implemen-
8 tation of the Commission on Evidence-Based Policy-
9 making recommendation for a government-wide data
10 linkage and access infrastructure for statistical ac-
11 tivities conducted for statistical purposes, as defined
12 in chapter 35 of title 44, United States Code.
13 (2) ESTABLISHMENT.—Not later than one year
14 after the date of enactment of this Act, the Director
15 shall establish a National Secure Data Service dem-
16 onstration project. The National Secure Data Serv-
17 ice demonstration project shall be—
18 (A) aligned with the principles, best prac-
19 tices, and priority actions recommended by the
20 Advisory Committee on Data for Evidence
21 Building, to the extent feasible; and
22 (B) operated directly by or via a contract
23 that is managed by the National Center for
24 Science and Engineering Statistics.

1 (3) DATA.—In carrying out this subsection, the
2 Director shall engage with Federal and State agen-
3 cies to collect, acquire, analyze, report, and dissemi-
4 nate statistical data in the United States and other
5 nations to support governmentwide evidence-building
6 activities consistent with the Foundations for Evi-
7 dence-Based Policymaking Act of 2018.
8 (4) PRIVACY AND CONFIDENTIALITY PROTEC-
9 TIONS.—If the Director issues a management con-
10 tract under paragraph (2), the awardee shall be des-
11 ignated as an "agent" under chapter 35 of title 44,
12 United States Code, subchapter III, section 3561 et
13 seq., with all requirements and obligations for pro-
14 tecting confidential information delineated in the
15 Confidential Information Protection and Statistical
16 Efficiency Act of 2018 and the Privacy Act of 1974.
17 (5) TECHNOLOGY.—In carrying out this sub-
18 section, the Director shall consider application and
19 use of systems and technologies that incorporate
20 protection measures to reasonably ensure confiden-
21 tial data and statistical products are protected in ac-
22 cordance with obligations under chapter 35 of title
23 44, United States Code, subchapter III, section
24 3561 et seq., including systems and technologies
25 that ensure raw data and other sensitive inputs are

1 not accessible to recipients of statistical outputs
2 from the National Secure Data Service demonstra-
3 tion project.
4 (6) TRANSPARENCY.—The National Secure
5 Data Service established under paragraph (2) shall
6 maintain a public website with up-to-date informa-
7 tion on supported projects.
8 (7) REPORT.—Not later than 2 years after the
9 date of enactment of this Act, the National Secure
10 Data Service demonstration project established
11 under paragraph (2) shall submit a report to Con-
12 gress that includes—
13 (A) a description of policies for protecting
14 data, consistent with applicable federal law;
15 (B) a comprehensive description of all
16 completed or active data linkage activities and
17 projects;
18 (C) an assessment of the effectiveness of
19 the demonstration project for mitigating risks
20 and removing barriers to a sustained implemen-
21 tation of the National Secure Data Service as
22 recommended by the Commission on Evidence-
23 Based Policymaking; and
24 (D) if deemed effective by the Director, a
25 plan for scaling up the demonstration project to

1 facilitate data access for evidence building while
2 ensuring transparency and privacy.
3 (8) AUTHORIZATION OF APPROPRIATIONS.—
4 There are authorized to be appropriated to the Di-
5 rector to carry out this subsection $9,000,000 for
6 each of fiscal years 2022 through 2026.

7 **SEC. 9. DIRECTORATE FOR SCIENCE AND ENGINEERING**
8 **SOLUTIONS.**

9 (a) ESTABLISHMENT.—Subject to the availability of
10 appropriated funds, there is established within the Foun-
11 dation the Directorate for Science and Engineering Solu-
12 tions to advance research and development solutions to ad-
13 dress societal and national challenges for the benefit of
14 all Americans.
15 (b) PURPOSE.—The purpose of the Directorate estab-
16 lished under subsection (a) is to support use-inspired re-
17 search, accelerate the translation of Foundation-supported
18 fundamental research and to advance technologies, facili-
19 tate commercialization and use of Federally funded re-
20 search, and expand the pipeline of United States students
21 and researchers in areas of societal and national impor-
22 tance.
23 (c) ACTIVITIES.—The Director shall achieve the pur-
24 poses described in subsection (b) by awarding financial as-
25 sistance through the Directorate to—

1 (1) support transformational advances in use-
2 inspired and translational research through diverse
3 funding mechanisms and models, including conver-
4 gence accelerators;
5 (2) translate research into science and engineer-
6 ing innovations, including through developing inno-
7 vative approaches to connect research with societal
8 outcomes, developing approaches to technology
9 transfer that do not rely only on traditional market
10 and commercialization tools, education and training
11 for students and researchers on engaging with end
12 users and the public, partnerships that facilitate re-
13 search uptake, application, and scaling, prototype
14 development, entrepreneurial education, developing
15 tech-to-market strategies, and partnerships that con-
16 nect research products to businesses, accelerators,
17 and incubators and encourage the formation and
18 growth of new companies;
19 (3) develop and expand sustainable and mutu-
20 ally-beneficial use-inspired and translational research
21 and development partnerships and collaborations
22 among institutions of higher education, including
23 minority serving institutions and emerging research
24 institutions, non-profit organizations, labor organiza-
25 tions, businesses and other for-profit entities, Fed-

1 eral or State agencies, community organizations,
2 other Foundation directorates, national labs, field
3 stations and marine laboratories, international enti-
4 ties as appropriate, and other organizations;
5 (4) build capacity for use-inspired and
6 translational research at institutions of higher edu-
7 cation, including necessary administrative support;
8 (5) expand opportunities for researchers to con-
9 tribute to use-inspired and translational research in-
10 cluding through support for workshops and con-
11 ferences, targeted incentives and training, and multi-
12 disciplinary research centers;
13 (6) support the education, mentoring, and
14 training of undergraduate students, graduate stu-
15 dents, and postdoctoral researchers in use-inspired
16 and translational approaches to research and entre-
17 preneurship in key focus areas identified under sub-
18 section (g) through scholarships, fellowships, and
19 traineeships;
20 (7) support translational research infrastruc-
21 ture, including platforms and testbeds, data manage-
22 ment and software tools, and networks and commu-
23 nication platforms for interactive and collective
24 learning and information sharing;

1 (8) identify social, behavioral, and economic
2 drivers and consequences of technological innova-
3 tions; and
4 (9) ensure the programmatic work of the Direc-
5 torate and Foundation incorporates a worker per-
6 spective through participation by labor organizations
7 and workforce training organizations.
8 (d) ASSISTANT DIRECTOR.—
9 (1) IN GENERAL.—The Director shall appoint
10 an Assistant Director responsible for the manage-
11 ment of the Directorate established under this sec-
12 tion.
13 (2) TERM LIMIT.—The Assistant Director ap-
14 pointed under paragraph (1) shall serve a term last-
15 ing no longer than 4 years.
16 (3) QUALIFICATIONS.—The Assistant Director
17 shall be an individual, who by reason of professional
18 background and experience, is specially qualified
19 to—
20 (A) advise the Director on all matters per-
21 taining to use-inspired and translational re-
22 search, development, and commercialization at
23 the Foundation, including partnership with the
24 private sector and other users of Foundation
25 funded research; and

1 (B) develop and implement the necessary
2 policies and procedures to promote a culture of
3 use-inspired and translational research within
4 the Directorate and across the Foundation and
5 carry out the responsibilities under paragraph
6 (4).
7 (4) RESPONSIBILITIES.—The responsibilities of
8 the Assistant Director shall include—
9 (A) advising the Director on all matters
10 pertaining to use-inspired and translational re-
11 search and development activities at the Foun-
12 dation, including effective practices for conver-
13 gence research;
14 (B) identifying opportunities for and facili-
15 tating coordination and collaboration, where ap-
16 propriate, on use-inspired and translational re-
17 search, development, commercialization, and so-
18 cietal application activities—
19 (i) among the offices, directorates,
20 and divisions within the Foundation; and
21 (ii) between the Foundation and
22 stakeholders in academia, the private sec-
23 tor, including non-profit entities, labor or-
24 ganizations, Federal or State agencies, and
25 international entities, as appropriate;

1 (C) ensuring that the activities carried out
2 under this section are not duplicative of activi-
3 ties supported by other parts of the Foundation
4 or other relevant Federal agencies;
5 (D) approving all new programs within the
6 Directorate;
7 (E) developing and testing diverse merit-
8 review models and mechanisms for selecting
9 and providing awards for use-inspired and
10 translational research and development at dif-
11 ferent scales, from individual investigator
12 awards to large multi-institution collaborations;
13 (F) assessing the success of programs;
14 (G) administering awards to achieve the
15 purposes described in subsection (b); and
16 (H) performing other such duties per-
17 taining to the purposes in subsection (b) as are
18 required by the Director.
19 (5) RELATIONSHIP TO THE DIRECTOR.—The
20 Assistant Director shall report to the Director.
21 (6) RELATIONSHIP TO OTHER PROGRAMS.—No
22 other directorate within the Foundation shall report
23 to the Assistant Director.
24 (e) ADVISORY COMMITTEE.—

1 (1) IN GENERAL.—In accordance with the Fed-
2 eral Advisory Committee Act (5 U.S.C. App.) the
3 Director shall establish an advisory committee to as-
4 sess, and make recommendations regarding, the ac-
5 tivities carried out under this section.
6 (2) MEMBERSHIP.—The advisory committee
7 members shall—
8 (A) be individuals with relevant experience
9 or expertise, including individuals from industry
10 and national labs, educators, academic subject
11 matter experts, including individuals with
12 knowledge of the technical and social dimen-
13 sions of science and technology, technology
14 transfer experts, labor organizations, and rep-
15 resentatives of civil society, community organi-
16 zations, and other nongovernmental organiza-
17 tions; and
18 (B) consist of at least 10 members broadly
19 representative of stakeholders, including no less
20 than 3 members from the private sector, none
21 of whom shall be an employee of the Federal
22 Government.
23 (3) RESPONSIBILITIES.—The Committee shall
24 be responsible for—

1 (A) reviewing and evaluating activities car-
2 ried out under this section; and
3 (B) assessing the success of the Direc-
4 torate in and proposing new strategies for ful-
5 filling the purposes in subsection (b).
6 (f) EXISTING PROGRAMS.—The Convergence Accel-
7 erator, the Growing Convergence Research Big Idea, and
8 any other program, at the discretion of the Director, may
9 be managed by the Directorate.
10 (g) FOCUS AREAS.—In consultation with the Assist-
11 ant Director, the Board, and other Federal agencies and
12 taking into account advice under subsection (e), the Direc-
13 tor shall identify, and regularly update, up to 5 focus
14 areas to guide activities under this section. In selecting
15 such focus areas, the Director shall consider the following
16 societal challenges:
17 (1) Climate change and environmental sustain-
18 ability.
19 (2) Global competitiveness and domestic job
20 creation in critical technologies.
21 (3) Cybersecurity.
22 (4) National security.
23 (5) STEM education and workforce.
24 (6) Social and economic inequality.
25 (h) TECHNOLOGY RESEARCH INSTITUTES.—

1 (1) IN GENERAL.—The Director may award
2 grants and cooperative agreements to institutions of
3 higher education, or consortia thereof, for the plan-
4 ning, establishment, and support of Technology Re-
5 search Institutes in key technology areas, as deter-
6 mined by the Director.
7 (2) USES OF FUNDS.—Funds awarded under
8 this section may be used by a Technology Research
9 Institute to—
10 (A) conduct fundamental research to ad-
11 vance innovation in a key technology;
12 (B) conduct research involving a key tech-
13 nology to solve challenges with social, economic,
14 health, scientific, and national security implica-
15 tions;
16 (C) further the development, adoption, and
17 commercialization of innovations in key tech-
18 nology focus areas, including through partner-
19 ship with other Federal agencies and Federal
20 laboratories, industry, including startup compa-
21 nies, labor organizations, civil society organiza-
22 tions, and state and local, and Tribal govern-
23 ments.

(D) develop and manage multi-user research testbeds and instrumentation for key technologies;

(E) develop and manage an accessible repository, as appropriate, for research data and computational models relevant to the relevant key technology field, consistent with applicable privacy and intellectual property laws;

(F) convene national workshops for researchers and other stakeholders in that technology area;

(G) establish traineeship programs for graduate students who pursue research related to the technology leading to a masters or doctorate degree by providing funding and other assistance, and by providing graduate students opportunities for research experiences in government or industry related to the students' studies in that technology area;

(H) engage in outreach and engagement to broaden participation in technology research and education; and

(I) support such other activities that the Director determines appropriate.

1 (3) CONSIDERATIONS.—In making awards
2 under this section, the Director may consider the ex-
3 tent to which the activities proposed—
4 (A) have the potential to create an innova-
5 tion ecosystem, or enhance existing ecosystems,
6 to translate Technology Research Institute re-
7 search into applications and products, as appro-
8 priate to the topic of each Institute;
9 (B) support transdisciplinary research and
10 development across multiple institutions of
11 higher education and organizations;
12 (C) support transdisciplinary education ac-
13 tivities, including curriculum development, re-
14 search experiences, and faculty professional de-
15 velopment across undergraduate, graduate, and
16 professional academic programs;
17 (D) involve partnerships with multiple
18 types of institutions, including emerging re-
19 search institutions, HBCUs, and minority serv-
20 ing institutions, and with other Federal agen-
21 cies, Federal laboratories, industry, state, local,
22 and Tribal governments, labor organizations,
23 civil society organizations, and other entities
24 that may use or be affected by the technology;
25 and

1 (E) include a component that addresses
2 the ethical, societal, safety, and security impli-
3 cations relevant to the application of the tech-
4 nology.
5 (4) DURATION.—
6 (A) INITIAL PERIOD.—An award under
7 this section shall be for an initial period of 5
8 years.
9 (B) RENEWAL.—An established Tech-
10 nology Institute may apply for, and the Direc-
11 tor may grant, extended funding for periods of
12 5 years on a merit-reviewed basis.
13 (5) APPLICATION.—An institution of higher
14 education or consortia thereof seeking financial as-
15 sistance under this section shall submit to the Direc-
16 tor an application at such time, in such manner, and
17 containing such information as the Director may re-
18 quire.
19 (6) COMPETITIVE, MERIT-REVIEW.—In making
20 awards under the section, the Director shall—
21 (A) use a competitive, merit review process
22 that includes peer review by a diverse group of
23 individuals with relevant expertise from both
24 the private and public sectors; and

1 (B) ensure the focus areas of the Institute
2 do not substantially and unnecessarily duplicate
3 the efforts of any other Technology Research
4 Institute or any other similar effort at another
5 Federal agency.
6 (7) COLLABORATION.—In making awards under
7 this section, the Director may collaborate with Fed-
8 eral departments and agencies whose missions con-
9 tribute to or are affected by the technology focus
10 area of the institute.
11 (i) TRANSFER OF FUNDS.—
12 (1) IN GENERAL.—Funds made available to
13 carry out this section shall be available for transfer
14 to other offices, directorates, or divisions within the
15 Foundation for such use as is consistent with the
16 purposes for which such funds are provided.
17 (2) PROHIBITION ON TRANSFER FROM OTHER
18 OFFICES.—No funds shall be available for transfer
19 to the Directorate established under this section
20 from other offices, directorates, or divisions within
21 the Foundation.
22 (j) AUTHORITIES.—In addition to existing authorities
23 available to the Foundation, the Director may exercise the
24 following authorities in carrying out the activities under
25 this section:

1 (1) AWARDS.—In carrying out this section, the
2 Director may provide awards in the form of grants,
3 contracts, cooperative agreements, cash prizes, and
4 other transactions.
5 (2) APPOINTMENTS.—The Director shall have
6 the authority to make appointments of scientific, en-
7 gineering, and professional personnel for carrying
8 out research and development functions which re-
9 quire the services of specially qualified personnel re-
10 lating to the focus areas identified under subsection
11 (g) and such other areas of national research prior-
12 ities as the Director may determine.
13 (k) ETHICAL, LEGAL, AND SOCIETAL CONSIDER-
14 ATIONS.—The Director shall establish policies regarding
15 engagement with experts in the social dimensions of
16 science and technology and set up formal avenues for pub-
17 lic input, as appropriate, to ensure that ethical, legal, and
18 societal considerations are explicitly integrated into the
19 priorities for the Directorate, including the selection of
20 focus areas under subsection (g), the award-making proc-
21 ess, and throughout all stages of supported projects.
22 (l) REPORTS AND ROADMAPS.—
23 (1) ANNUAL REPORT.—The Director shall pro-
24 vide to the relevant authorizing and appropriations
25 committees of Congress an annual report describing

1 projects supported by the Directorate during the
2 previous year.
3 (2) ROADMAP.—Not later than 1 year after the
4 date of enactment of this Act, the Director shall pro-
5 vide to the relevant authorizing and appropriations
6 committees of Congress a roadmap describing the
7 strategic vision that the Directorate will use to guide
8 investment decisions over the following 3 years.
9 (m) EVALUATION.—
10 (1) IN GENERAL.—After the Directorate has
11 been in operation for 6 years, the National Science
12 Board shall evaluate how well the Directorate is
13 achieving the purposes identified in subsection (b),
14 including an assessment of the impact of Directorate
15 activities on the Foundation's primary science mis-
16 sion.
17 (2) INCLUSIONS.—The evaluation shall in-
18 clude—
19 (A) a recommendation on whether the Di-
20 rectorate should be continued or terminated;
21 and
22 (B) a description of lessons learned from
23 operation of the Directorate.

1 (3) AVAILABILITY.—On completion of the eval-
2 uation, the evaluation shall be made available to
3 Congress and the public.
4 (n) LIMITATION.—No amounts may be appropriated
5 for the Directorate for each of fiscal years 2022, 2023,
6 2024, 2025, or 2026 unless—
7 (1) a specific appropriation is made for the Di-
8 rectorate; and
9 (2) the amount appropriated for the activities
10 of the Foundation, other than the activities author-
11 ized under this section, for each such fiscal year ex-
12 ceeds the amount appropriated for the Foundation
13 for fiscal year 2021, as adjusted for inflation in ac-
14 cordance with the Consumer Price Index published
15 by the Bureau of Labor Statistics of the Depart-
16 ment of Labor.
17 **SEC. 10. ADMINISTRATIVE AMENDMENTS.**
18 (a) SUPPORTING VETERANS IN STEM CAREERS.—
19 Section 3(c) of the Supporting Veterans in STEM Careers
20 Act is amended by striking "annual" and inserting "bien-
21 nial".
22 (b) SUNSHINE ACT COMPLIANCE.—Section 15 of the
23 National Science Foundation Authorization Act of 2002
24 is amended—
25 (1) so that paragraph (3) reads as follows:

1 "(3) COMPLIANCE REVIEW.—The Inspector
2 General of the Foundation shall conduct a review of
3 the compliance by the Board with the requirements
4 described in paragraph (2) as necessary based on a
5 triennial risk assessment. Any review deemed nec-
6 essary shall examine the proposed and actual con-
7 tent of closed meetings and determine whether the
8 closure of the meetings was consistent with section
9 552b of title 5, United States Code."; and
10 (2) by striking paragraphs (4) and (5) and in-
11 serting the following:
12 "(4) MATERIALS RELATING TO CLOSED POR-
13 TIONS OF MEETING.—To facilitate the risk assess-
14 ment required under paragraph (3) of this sub-
15 section, and any subsequent review conducted by the
16 Inspector General, the Office of the National Science
17 Board shall maintain the General Counsel's certifi-
18 cate, the presiding officer's statement, and a tran-
19 script or recording of any closed meeting, for at
20 least 3 years after such meeting.".
21 (c) SCIENCE AND ENGINEERING INDICATORS RE-
22 PORT SUBMISSION.—Section 4(j)(1) of the National
23 Science Foundation Act of 1950 (42 U.S.C. 1863(j)(1))
24 is amended by striking "January 15" and inserting
25 "March 15".

1 **SEC. 11. PLANNING AND CAPACITY BUILDING GRANTS.**

2 Section 602 of the American Innovation and Com-
3 petitiveness Act (42 U.S.C. 1862s–9) is amended—

4 (1) by redesignating subsection (e) as sub-
5 section (f); and

6 (2) by inserting after subsection (d), the fol-
7 lowing:

8 "(e) PLANNING AND CAPACITY BUILDING GRANTS.—

9 "(1) IN GENERAL.—Under the program estab-
10 lished in section 508 of the America COMPETES
11 Reauthorization Act of 2010 (42 U.S.C. 1862p–2)
12 and the activities authorized under this section, the
13 Director shall award grants to eligible entities for
14 planning and capacity building at institutions of
15 higher education.

16 "(2) ELIGIBLE ENTITY DEFINED.—In this sub-
17 section, the term 'eligible entity' means an institu-
18 tion of higher education (or a consortium of such in-
19 stitutions) that, according to the data published by
20 the National Center for Science and Engineering
21 Statistics, is not, on average, among the top 100 in-
22 stitutions in Federal R&D expenditures during the 3
23 year period prior to the year of the award.

24 "(3) USE OF FUNDS.—In addition to activities
25 listed under subsection (c), an eligible entity receiv-

1 ing a grant under this subsection may use funds
2 to—
3 "(A) ensure the availability of staff, includ-
4 ing technology transfer professionals, entre-
5 preneurs in residence, and other mentors as re-
6 quired to accomplish the purpose of this sub-
7 section;
8 "(B) revise institution policies, including
9 policies related to intellectual property and fac-
10 ulty entrepreneurship, and taking other nec-
11 essary steps to implement relevant best prac-
12 tices for academic technology transfer;
13 "(C) develop new local and regional part-
14 nerships among institutions of higher education
15 and between institutions of higher education
16 and private sector entities and other relevant
17 organizations with the purpose of building net-
18 works, expertise, and other capacity to identify
19 promising research that may have potential
20 market value and enable researchers to pursue
21 further development and transfer of their ideas
22 into possible commercial or other use;
23 "(D) develop seminars, courses, and other
24 educational opportunities for students, post-doc-
25 toral researchers, faculty, and other relevant

1 staff at institutions of higher education to in-
2 crease awareness and understanding of entre-
3 preneurship, patenting, business planning, and
4 other areas relevant to technology transfer, and
5 connect students and researchers to relevant re-
6 sources, including mentors in the private sector;
7 and
8 "(E) create and fund competitions to allow
9 entrepreneurial students and faculty to illus-
10 trate the commercialization potential of their
11 ideas.
12 "(4) MINIMUM DURATION AND SIZE OF
13 AWARD.—Grants awarded under this subsection
14 shall be at least 3 years in duration and $500,000
15 in total amount.
16 "(5) APPLICATION.—An eligible entity seeking
17 funding under this subsection shall submit an appli-
18 cation to the Director of the Foundation at such
19 time, in such manner, and containing such informa-
20 tion and assurances as such Director may require.
21 The application shall include, at a minimum, a de-
22 scription of how the eligible entity submitting an ap-
23 plication plans to sustain the proposed activities be-
24 yond the duration of the grant.

1 "(6) AUTHORIZATION OF APPROPRIATIONS.—
2 From within funds authorized under section 9, there
3 are authorized to carry out the activities under this
4 subsection $40 million for each of fiscal years 2022
5 through 2026.".

Chairwoman JOHNSON. I ask unanimous consent to dispense with the reading, and without objection, so ordered.

I now recognize myself for 5 minutes to explain the amendment.

I am pleased to offer this amendment in the nature of a substitute for the *National Science Foundation for the Future Act*, along with Ranking Member Lucas. I want to thank my colleagues on both sides of the aisle for their thoughtful engagement and enthusiastic support for the strengthening of the National Science Foundation through this process. We have a lot of amendments today, so in the interest of time, I'll insert my full statement in the record at this point, and I urge all my colleagues to support the amendment.

[The prepared statement of Chairwoman Johnson follows:]

I am pleased to offer this amendment in the nature of a substitute for the *National Science Foundation for the Future Act* along with Ranking Member Lucas. Before I explain the amendment, I want to thank my colleagues on both sides of the aisle for their thoughtful engagement and enthusiastic support for strengthening the National Science Foundation throughout this process.

The *NSF for the Future Act* substitute amendment, like the introduced bill, is a comprehensive reauthorization for the NSF. It authorizes 5 years of appropriations for all of NSF's accounts. In total, the amendment authorizes $73 billion over 5 years, allowing for growth that is both ambitious and sustainable. After a decade of stagnant funding, this legislation unleashes NSF to do more of what it does best.

The substitute lays out direction for NSF's portfolio of programs in fundamental research, STEM education at all levels, and broadening participation in STEM. It addresses long overdue needs in research infrastructure. It also provides bipartisan solutions to address research security in effective and practical ways.

The substitute also includes a bold new proposal for a Science and Engineering Solutions Directorate. The new directorate will help scale efforts to drive research-to-solutions for society's most pressing problems, from climate change to competitiveness. Importantly, the legislation is designed to give NSF the flexibility it needs to succeed. I was pleased to see how well aligned NSF's own proposal for a new directorate is with our legislation.

The Subcommittee on Research and Technology, under the leadership of Chairwoman Stevens and Ranking Member Waltz, held two hearings and a markup of this legislation. I want to thank the Members of the subcommittee for their thoughtful discussions and contributions to the underlying bill. The substitute also incorporates input from a wide range of stakeholders and ideas championed by Members of the Full Committee.

I also want to thank Ranking Member Lucas and his staff for developing the new provision authorizing funding for research capacity building at R2 institutions. Building more regional and institutional diversity in our research and innovation ecosystem is essential to our future competitiveness.

In closing, I want to emphasize the critical role the National Science Foundation plays in our society. Many of the transformative innovations developed over the past half century would not have been possible without the foundation of scientific discovery supported by NSF. As we look to the agency's future, we can be bold in a way that builds upon that legacy of achievement. I believe this legislation does exactly that.

I have been pleased with the tremendous support we have received from the broad stakeholder community, and I look forward to your continued support as we move toward conference with the Senate. I am proud of this bill, and the transparent, bipartisan, and deliberative process that continues to make it even better. I thank Ranking Member Lucas for his partnership in this effort, and I urge all of my colleagues to support this amendment.

Chairwoman JOHNSON. Is there further discussion on the amendment?

Mr. LUCAS. Madam Chair?

Chairwoman JOHNSON. Yes. Mr. Lucas.

Mr. LUCAS. Thank you, Chairwoman Johnson. This amendment strikes and replaces the text of H.R. 2225, the *NSF for the Future Act*, to incorporate stakeholder feedback on the underlying bill, add

bipartisan Member priorities, and make technical changes to the text. I'd like to thank the Chairwoman and her staff for working with us to get these changes finalized.

As I said in my opening statement, this legislation is a result of more than 2 years of tireless bipartisan staff work, and this amendment is a continuation of that process. I'm grateful to the Members on this Committee for their engagement in the process for further improving the bill and to the Chairwoman for agreeing to incorporate Republican priorities. Such priorities include a provision by Representative Babin to launch a secure computing enclave program to ensure the protection of federally funded research conducted at universities.

It also includes a bipartisan provision by Representatives Ross and Baird to establish technology research institutions at universities focused on key technology areas and another to encourage the development of unmanned aerial vehicle technologies by Representative Anthony Gonzalez.

This amendment also includes several new STEM education provisions, a priority for Members on both sides of the aisle. It includes Representative Kim's provision to encourage informal STEM learning by supporting student participation in nonprofit competitions, out-of-school activities, and field experiences related to STEM subjects.

And, as artificial intelligence continues to drive the future of technology, manufacturing, and services, this amendment recognizes that we will need a workforce of skilled researchers and practitioners to support that growth. This amendment includes a provision by Representative Obernolte and Representative McNerney to establish traineeship and fellowship programs for graduate and postdoc students who pursue artificial intelligence-related research.

As we redouble our research investment in NSF, it is also critical that we do more to ensure STEM opportunities reach more Americans. We need to make sure investment doesn't just happen on the coast or at the top 10 universities but also at places like Stillwater, Oklahoma, and land-grant institutions like Oklahoma State or historically Black colleges and universities (HBCUs) like Langston University.

The capacity building for developing universities provision supports administrative capacity-building activities at minority-serving institutions (MSIs) to increase their expertise and ability to compete for and manage foundation research awards.

In addition, the Fostering STEM Research Diversity and Capacity program will support research capacity building for research institutions outside of the top 100 federally funded institutions. This includes developing and expanding research programs, faculty professional development support, support for students to conduct hands-on research, the acquisition of research instrumentation, and much-needed administrative research support.

I am grateful to Chairwoman Johnson for working with me to develop these complementary and important provisions that further the goal of providing quality access to STEM opportunities to all Americans, regardless of your ZIP Code. As always, I'm grateful for the opportunity to work alongside my Science Committee colleagues to prioritize fundamental research that will support U.S.

innovation and keep our country safe, independent, and globally competitive. The *NSF for the Future Act* is a product we should all be proud of, and today's amendment brings us one step closer to its enactment. I encourage my colleagues to support this amendment, and I yield back the balance of my time, Madam Chair.

[The prepared statement of Mr. Lucas follows:]

Thank you, Chairwoman Johnson. This amendment strikes and replaces the text of H.R. 2225, the *NSF for the Future Act*, to incorporate stakeholder feedback on the underlying bill, add bipartisan Member priorities, and make technical changes to the text. I'd like to thank the Chairwoman and her staff for working with us to get these changes finalized.

As I said in my opening statement, this legislation is the result of more than two years of tireless bipartisan staff work and this amendment is a continuation of that process. I am grateful to the Members of this Committee for their engagement in the process to further improve the bill and to the Chairwoman for agreeing to incorporate many Republican priorities.

Such priorities include a provision from Representative Babin to launch a secure computing enclaves program to ensure the protection of federally-funded research conducted at universities. It also includes a bipartisan provision from Representative Ross and Representative Baird to establish Technology Research Institutes at universities focused on key technology areas, and another to encourage the development of unmanned aerial vehicle technologies from Representative Anthony Gonzalez.

This Amendment also includes several new STEM education provisions—a priority for members on both sides of the aisle. It includes Representative Kim's provision to encourage informal STEM learning by supporting student participation in nonprofit competitions, out-of-school activities, and field experiences related to STEM subjects. And—as artificial intelligence continues to drive the future of technology, manufacturing, and services—this amendment recognizes that we will need a workforce of skilled researchers and practitioners to support that growth. This amendment includes a provision from Representative Obernolte and Representative McNerney to establish traineeship and fellowship programs for graduate and postdoc students who pursue artificial intelligence-related research.

As we redouble our research investment in NSF, it is also critical we do more to ensure STEM opportunities reach more Americans. We need to make sure investment doesn't just happen on the coasts, or at the top 10 universities, but also in places like Stillwater, Oklahoma and land-grant institutions like Oklahoma State or Historically Black Colleges and Universities like Langston University.

The "Capacity Building for Developing Universities" provision supports administrative capacity building activities at minority serving institutions to increase their expertise and ability to compete for and manage Foundation research and development awards.

In addition, the "Fostering STEM Research Diversity and Capacity Program" will support research capacity building for research institutions outside of the top 100 federally- funded institutions. This includes developing and expanding research programs, faculty professional development, support for students to conduct hands-on research, the acquisition of research instrumentation, and much-needed administrative research support.

I am grateful to Chairwoman Johnson for working with me to develop these complementary and important provisions that further the goal of providing quality access to STEM opportunities for all Americans, regardless of zip code. As always, I'm grateful for the opportunity to work alongside my Science Committee colleagues to prioritize fundamental research that will support U.S. innovation and keep our country safe, independent, and globally competitive.

The *NSF for the Future Act* is a product we should all be proud of, and today's amendment brings us one step closer to its enactment. I encourage my colleagues to support this amendment, and I yield back the balance of my time.

Chairwoman JOHNSON. Thank you very much. Are there any other comments?

Ms. BONAMICI. Yes, Madam Chair, I do seek recognition.

Chairwoman JOHNSON. Yes, Ms. Bonamici.

Ms. BONAMICI. Thank you so much. I move to strike the last word. I move to strike the last word, Chairwoman Johnson.

Chairwoman JOHNSON. You are recognized.

Ms. BONAMICI. Thank you so much, Chairwoman Johnson, for your leadership.

The National Science Foundation plays a key role in our Nation's research enterprise. It's the only Federal agency tasked with supporting fundamental research across all scientific disciplines. Over the course of more than 70 years, the NSF has funded research and education activities at more than 1,800 universities, colleges, and other public and private institutions. But despite the agency's expansive mission and role in our Nation's research ecosystem, that funding has often limited its contributions.

Today, we have the opportunity to strengthen the work of the NSF to address the next moonshot challenge by advancing the first comprehensive reauthorization of the NSF in more than a decade. I'm grateful to Chairwoman Johnson and Ranking Member Lucas for their collaborative and thoughtful approach in crafting this bipartisan legislation, and I'm pleased to be a cosponsor of this bill.

This is a critical time to be scaling up investments in fundamental research. The NSF provides approximately 25 percent of the Federal support for basic research conducted at academic institutions. For example, with the support of the NSF, Oregon State University, a land-grant university, will operate a regional class research vehicle. The name of the vessel Taani comes from a Siletz term meaning offshore, and the vessel will be equipped to conduct detailed seafloor mapping. The Taani will help identify geologic structures important in predicting the Cascadia Subduction Zone earthquake that could likely triggered a tsunami on the West Coast. As this Committee works to increase funding for the NSF, I hope the agency can continue to build on this [inaudible] support further investments in ocean observations.

NSF-funded research is also important in our efforts to solve the climate crisis. Last month, the House passed my bipartisan *COAST Research Act*, which reauthorized NSF supported ocean and coastal acidification research. There is tremendous untapped potential for NSF research to help advance comprehensive science-based climate policy.

Throughout my years on this Committee, I've heard some concerns from tribal nations and entities about their exclusion from many climate science funding opportunities across the Federal research enterprise, including those at the NSF. I appreciate Chairwoman Johnson's partnership in including report language as this bill in advances, explicitly encouraging partnerships with tribes to receive NSF funding for collaborative research opportunities.

Also as a Member of the Education and Labor Committee and founder of the—and Co-Chair of the congressional STEAM (science, technology, engineering, arts, and mathematics) Caucus, I continue to advocate for the integration of art and design into STEM fields. STEAM education inspires creative critical thinking, and it can build more inclusive classroom environments to support greater diversity of students interested in STEM, especially girls and people of color.

Our Committee's work today is also an important step to address the underrepresentation of women and people of color in STEM fields by better aligning STEM education with training and needs of our Nation's workforce.

I again want to thank Chairwoman Johnson and Ranking Member Lucas for their leadership. I urge my colleagues to support the amendment in the nature of a substitute, and I yield back the balance of my time.

Chairwoman JOHNSON. Thank you very much. I now recognize Mr. Waltz.

Mr. WALTZ. Thank you. Thank you, Chairwoman Johnson, and thank you for holding today's Full Committee markup of the *NSF for the Future Act*. I'm proud of the process this Committee has undertaken to get here today.

This bill includes long-term planning to make sure strategic and sustainable investments in the STEM workforce to expand and enhance America's talent pipeline. It supports the construction and maintenance of world-class facilities. It promotes the research needed to develop revolutionary technologies that are crucial to our national security and our economic security.

As I've said before and I just want to state again for the record that making these investments are important, but we must also secure them. We must secure taxpayer-funded research and technologies from our adversaries like the Chinese Communist Party (CCP). Currently, the NSF funds approximately 12,000 annual awards to more than 40,000 recipients. And through the investments that this bill proposes, these numbers are anticipated to nearly double. With that growth comes a greater need for resources to protect our research. We need authorities and tools for NSF for the Foundation, for sponsoring institutions, and for applicants to identify and to address malign foreign influence and research staff.

I want to thank you, Chairwoman Johnson, Ranking Member Lucas, Chairwoman Stevens, for working with me and my team during our Subcommittee markup and adding my amendment to ensure NSF has those resources and authorities they need to further investigate and act upon the nearly 1,000 percent increase in malign influence and research theft that the NSF IG (Inspector General) is reporting.

This bill instructs the Director to develop the required online security training modules to ensure that individual researchers understand what makes an appropriate foreign partnership and domestic partnership and the importance of accurate disclosures. And it sets a baseline for what's right and wrong. It's critical that we strike the correct balance between keeping this research enterprise open as it has always been but also protecting it.

There is more work to be done, however, including adopting the amendment that Representative Feenstra and I are offering today to prohibit grant applicants from participating in malign foreign talent programs. I think these provisions take some big steps in striking that balance. I also want to thank the university systems for working with us on the training module and the training—and that policy that requires institutions to certify compliance.

Look, with the CCP threatening to leapfrog America technologically, we are at an inflection point. It's critical for the United States to scale up this enterprise. But it does also include the need for more R&D security of our domestic supply chain of critical minerals. China currently has a stranglehold on the supply and proc-

essing technology of these resources, and it endangers our ability to produce critical end products.

Thank you again, Chairwoman, for including the provision from my *America Critical Mineral Independence Act of 2021* in this amendment. This provision supports basic research grants to advance critical minerals—to advance critical mineral mining strategies and technologies to better utilize existing domestic resources. We need to bring the supply chain back home to America, and this provision is an important part of achieving that goal.

Lastly, I would like to thank Representative Ross, Ranking Member Lucas, Chairwoman Johnson for cosponsoring the *National Science and Technology Strategy Act of 2021*, which we introduced on Friday. We consider these two—as we consider these two bills today, that would double down on our investments in science and technology. It's critical that we have a whole-of-government strategic approach to develop U.S. research and innovation goals. And by requiring a national S&T strategy be set every 4 years, this legislation will help the United States establish priorities to maintain—to remain competitive on a global scale and stay a leader in crosscutting innovation. I look forward to working with the Chairwoman on moving this bill through Committee—through our Committee in the future.

Look, there is momentum on both sides of the aisle to make the needed investments, to scale up the U.S. research enterprise, but it must be done in a realistic and pragmatic and sustainable way. I believe this legislation does that. I'm proud to be an original cosponsor of this legislation with Chairwoman Johnson, Ranking Member Lucas, and Chairwoman Stevens. I want to thank them and their staff for working together with mine to develop such a strong piece of legislation, and I encourage Members to support this amendment and support the full bill on final passage.

I yield back.

Chairwoman JOHNSON. Thank you very much. Ms. Stevens.

Ms. STEVENS. Madam Chair, I move to strike the last word.

Chairwoman JOHNSON. You're recognized for 5 minutes.

Ms. STEVENS. Well, thank you, Madam Chair, not only for your remarkable leadership but also for convening today's Full Committee markup. This has certainly been a remarkable process that has brought us to today's markup.

Last month, I was honored to move the *National Science Foundation for the Future Act* through the Subcommittee markup as the Chairwoman of the Subcommittee on Research and Technology, alongside Ranking Member Waltz. We passed this bill with—through our Subcommittee with incredible and overwhelming bipartisan support by voice vote.

We also want to recognize Dahlia Sokolov and Sara Barber from the Committee staff for a lot of their tireless work on this bill and helping to move things along.

And today, we took another step forward and markup the *National Science Foundation for the Future Act* as a Full Committee to build on the R&D infrastructure the National Science Foundation needs to seize the promise of America's innovation future.

We have been through a challenging period where, over the last decade, we have seen a significant underinvestment in research

from our Federal Government, all while the global landscape of competition in science fields drastically shifted and exploded with opportunity. For instance, currently, the National Science Foundation is only able to fund less than 1/4 of the grant proposals submitted, and three billion of the top-rated grant applications are ultimately declined.

Through three Committee hearings this year alone we have heard from stakeholders and academia, the private sector, and innovation policy experts that the National Science Foundation is an essential asset that flat budgets have squeezed for too long. The National Science Foundation plays a pivotal role in our research ecosystem. As the only Federal agency charged with supporting Federal and fundamental research across all scientific disciplines, we are at a moment where we will say we are no longer going to undermine and diminish this function.

Therefore, this bill, the *National Science Foundation for the Future Act*, Madam Chair, that you have helped to champion alongside Ranking Member Lucas, doubles the budget of the NSF over 5 years in order to meet the needs of our country's global leadership and innovation.

But that increasing of the budget is not enough. The *NSF for the Future Act* creates a partnership-driven solutions-oriented technology directorate to accelerate use-inspired and translational research within the United States. We are capturing our return on spend.

The bill also proposes scaling up our pre-K through 12 STEM education research innovations and modernizing undergraduate and graduate student training to making research data more accessible, funding more research enabling infrastructure, and expanding opportunities to participate in NSF-funded projects. We are talking about the equity agenda. I am hopeful that we will take another major step forward and pass the bill out of Committee today.

As Members of the Science Committee, we are certainly no strangers to working together to get the job done and to get it done right away. So often this Committee serves as a model Committee of effective congressional bipartisanship and proves that so much good work can be done for the American people. Working on the *NSF for the Future Act* has been a collaborative process. I our discussions, the stakeholder community and our congressional colleagues have remained committed to this shared goal of positioning the United States to continue to lead the world with our ideas, our inventions, and most certainly our people.

We are a nation founded on ideas and by people who know how to innovate. Innovation is in our bones as Americans and striving for a better way or a more perfect way forward as it is in our creed. I look forward to today's continuing discussions on the best way forward with this bill to achieve our shared goal. Thank you, Madam Chair.

Chairwoman JOHNSON. Thank you very much. Mr. Babin.

Mr. BABIN. Yes, ma'am, thank you so very much, Madam Chair.

First, I want to commend the excellent bipartisan effort that we've seen in crafting these bills. Sadly, it's rare to see true bipartisan work these days here in the House. The 19-hour Transportation and Infrastructure highway bill markup last week serves as

an example of the unfortunate realities of partisan closed-door work. And I'm very happy to say that this bill is a very good example of how the House is supposed to work in crafting legislation.

To that, I'm very pleased to see that my bill, which secures and protects our universities' technologies and—is included in this bill. If we are going to authorize new spending to invest in our science and technology, we must make sure that it is protected. The FBI (Federal Bureau of Investigation) and intelligence agencies have continually warned Congress about the threat of foreign espionage of U.S. science and technology and particularly on university campuses.

China's investment in development and not on basic research implies that they are building their technological success on the basic research developed here in the United States and also around the world of our allies. We have even seen the infiltration of Chinese influence in our university systems on several different occasions at our top institutions. We must work to ensure that foreign nationals from China coming to study at our universities do not undermine our open system of research.

And that is why I introduced H.R. 3747, which will provide a pilot project for a nationwide network of secure computing enclaves for federally funded research at universities. I am delighted to see that this bill is included here today and that we can help provide our research institutes with the resources necessary to mitigate these threats by securing our own networks.

And I again thank you, Chairwoman Johnson and Ranking Member Lucas, for the excellent bipartisan work. And with that, I yield back.

Chairwoman JOHNSON. Thank you very much. Mr. McNerney.

Mr. MCNERNEY. Well, I thank the Chairwoman for recognizing me. And I want to thank you personally for your hard work, Chairwoman Johnson, and your leadership on this issue and the Democratic staff. I also want to give a shout out to Frank Lucas, the Ranking Member, for your hard work, Frank. It's always good to hear that you're involved in this and the staffs on both sides.

Say, you know, the United States has been the leader in tech and science for generations. We take it for granted. We can't even imagine what it would be like if we weren't the leaders. And if we didn't pass this bill, then we might just find ourselves in that position. So this is a critically important piece of legislation. It will keep us in the game and put us on top. And because of that, I am strongly supporting of this.

And it's great to see a bipartisan effort here, and this is truly a bipartisan effort. And we all tend to agree that we want the United States to have a strong science leadership role in the world today.

I'm also pleased that several pieces of legislation that I've worked hard on are included in this ANS and including this one that is being discussed now. This is important because the—several of the United States universities are really leaders in the world. And I don't want to name them, but I'll point out Stanford since that's near my home, and there's qualities that these institutions have that we want to identify and we want to make sure we understand what makes these institutions so powerful and help use that information to empower many other institutions around the country to

become thought leaders and science leaders. So that's what this particular amendment is about. I'm very proud to support it. Again, I appreciate the work that's gone into it from both sides of the aisle. And I'll urge my colleagues to show their strong support and brag about it, too.

So with that, I'll yield back to the Chair.

Chairwoman JOHNSON. Thank you very much. Mr. Baird.

Mr. BAIRD. I want to thank you, Chairwoman Johnson and Ranking Member Lucas, for holding today's markup, and I also thank you for offering this amendment in the nature of a substitute, which I support.

This amendment includes a number of productive provisions, including one that includes bipartisan legislation Representative Ross and I introduced last week to establish technology research institutes at research universities as part of the new Science and Engineering Solutions Directorate. These institutes will support critical research in key technology areas to solve some of the greatest challenges, including challenges with social, economic, health, scientific, and national security implications. These institutes will also promote public-private partnerships for key technologies and the creation of multiuser research testbeds and instrumentation. Another key role of these institutes will be to establish traineeship programs for graduate students pursuing a master's or doctorate degree in areas related to critical technologies for hands-on research experiences in government and industry.

American superiority in science and technology is foundational to our economic competitiveness, our national security, and our way of life. This provision, this amendment, and this bill provides a responsible and sustainable future for our National Science Foundation. The investments they make in basic research, which are really the seeds of innovation, will ensure America's future competitiveness.

I am proud to be a cosponsor of the *NSF for the Future Act* and support this amendment. I encourage my colleagues to support this amendment and this bill during the final passage.

Thank you, Chairwoman Johnson, Ranking Member Lucas, Chairwoman Stevens, and Ranking Member Waltz for their leadership on this bill. I yield back.

Chairwoman JOHNSON. Thank you very much. Mr. Ross—Ms. Ross.

Ms. ROSS. Thank you very much, Chairwoman Johnson and Ranking Member Lucas. I also am speaking in favor of this amendment and all of the wonderful bipartisan work that this Committee and the Subcommittee did. I tell my district all the time don't believe what you see on TV. The Science, Space, and Technology Committee is setting an example for the country.

These bills will play a vital role in furthering our national research enterprise, which is a priority for my district, which includes much of the Research Triangle Park. The bills will enhance our research enterprise by funding researchers, expanding STEM education initiatives, broadening participation in STEM by underrepresented groups, updating research and infrastructure, and even more.

In 2020 NC (North Carolina) State, a land-grant institution in my district, was one of the country's leading research institutes—institutions and was awarded nearly $53 million in grants from NSF for cutting-edge research. I was there last week visiting several of these research institutes on the Centennial campus.

I'm particularly excited to speak today about the bill that I introduced with Representative Baird, which he discussed the *NSF Technology Research Institutes Act*. The bill, which is now included in the *NSF for the Futures Act*, would create an NSF program to provide grants to colleges and universities focused on key technology areas.

U.S. leadership in science and technology is crucial to sustaining our leadership on the global stage. The grants will be used for fundamental and experimental research activities focused on solving societal or national challenges in addition to workforce development opportunities for researchers.

The importance of academic institutions in creating robust innovation economies and highly trained workforce cannot be understated. It's no coincidence that with universities and colleges with my—in my district, full of students and researchers pursuing STEM careers, Raleigh, North Carolina, ranks No. 2 in the Nation in technology and job growth. And North Carolina leads the country in rural clean energy jobs.

The *NSF Research and Technology Institutes Act* and both of the bills we're marking up today will help educate our students, train our workforce, grow our industries, and energize State, regional, and national economies.

Thank you very much, Ms. Chairman, and I yield back.

Chairwoman JOHNSON. Thank you very much. Ms. Kim.

Ms. KIM. Madam Chair, Ranking Member, I appreciate you holding this markup.

You know, I rise in strong support of the amendment in the nature of the substitute, which includes my legislation, H.R. 3859, the *Innovations in Informal STEM Learning Act*. This was introduced with my colleague Representative Moore, Ranking Member Lucas, and Chairwoman Johnson. Thank you. This bill directs the NSF directorate to award competitive merit-reviewed grants to support the participation of students in competitions, afterschool activities, and field experiences related to STEM education and setting up the pre-K through eighth grade Informal STEM program. Under H.R. 3859, the grants will be used to advance the engagement in STEM of students in pre-K through eighth grade.

Additionally, this bill makes a concerted effort to bridge the achievement gap in STEM education with our minority and women students by addressing activities outside of the classroom.

Finally, the *Innovations in Informal STEM Learning Act* directs the NSF Director to evaluate the pre-K through eighth grade Informal STEM program and report the evaluations of—to Congress and provide recommendations that would improve the effectiveness of the program.

In order for our country and to increase our competitiveness abroad we should be focusing on bridging the achievement gap in STEM education at the elementary and secondary levels, and this bill aims to achieve that.

I was also proud to support H.R. 3809, the *Research Excellence through STEM Inclusion Act* as an original cosponsor with my colleague Representative Bowman. The legislation was also included in today's ANS. The legislation would codify the Office of Diversity of Inclusion at the National Science Foundation. This legislation is important because it would provide oversight, guidance, and coordination to ensure we have a diverse set of researchers, students, and institutions contributing to our sciences.

As our Nation fights to stay ahead as the world leader in innovation, science, and technology, we must rely on the strengths of our Nation's diversity. But we simply aren't doing enough to advance STEM with minority communities and women. For instance, women earn 85 percent of the bachelor's degrees in health-related fields but just 22 percent in engineering and 19 percent in computer science as of 2018. As I have been saying, we cannot afford to compete in the 21st-century economy with one hand tied behind our back.

I commend Ranking Member Lucas and Chairwoman Johnson for your leadership in STEM education and for reaching a bipartisan agreement to pass this legislation, and I urge my colleagues to support the ANS and the broader piece of legislation, H.R. 2225. With that, I yield back.

Chairwoman JOHNSON. Thank you very much. Ms. Moore.

Ms. MOORE. Thank you so very, very much for recognizing me, Madam Chair.

I am so absolutely pleased to be able to support a strong reauthorization of the NSF. And as you heard from Representative Kim, so many important things are happening in this bill that I don't have enough time on the clock to be able to talk about every single thing that has been done, but so many important priorities are included.

And I want to talk about one such priority. That is improving the diversity in STEM. And I applaud the thoughtful and bipartisan provisions that are included in this measure. I want to particularly lift up the Chairwoman Johnson and Ranking Member Lucas for their just tireless effort to make sure that this was a bipartisan and inclusive measure and for including my bill, the *Minority-Serving Institutions STEM Research Capabilities* in the amendment in the nature of a substitute, as well as cosponsoring it when I introduced this provision as a standalone bill. This important legislation would promote STEM capacity for building for minority-serving institutions like Alverno College in my district in Milwaukee or Mount Mary College in Milwaukee, both of them being Hispanic-serving institutions. These MSIs would include all of our HBCUs, tribal colleges, and universities. And again, Hispanic-serving institutions under this umbrella are very important to me personally for my district.

You know what, if we want to create the researchers of the future, we need to meet the students where they are, and that was one reason I was so happy to be able to join Representative Kim in starting that education at a young age. But, you know, it's not enough to just say that we want to increase diversity. Everybody is for that conceptually. We need to provide those institutions the tools that they need to build out their programs. And minority-

serving institutions have some of the most talented students in our country, and we need their great minds to meet the challenges of today.

We have seen in real time and in real life the importance of having diverse points of view in every aspect of science and business. The best decisions are being made by the intellectual gathering of diverse minds. And we know that underrepresented students have the talent. We just need to give them the chance.

And what makes this legislation unique is that these MSI programs will be open to partner with their local technical and community colleges, giving students who may not be able to afford a 4-year university, they're able to still participate in STEM. Yes, STEM is needed at the community college level.

This change complements another provision I worked with on—in—on this legislation, which was adopted during a Subcommittee markup to increase efforts by the NSF to partner with these community colleges to strengthen their research efforts. We need to meet students where they are, and for many students of color who we would like to engage more in STEM, that can be in that local community college.

With these types of investments, we can usher in the next generation of scientists, erode racial imbalances in education and research, and expand opportunities in science and technology for the traditionally underrepresented people of color. Diversity makes our research better and our institutions strong, and I'm so proud to have partnered with the Chairwoman and the Ranking Member on this important issue, and I yield back. Thank you so much for allowing me the privilege to serve on this wonderful Committee.

Chairwoman JOHNSON. Thank you very much. Mr. Obernolte.

Mr. OBERNOLTE. Thank you, Madam Chairman, and thank you very much for the opportunity to testify in support of the amendment.

I'm a strong supporter of not only this amendment but the underlying legislation to reauthorize the National Science Foundation and endow it with the necessary tools to keep our country competitive.

I'd also like to thank you very much for including my legislation, the *Fellowships and Traineeships for Early Career AI Researchers Act*, in the amendment. As a computer scientist myself, I believe the future investment in artificial intelligence is going to be critical for the long-term success of our economy and the long-term competitiveness of our country, but I also am concerned that we underinvest. Yet in particular I'm concerned that we don't have enough graduate students that are going into artificial intelligence. I can tell you from personal experience it's a very difficult field to get in, and so I'm very pleased that this legislation includes provisions to endow scholarships for master's and doctoral students in artificial intelligence and also to endow fellowships to enable these early career researchers to get experience in artificial intelligence, which is a very diverse field and a very difficult field to get into.

So I want to thank Representative McNerney for working with me on this legislation, and also thank you, Madam Chair, and our Ranking Member Lucas, for including it in this bill. I'm proud to

be a part of it, and I am in strong support of it and glad to help. So I yield back. Thank you.

Chairwoman JOHNSON. Thank you very much. Mr. Foster.

Mr. FOSTER. Thank you, Madam Chairwoman.

This ANS and the legislation we are considering today represents the culmination of the historic development that started in this Committee during the last Congress when we saw dueling proposals from each side of the aisle to roughly double the science budget in this country. The bipartisan leadership of the Science Committee deserves tremendous credit for bringing forth these bills in a unified manner and in a manner that truly recognizes the importance of our Federal scientific infrastructure and manpower. And, as the Ranking Member has emphasized, it recognizes the preferability of expanding funding to existing and proven projects and programs rather than reinventing and rebranding the wheel.

It is not an accident that these House bills have received overwhelming support from the scientific and business communities while the competing alternative from the Senate, maybe not so much. As the NSF makes plans to use this overdue expansion in funding for its programs in basic and applied scientific research, it should be assured that Congress is prepared to support this endeavor no matter which party is in control of Congress. I urge my colleagues to support this ANS and this legislation. I yield back.

Chairwoman JOHNSON. Is there any additional comments? If there are—if we do not have any additional comments, we'll move to our first amendment.

The first amendment on the roster is an amendment offered by the gentlelady from California, Ms. Lofgren. Ms. Lofgren had to step away, but I'll ask the Clerk to read it.

The CLERK. Amendment No. 2, amendment to the amendment in the nature of a substitute to H.R. 2225 offered by Ms. Lofgren of California.

[The amendment of Ms. Lofgren follows:]

AMENDMENT TO THE AMENDMENT IN THE NATURE OF A SUBSTITUTE TO H.R. 2225 OFFERED BY MS. LOFGREN OF CALIFORNIA

Page 6, line 2, strike the dollar amount and insert "$12,504,890,000".

Page 6, line 6, strike the dollar amount and insert "$10,025,000,000".

Page 6, line 12, strike the dollar amount and insert "$1,400,000,000".

Page 7, line 8, strike the dollar amount and insert "$620,000,000".

Page 7, line 16, strike the dollar amount and insert "$14,620,800,000".

Page 7, line 20, strike the dollar amount and insert "$11,870,000,000".

Page 8, line 1, strike the dollar amount and insert "$2,300,000,000".

Page 8, line 21, strike the dollar amount and insert "$710,000,000".

Page 9, line 5, strike the dollar amount and insert "$15,945,020,000".

Page 9, line 9, strike the dollar amount and insert "$13,050,000,000".

Page 9, line 15, strike the dollar amount and insert "$2,900,000,000".

Page 10, line 11, strike the dollar amount and insert "$750,000,000".

Page 10, line 19, strike the dollar amount and insert "$17,004,820,000".

Page 10, line 23, strike the dollar amount and insert "$14,000,000,000".

Page 11, line 4, strike the dollar amount and insert "$3,250,000,000".

Page 11, line 24, strike the dollar amount and insert "$770,000,000".

Page 12, line 7, strike the dollar amount and insert "$17,939,490,000".

Page 12, line 11, strike the dollar amount and insert "$14,800,000,000".

Page 12, line 17, strike the dollar amount and insert "$3,400,000,000".

Page 13, line 14, strike the dollar amount and insert "$800,000,000".

☒

Chairwoman JOHNSON. I ask unanimous consent that the amendment be considered as read, and without objection, so ordered.

I recognize myself to speak on the amendment for Ms. Lofgren.

Authorizing Committees such as the Science Committee do our best to propose authorization levels that make sense, but sometimes we may be too cautious. We may look for—look backward to what appropriations have been and in comparison to past authorizations. And that disappointment colors our thinking of what is possible. However, the Nation is at an inflection point on so many fronts, and if there was ever a time to look forward with a bolder vision of what is possible, that time is now.

We have heard from one expert and report after report about what is possible if we are willing to invest. We heard from the National Science Foundation Director himself how the agency could absorb a near-term doubling of their budget. Specifically, the agency would use increased funds to right-size the duration and amount of grants and fund more excellent science.

I want to thank Ms. Lofgren for her assistance, and we look forward to imagine what is both needed and what is possible. And I thank Ranking Member Lucas and Republican Committee staff for working across the aisle on this amendment. Every new number proposed in this amendment was developed with a clear strategy and justification, and I urge my colleagues to support this amendment and I yield back. Mr. Lucas.

Mr. LUCAS. Madam Chair?

Chairwoman JOHNSON. Yes.

Mr. LUCAS. Thank you, Madam—thank you, Chairwoman Johnson and Chairwoman Lofgren, for working with me to achieve a compromise on this amendment to increase the authorization for NSF over the next 5 years by an additional $5 billion. I know Ms. Lofgren's initial ambitions for this amendment were to increase the authorization much higher, and I appreciate the gentlelady and her staff working with us on a compromise I think that achieves both our goals. My priority all along has been to double funding for NSF in a way that is achievable and sustainable. This amendment accelerates funding for NSF faster than our original bill as it launches a new directorate but does so in a way that will not cause immediate drop-off in funding increases afterwards.

And I actually believe this amendment grows the new directorate in a more appropriate annual funding level in the final year of the authorization, one that is in proportion to the rest of the Foundation. If we get to the point of conferencing our ability with the Senate, I'm sure these funding levels will be a vigorous source of debate, but will set an appropriate benchmark. I look forward to working with the Chairwoman and other Members of the Committee to make sure we get it right in the final product. I appreciate the Chairwoman and her staff for working overtime on the map to get this amendment right, and I hope my colleagues will support this amendment. And I yield back, Madam Chair.

Chairwoman JOHNSON. Thank you very much. Any further discussion on this amendment?

If there's no further discussion, the vote occurs on the amendment.

All in favor, say aye, and those opposed, no.

OK, any opposed?

The ayes have it and the amendment is agreed to.

Mr. Foster, amendment?

Mr. FOSTER. Madam Chair, I have an amendment at the desk.

Chairwoman JOHNSON. The Clerk will report the amendment.

The CLERK. Amendment No. 3, amendment to the amendment in the nature of a substitute to H.R. 2225 offered by Mr. Foster of Illinois.

[The amendment of Mr. Foster follows:]

AMENDMENT TO THE AMENDMENT IN THE NATURE OF A SUBSTITUTE TO H.R. 2225

OFFERED BY MR. FOSTER OF ILLINOIS

Insert on page 13, after line 19:

1 (f) SENSE OF CONGRESS.—It is the sense of Con-
2 gress that if, during the years for which there are author-
3 izations under this section, if actual inflation rates exceed
4 the inflation rates projected by the Office of Management
5 and Budget, on which such authorizations were based,
6 Congress should modify such authorizations to reflect the
7 actual rate of inflation.

☒

Chairwoman JOHNSON. I ask unanimous consent to dispense with the reading. Without objection, so ordered.

I now recognize the gentleman for 5 minutes to explain his amendment.

Mr. FOSTER. Thank you, Madam Chairwoman.

My amendment deals with one of the most vexing and uncontrolled variables that in my many years of experience in the planning and execution of scientific projects and programs cause great difficulties and misunderstandings, which is inflation. While making authorization decisions on a multiyear—for multiyear programs and projects, Congress rightly expects realistic budget estimates. This requires an estimate of what inflation will be in future years. These inflation estimates are often taken from guidance from the Office of Management and Budget with adjustments made by the agencies to reflect individual inflation estimates for different project elements, whether they be liquid helium rare earth magnets, or technical manpower.

Right now, there's a lot of uncertainty in the inflation expected over the next decade because of the shocks of COVID–19, the aftershocks of the financial crisis a decade ago, and the extraordinary monetary and fiscal intervention that's been required to stabilize our economy.

Since scientific projects must be planned and budgeted in real terms after correction for inflation, it's the purpose of my amendment to make sure that NSF knows that if inflation exceeds current estimates, that we will support them by authorizing budget levels that preserve real levels of investment.

Now, it has come to my understanding that this sort of commitment to ensure real inflation-adjusted authorizations is not conventionally allowed under our longstanding and arcane traditions of authorization of appropriations procedures, so, with regret, I reiterate my belief that scientific program authorizations should be automatically adjusted to reflect actual inflation in out years.

And I withdraw my amendment and yield back.

Chairwoman JOHNSON. Thank you very much.

The next amendment on the roster is the amendment offered by the gentleman from Texas, Mr. Babin.

Mr. BABIN. Thank you, Madam Chair. I have an amendment at the desk.

Chairwoman JOHNSON. The Clerk will read the amendment—report the amendment.

The CLERK. Amendment No. 4, amendment to H.R. 2225 offered by Mr. Babin of Texas.

[The amendment of Mr. Babin follows:]

AMENDMENT TO H.R. 2225

OFFERED BY MR. BABIN OF TEXAS

Page 13, after line 14, insert the following:

1 (f) LIMITATION.—None of the amounts authorized to
2 be appropriated by this Act may be made available to any
3 entity that has established or known ties to Confucius In-
4 stitutes.

Chairwoman JOHNSON. I ask unanimous consent to dispense with the reading, and I recognize the gentleman for 5 minutes to explain——

Mr. BABIN. Thank you.

Chairwoman JOHNSON [continuing]. His amendment.

Mr. BABIN. One of the greatest assets we have here in this country, a free country, is the partnership between our vibrant venture capital market and the Federal investment in science and technology. When we fully utilize the R&D capabilities of our industry, we can dominate global innovation in S&T, and we absolutely have.

However, the threat of adversarial larceny that we face in this industry greatly undermines this investment. If we don't protect our scientific innovations and the hard-earned taxpayer money that we are authorized, we cripple the competitive advantage that we have in developing cutting-edge technology. It is our duty in this Committee to make sure that provisions are included in any bill as we move forward that protect our investments in science, space, and technology.

As I mentioned earlier, we must take action against countries like China who come in and steal our research and our knowledge, and that is why I introduced this amendment, which simply says that no funding authorized in this bill shall go toward any institution that has ties to the Confucius institutes because of their relationship to the Communist Chinese Party and the concerns and criticisms of issuing Communist Chinese Party propaganda and undermining academic freedom, engaging in industrial and military espionage, surveillance of Chinese students abroad, and advancing the Chinese Government's agendas.

And while I plan on withdrawing this amendment, I would like to make clear that this must remain a priority, a top priority for this Committee, and I will continue to advocate for the strongest possible measures against foreign espionage of our science and technology.

So with that, Madam Chair, I withdraw this amendment, and I will yield back.

Chairwoman JOHNSON. Thank you very much, Mr. Babin. I appreciate your sentiments, and I appreciate the fact that you're withdrawing until we can vet it to make sure that we are in course with the research enterprise.

Mr. BABIN. Yes, ma'am.

Chairwoman JOHNSON. Our next——

Mr. BABIN. Thank you.

Chairwoman JOHNSON. Thank you very much. Our next amendment is another one from Ms. Lofgren. And she is still not back, but I will present her amendment. So I ask unanimous consent that the amendment be considered. The Clerk will read the amendment.

The CLERK. Amendment No. 5, amendment to the amendment in the nature of a substitute to H.R. 2225 offered by Ms. Lofgren of California.

[The amendment of Ms. Lofgren follows:]

AMENDMENT TO THE AMENDMENT IN THE NATURE OF A SUBSTITUTE TO H.R. 2225 OFFERED BY MS. LOFGREN OF CALIFORNIA

Page 41, line 9, strike "graduate student".

Page 41, line 11, insert "and postdoctoral researchers" after "students".

Page 41, at the end of line 13, insert "Not more than 10 percent of supplements awarded under this subparagraph may be used to support professional development experiences for postdoctoral researchers.".

☒

Chairwoman JOHNSON. Without objection, the Ms. Lofgren amendment is recognized.

I want to thank her for this amendment. It updates the existing provision to expand eligibility for professional development funding to postdoctoral researchers. A 2018 National Academies study raised concerns that graduate STEM students have too few opportunities to develop the professional and personal skills in high demand by employers. The study recommended that universities and funding agencies take steps to better prepare graduate students for a wide range of career paths. Postdoctoral scholars will benefit equally from these opportunities as they pursue their diverse career paths, and I urge my colleagues to support this good amendment. And I yield back.

Any further discussion on this amendment?

If there is no further discussion, the vote occurs on the amendment.

All in favor, say aye.

Those opposed, say nay.

The ayes have it, and the amendment is agreed to.

The next amendment on the roster is an amendment offered by the gentlelady from Pennsylvania, Ms. Wild, and she's recognized to offer her amendment.

Ms. WILD. Thank you, Madam Chair. I have an amendment at the desk.

Chairwoman JOHNSON. The Clerk will read the amendment.

The CLERK. Amendment No. 6, amendment to the amendment in the nature of a substitute to H.R. 2225 offered by Ms. Wild of Pennsylvania.

[The amendment of Ms. Wild follows:]

AMENDMENT TO THE AMENDMENT IN THE NATURE OF A SUBSTITUTE TO H.R. 2225 OFFERED BY MS. WILD OF PENNSYLVANIA

Page 42, line 8, strike "and" at the end.

Page 42, line 13, strike the period and insert "; and".

Page 42, after line 13, insert the following:

1 (iv) research, data collection, and as-
2 sessment of the state of graduate student
3 mental health and wellbeing, factors con-
4 tributing to and consequences of poor
5 graduate student mental health, and the
6 development, adaptation, and assessment
7 of evidence-based strategies and policies to
8 support emotional wellbeing and mental
9 health.

☒

Chairwoman JOHNSON. I ask unanimous consent to dispense with the reading. Without objection, so ordered.

The Chair recognizes the gentlelady for 5 minutes to explain her amendment.

Ms. WILD. Thank you, Madam Chair. I appreciate the opportunity today to act on a bipartisan basis to invest in our country's scientific and research leadership with the *NSF for the Future Act*. Our Committee often hears from a range of stakeholders about the need to support STEM students and the research and workforce pipeline. The *NSF for the Future Act* rightly considers how we can modernize STEM education to support graduate students through school and into their early career.

And I believe as part of this work we must note a rising issue for students: their mental health and well-being. A recent study from the National Academies highlights what students, faculty, and administrators have been seeing for years: a pervasive and serious need to address mental and behavioral health issues. The past 16 months of pandemic and recession, disrupting learning and research, have certainly amplified the challenges to graduate students' mental health, but these concerns predate the pandemic. In a 2018–19 Health Minds survey, 40 percent of postsecondary students reported a significant mental health issue. University leaders have been working to address the issue, but our Committee must play a key role in supporting the research that understands and informs the need for more services and support.

To address this, my amendment expands on this bill's current graduate education research provisions to direct the National Science Foundation to fund research that assesses the state of graduate students' mental health and well-being, identifies the factors affecting their health, and develops evidence-based approaches to supporting students' mental health and emotional well-being. In speaking with leaders at Lehigh University in my district, they all agree that more has to be done to support the graduate student population whose experiences and needs are distinct from those of undergraduates.

The bill we consider today is a vital investment in our Nation's scientific leadership, but our success in this endeavor depends on us recognizing and prioritizing the health and well-being of our students and researchers. For that reason, I urge adoption of my amendment, and I yield back.

Chairwoman JOHNSON. Thank you very much. I might add that I support this amendment. Any other comments?

If not, then the vote occurs on this amendment.

All in favor, say aye.

Those opposed, no.

The ayes have it, and the amendment is agreed to.

The next amendment on the roster is one offered by the gentleman from Florida, Mr. Waltz, and he's recognized to offer his amendment.

Mr. WALTZ. Madam Chair, I have an amendment at the desk.

Chairwoman JOHNSON. The Clerk will report the amendment.

The CLERK. Amendment No. 7, amendment to the amendment in the nature of a substitute to H.R. 2225 offered by Mr. Waltz of Florida.

[The amendment of Mr. Waltz follows:]

AMENDMENT TO THE AMENDMENT IN THE NATURE OF A SUBSTITUTE TO H.R. 2225 OFFERED BY MR. WALTZ OF FLORIDA

Page 51, after line 11, insert the following:

1 (g) FEDERAL CYBER SCHOLARSHIP-FOR-SERVICE
2 PROGRAM.—
3 (1) SENSE OF CONGRESS.—It is the sense of
4 Congress that—
5 (A) since cybersecurity risks are constant
6 in the growing digital world, it is critical that
7 the United States stay ahead of malicious cyber
8 activity with a workforce that can safeguard
9 our innovation, research, and work environ-
10 ments; and
11 (B) Federal investments into the Federal
12 Cyber Scholarship-for-Service Program at the
13 National Science Foundation play a critical role
14 in preparing and sustaining a strong, talented,
15 and much-needed national cybersecurity work-
16 force and should be strengthened.
17 (2) IN GENERAL.—Section 302(b)(1) of the Cy-
18 bersecurity Enhancement Act of 2014 (15 U.S.C.
19 7442(b)(1)) is amended by striking the semicolon at

the end and inserting the following "and cybersecurity-related aspects of other related fields as appropriate, including artificial intelligence, quantum computing and aerospace.".

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Chairwoman JOHNSON. I ask unanimous consent to dispense with the reading. Without objection, so ordered.

I now recognize the gentleman for 5 minutes to explain his amendment.

Mr. WALTZ. Thank you, Chairwoman Johnson, for the opportunity to speak on this amendment.

The NSF's CyberCorps Scholarship for Service (SFS) program, its SFS program, has two primary goals: one, to increase the number of employees working in cybersecurity; and two, to increase the capacity of U.S. higher education to produce those cyber professionals. It's notable that the SFS program has placed 3,200 students in 357 government organizations with a placement rate of 95 percent. Top placements in government include the NSA (National Security Agency), DOD (Department of Defense), and the Department of Homeland Security. This program is helping our national security agencies recruit and retain elite cyber talent. And in fact, the 2020 Cyberspace Solarium Commission report recommends growing the SFS program to reach 2,000 students per year.

Considering the necessity of elite cyber talent within the Federal Government, I think we've all seen that need in recent months. In particular, as they've been highlighted by recent cyber attacks, my amendment seeks to ensure the SFS program is meeting the forward-looking goals and strategic objectives of the Federal Government to deter, protect, detect, and respond to cyber threats. Integral to maintaining a competitive edge in cyber is prioritizing AI and quantum.

Additionally, given the growing prevalence of unmanned aerial vehicles in American aerospace—in American airspace plus the high placement rate of SFS students at DOD, which is nearly 1/3, it's necessary to clarify that aerospace cyber is a focus area for the program.

My amendment simply ensures the National Science Foundation is considering AI, quantum, and aerospace as it selects participating institutions and scholarship recipients. Said another way, my amendment seeks to clarify that NSF is focusing on these areas. This amendment does not exclude or disadvantage other cyber topics like crypto, biometrics, behavioral sciences, or others. It simply ensures the SFS program stays on the cutting edge in the rapidly developing areas of AI, quantum, and aerospace. And I urge my colleagues to support the amendment. I yield back.

Chairwoman JOHNSON. Thank you. Any further discussion on the amendment?

The vote occurs on the amendment.

All those in favor, say aye.

All those opposed, say no.

The ayes have it, and the amendment is agreed to.

Mr. Posey has an amendment.

Mr. POSEY. Madam Chair, I have an amendment at the desk.

Chairwoman JOHNSON. The Clerk will report the amendment.

The CLERK. Amendment No. 8, amendment to the amendment in the nature of a substitute to H.R. 2225 offered by Mr. Posey of Florida.

[The amendment of Mr. Posey follows:]

AMENDMENT TO THE AMENDMENT IN THE NATURE OF A SUBSTITUTE TO H.R. 2225 OFFERED BY MR. POSEY OF FLORIDA

Page 51, after line 11, insert the following:

1 (g) CYBERSECURITY WORKFORCE DATA INITIA-
2 TIVE.—The Director, acting through the National Center
3 for Science and Engineering Statistics established in sec-
4 tion 505 of the America COMPETES Reauthorization Act
5 of 2010 (42 U.S.C. 1862p) and in coordination with the
6 Director of the National Institute of Standards and Tech-
7 nology and other appropriate Federal statistical agencies,
8 shall establish a cybersecurity workforce data initiative
9 that—
10 (1) assesses the feasibility of providing nation-
11 ally representative estimates and statistical informa-
12 tion on the cybersecurity workforce;
13 (2) utilizes the National Initiative for Cybersec-
14 urity Education (NICE) Cybersecurity Workforce
15 Framework (NIST Special Publication 800–181), or
16 other frameworks, as appropriate, to enable a con-
17 sistent measurement of the cybersecurity workforce;

1 (3) utilizes and complements existing data on
2 employer requirements and unfilled positions in the
3 cybersecurity workforce;
4 (4) consults key stakeholders and the broader
5 community of practice in cybersecurity workforce de-
6 velopment to determine data requirements needed to
7 strengthen the cybersecurity workforce;
8 (5) evaluates existing Federal survey data for
9 information pertinent to developing national esti-
10 mates of the cybersecurity workforce;
11 (6) evaluates administrative data and other
12 supplementary data sources, as available, to describe
13 and measure the cybersecurity workforce; and
14 (7) collects statistical data, to the greatest ex-
15 tent practicable, on credential attainment and em-
16 ployment outcomes information for the cybersecurity
17 workforce.

Chairwoman JOHNSON. I ask unanimous consent to dispense with the reading. Without objection, so ordered.

I now recognize the gentleman for 5 minutes to explain his amendment.

Mr. POSEY. Thank you, Chairwoman Johnson.

My amendment also addresses the recommendations made by the Cyberspace Solarium Commission, which Congressman Waltz just referenced. While we know our Nation's cyber workforce needs are great, we do not have the quality of data necessary to effectively understand and address the needs. This amendment directs the National Science Foundation to expand the mandate of National Center for Science and Engineering Statistics to produce a statistical insight into America's cybersecurity workforce to better understand the current state of the cyber workforce path to entry, demographic trends of the cyber workforce, and other relevant data. Having this information will have a better picture of our Nation's cyber workforce needs and will help inform the interventions needed to recruit and retain cyber professionals.

I'm delighted the majority has agreed to accept this amendment and yield back the balance of my time. Thank you.

Chairwoman JOHNSON. Thank you very much.

Any further discussion on the amendment? I support the amendment. And the vote occurs on the amendment.

All in favor, say aye.

Those opposed, say nay.

Hearing none, the amendment is adopted.

The next amendment on the roster is by Mr. Feenstra.

Mr. FEENSTRA. Madam Chair, I have an amendment at the desk.

Chairwoman JOHNSON. The Clerk will report the amendment.

The CLERK. Amendment No. 9, amendment to the amendment in the nature of a substitute to H.R. 2225 offered by Mr. Feenstra of Iowa.

[The amendment of Mr. Feenstra follows:]

AMENDMENT TO THE AMENDMENT IN THE NATURE OF A SUBSTITUTE TO H.R. 2225 OFFERED BY MR. FEENSTRA OF IOWA

Page 78, after line 24, insert the following:

1 (8) MALIGN FOREIGN TALENT RECRUITMENT
2 PROGRAM PROHIBITION.—
3 (A) IN GENERAL.—Not later than 12
4 months after the date of enactment of this Act,
5 the Director shall establish a requirement that,
6 as part of an application for a research and de-
7 velopment award from the agency—
8 (i) each covered individual listed on
9 the application for a research and develop-
10 ment award certify that they are not an
11 active participant of a malign foreign tal-
12 ent recruitment program from a foreign
13 country of concern and will not be a par-
14 ticipant in such a program for the duration
15 of the award; and
16 (ii) each institution of higher edu-
17 cation or other organization applying for
18 such an award certify that each covered in-
19 dividual who is employed by the institution

of higher education or other organization has been made aware of the requirement under this subsection.

(B) INTERNATIONAL COLLABORATION.—Each policy developed under subparagraph (A) shall not prohibit—

(i) making scholarly presentations regarding scientific information not otherwise controlled under current law;

(ii) participation in international conferences or other international exchanges, partnerships or programs that involve open and reciprocal exchange of scientific information, and which are aimed at advancing international scientific understanding; and

(iii) other international activities deemed appropriate by the Director.

(C) LIMITATION.—The policy developed under subparagraph (A) shall not apply retroactively to research and development awards made prior to the establishment of the policy by the Director.

(D) DEFINITIONS.—In this subsection:

(i) COVERED INDIVIDUAL.—The term "covered individual" means the principal

1 investigator, co-principal investigators, and
2 any other person at the institution who is
3 responsible for the design, conduct, or re-
4 porting of research or educational activities
5 funded or proposed for funding by the
6 Foundation.

7 (ii) FOREIGN COUNTRY OF CON-
8 CERN.—The term "foreign country of con-
9 cern" means the People's Republic of
10 China, the Democratic People's Republic of
11 Korea, the Russian Federation, the Islamic
12 Republic of Iran, or any other country
13 deemed to be a country of concern as de-
14 termined by the Department of State.

15 (iii) MALIGN FOREIGN GOVERNMENT
16 TALENT RECRUITMENT PROGRAM.—The
17 term "malign foreign government talent
18 recruitment program" means any program
19 or activity that includes compensation, in-
20 cluding cash, research funding, honorific
21 titles, promised future compensation, or
22 other types of remuneration, provided by
23 the foreign state or an entity sponsored by
24 the foreign state to the targeted individual
25 in exchange for the individual transferring

1 knowledge and expertise to the foreign
2 country.

Beginning on page 78, line 25, redesignate paragraphs (8) through (10) as paragraphs (9) through (11), respectively.

Chairwoman JOHNSON. I ask unanimous consent to dispense with the reading, and the gentleman is recognized for 5 minutes to explain his amendment.

Mr. FEENSTRA. Thank you, Chairwoman Johnson.

My amendment is fairly simple. It directs the National Science Foundation to prohibit grantees from participating in malign foreign talent programs from countries of concern while they are receiving an NSF grant. These countries, as identified by the State Department, are currently China, Iran, North Korea, and Russia.

I want to thank Congressman Waltz for joining me in introducing this amendment.

For years, Congress, Federal research agencies, the national security agencies, and universities have been working to root out malign foreign talent recruitment. The time has come to simply prohibit them from receiving U.S. taxpayer dollars. The Chinese Government knows that economic strength and scientific innovation are keys to global influence of military power, so the Chinese Communist Party aims to acquire our early stage research and expertise to erode our competitive advantage.

As part of this effort, China has been making extensive use of nontraditional collectors. These individuals are not spies in the traditional sense, but they are nonetheless collecting information sought by the Chinese Government. Until recently, many U.S. researchers participating in these programs may have been that naïve or unwitting participants in this espionage, but they are no longer—but can no longer claim ignorance.

My amendment defines malign foreign talent programs as "any program or activity that includes compensation, including cash, research funding, honorific titles, promised future compensation, or other types of renumeration provided by a foreign State or an entity sponsored by the foreign State to the targeted individual in exchange for the individual transferring knowledge or expertise to the foreign country." The key word here is "in exchange."

We know from foreign talent contracts that have been uncovered by the FBI and agency investigations that Chinese talent programs have extensive requirements for transfer of information to China usually in the conflict with the requirements of U.S. research grants and university employment contracts. Let me be clear. Legitimate talent programs do not require the unethical or sometimes illegal transfer of knowledge or research to sponsor.

My amendment also makes clear that we are not trying to prohibit the legitimate exchange of scientific ideas and collaboration. It explicitly states that this—the prohibition should not prevent participation in international conferences, scholarly—and scholarly presentations of open research.

This amendment was informed by feedback from university associations and several scientific societies. University and scientists want clear rules for the road, and this will help to provide that type of guidance.

I consider this amendment as a first step. The rules should be the same for all Federal research agencies, so I hope I can work together with the cosponsor of my amendment, Congressman Waltz, as well as Chairwoman Johnson and Ranking Member Lucas to make this governmentwide prohibition through the legis-

lation process. I urge my colleagues to support this amendment, and I yield back the remaining—remainder of my time. Thank you.

Chairwoman JOHNSON. Thank you very much. I recognize myself to speak on this amendment.

And I want to thank you and the Republican Committee staff for working closely with the Democratic Members and staff on this amendment. This Committee, on a bipartisan basis, has continued to advance constructive policies to address research security risks. We all understand that the risks are real. We also understand that—the need for science to remain open and collaborative. And we have a deep appreciation for the contributions that foreign scholars have and will continue to make to U.S. science and innovation. We must keep our doors open to global talent if we are to remain competitive.

I believe this amendment was carefully developed to balance those risks and benefits, so I support this amendment and yield back.

Any further comments?

If no, then the vote occurs——

STAFF. Mr. Lucas wants to be recognized.

Chairwoman JOHNSON. Oh, Mr. Lucas.

Mr. LUCAS. Thank you, Madam Chair. I support this amendment, and I want to thank Congressman Feenstra and Ranking Member Waltz for their work on this issue.

For the last 4 years on a bipartisan basis the Science Committee has been working to address foreign theft of taxpayer research particularly by the Chinese Communist Party. I know that research theft and malign foreign influence are explicit strategies within the CCP's plan to become the global leader in science and innovation.

Our Committee has carefully worked with Federal research and national security agencies, as well as universities and other stakeholders, to determine the appropriate steps the Federal Government should take to stop this malign activity. We've worked to find solutions that address actual problems identified by agencies and universities without harming the open research system in the United States that has attracted the best scientists in the world.

This amendment ensures that legitimate international cooperation and exchange of scientific ideas is not prohibited by this new policy. This amendment is the appropriate next step we must take to stop the CCP and others from using malign foreign talent programs to steal knowledge and expertise.

I appreciate the university community working with us to refine the language of the amendment and for recognizing the time has come to simply prohibit these malign foreign talent programs.

I look forward to working with my colleagues through the process to make this requirement a requirement across all Federal research agencies, and I urge my colleagues to support the amendment. And I yield back the balance of my time.

Chairwoman JOHNSON. Thank you very much. Mr. Waltz I think has requested time.

Mr. WALTZ. Thank you, Chairwoman Johnson. I am proud to cosponsor this amendment with my colleague Congressman Feenstra. In my opinion this prohibition on U.S. taxpayer-funded research

participating in malign foreign talent programs is many years overdue, but I am glad universities are now on board.

Two years ago, I sponsored the *Securing American Science and Technology Act*, which became law as part of the fiscal year 2019 *NDAA (National Defense Authorization Act)*. This was the first step Congress took to secure Federal research from foreign theft. Last year, I sponsored the provision that took the next step to require researchers across all Federal research agencies to disclose their foreign sources of funding. In the underlying *NSF for the Future Act* we give NSF further tools to deal with foreign theft of foundation-funded research, including requiring annual training for NSF-funded research.

This amendment takes the next step and in many ways simplifies many of the rules and processes we put into place by simply prohibiting malign foreign talent programs. We know that most of these talent program contracts already violate Federal grant terms and conditions, but now there will be no question left in the mind of a faculty member of a university of whether or not participation is allowed.

Now, while this amendment is only a requirement for NSF, which is germane for this markup, my intention is that this should serve as a placeholder for governmentwide requirement. I will work with Mr. Feenstra, with you, Chairwoman Johnson, Chairwoman Stevens, Ranking Member Lucas as we move forward on the next *NDAA* to make this requirement for every Federal research agency. We need to make the investments in science or technology that *NSF for the Future* proposes, but we also need to make sure the research isn't transferred right out the back door to Beijing. I urge my colleagues to support this amendment.

Chairwoman JOHNSON. Thank you very much.

Any further comments?

Hearing none, then the vote occurs on the amendment.

All those in favor, say aye.

Those opposed, say nay.

The amendment is adopted.

The next amendment is by Mr. McNerney.

Mr. MCNERNEY. I thank the Chair for recognizing——

Chairwoman JOHNSON. The Clerk will report the amendment.

Mr. MCNERNEY. I have an amendment at the desk.

The CLERK. Amendment number 10, amendment to the amendment in the nature of a substitute to H.R. 2225 offered by Mr. McNerney of California and Mr. Meijer of Michigan.

[The amendment of Mr. McNerney and Mr. Meijer follows:]

AMENDMENT TO THE AMENDMENT IN THE NATURE OF A SUBSTITUTE TO H.R. 2225

OFFERED BY MR. MCNERNEY OF CALIFORNIA and Mr. Meijer of Michigan

Beginning on page 92, line 15 and ending on page 93, line 1, redesignate subparagraphs (G) through (I) as subparagraphs (H) through (J), respectively.

Page 92, after line 14, insert the following:

1 (G) research to understand the atmos-
2 pheric processes related to solar radiation man-
3 agement strategies and technologies and exam-
4 ine related economic, geopolitical, societal, envi-
5 ronmental, and ethical implications, not includ-
6 ing research designed to advance future deploy-
7 ment of these strategies and technologies.

☒

Chairwoman JOHNSON. I ask unanimous consent to dispense with the reading. Without objection, so ordered.

And I now recognize the gentleman for 5 minutes to explain his amendment.

Mr. MCNERNEY. Again, I thank the Chairwoman. And I want to thank my colleague from Michigan, Mr. Meijer, for his co-sponsorship of this amendment to the *NSF for the Futures Act*.

Climate change is an increasing threat to our communities, our economy, our national security with devastating impacts expected in the next 10 to 30 years. First and foremost, we must commit to aggressively reducing carbon and other greenhouse gas emissions, as well as sequestering carbon through agriculture and forestry and from captured emissions from smokestacks and from direct air capture. But there's enough carbon and other greenhouse gases in the atmosphere right now today to continue the threat of atmospheric heating and oceanic warming and with the resulting threats to our society. Moreover, even more—even the most optimistic projections predict it will take decades to reduce carbon emissions to equilibrium levels, leaving us at the mercy of climate warming without any insurance against the near-term catastrophic risks. We may need to actively cool the atmosphere.

Because of this, it's critical that we have a robust science research agenda that policymakers, U.S. agencies, and the broader research community can take guidance from. We must examine all the potential tools we have in our toolbox with an objective view and let the science guide the research agenda. To ignore this imminent threat would be irresponsible and potentially dangerous.

Additionally, it's imperative that science and the research agenda inform all aspects of this arena, including the policies of governance. These two go hand-in-hand. Research and information are required for good governance. It's not an either/or situation. In order to assess, predict, and potentially intervene against the threat of climate change, there is a first need for consideration of the entire system of observations, analysis, and scientific resources and technology.

That's why I'm offering an amendment which allows for the use of funds under climate change research to understand the atmospheric process related to solar radiation management strategies and technologies. Furthermore, the research would examine related economic geopolitical, social——

STAFF. Sorry, he got muted.

Mr. MCNERNEY. I just unmuted myself.

Chairwoman JOHNSON. OK, you may.

Mr. MCNERNEY. This amendment does not, does not—I repeat, does not include research designed to advance future deployment of these strategies and technologies. We simply need to research and computer model to inform us is climate intervention viable or is it too risky? Does the risk of climate intervention outweigh the risk of unimpeded climate change? It will take about a decade to develop the scientific technology needed for any future deployment. In the meantime, new ideas might be and hopefully will be developed from this research to draw climate out of the atmosphere and eliminate carbon emissions or fight climate change in other ways.

But we cannot just hide our heads in the sand and hope for the best. The threat posed by climate change is unlike any threat humanity has faced, and we must explore every single avenue available. Some research in solar radiation management strategies is already taking place in China, and it's imperative that the appropriate authorities are leading this initiative to ensure safe practices are being promoted and proper governance is being applied.

Thank you, Madam Chair, and I yield back.

Chairwoman JOHNSON. Thank you. Any further discussion? Any requests for time?

If not, the vote occurs on the amendment.

All those in favor, say aye.

Those opposed, no?

The ayes have it, and the amendment is agreed to.

Mr. Perlmutter has an amendment.

Mr. PERLMUTTER. Thanks, Madam Chair. I have an amendment at the desk.

Chairwoman JOHNSON. The Clerk will report the amendment.

The CLERK. Amendment number 11, amendment to the amendment in the nature of a substitute to H.R. 2225 offered by Mr. Perlmutter of Colorado and Ms. Lofgren.

[The amendment of Mr. Perlmutter and Ms. Lofgren follows:]

AMENDMENT TO THE AMENDMENT IN THE NATURE OF A SUBSTITUTE TO H.R. 2225

OFFERED BY MR. PERLMUTTER OF COLORADO AND MS. LOFGREN

Page 97, line 17, strike "and".

Page 97, line 21, strike the period and insert "; and".

Page 97, after line 21, insert the following:

1 (5) advancements in multidisciplinary wildfire
2 science, including those related to air quality im-
3 pacts, human behavior, and early detection and
4 warning.

☒

Chairwoman JOHNSON. I ask unanimous consent to dispense with the reading. Without objection, so ordered.

I now recognize the gentleman for 5 minutes to explain his amendment.

Mr. PERLMUTTER. Thanks, Madam Chair, and thank you and Mr. Lucas for your leadership on this bill.

The amendment that Ms. Lofgren and I offer is simple. It ensures NSF's risk and resilience research includes a focus on wildfire science and the impact wildfires have on air quality, human behavior, and how to improve early detection of these fires. I want to thank my colleague Representative Lofgren for joining me as a cosponsor of this amendment and for her work to advance wildfire science and protect our communities across the West that have been devastated by wildfires.

Colorado just had its worst wildfire season on record. The three largest wildfires in our State's history occurred in 2020. Climate change is now forcing Colorado and many other States to prepare for larger and more destructive wildfire seasons. In fact, the Director of the Colorado Division of Fire Prevention and Control just remarked, "We're having fire years, not fire seasons anymore."

As the number of people moving to fire-prone areas continues to grow, it's more important than ever we find more effective ways to protect people's lives, their homes, and our natural resources. We need to understand more about wildfire so we can best invest in ways to protect our communities and our natural resources.

Our amendment will help to do exactly that by ensuring NSF supports researchers like those at my alma mater, the University of Colorado, further their work in wildfire science. By expanding our investments in this important research, we can better prepare for and mitigate the effects of wildfires. I look forward to continuing to work with my colleagues on this Committee to further strengthen wildfire science and research across all Federal agencies, and we can take the first step toward that by including our amendment today.

Again, I want to thank Representative Lofgren, and I urge all my colleagues to support our amendment and the underlying bill, and I yield back.

Chairwoman JOHNSON. Thank you very much. Any further discussion on this amendment?

Ms. BONAMICI. Madam Chair, I wish to be recognized, please.

Chairwoman JOHNSON. Ms. Bonamici, you're recognized.

Ms. BONAMICI. Thank you so much, Madam Chair. I move to strike the last word.

Chairwoman JOHNSON. You are recognized for 5 minutes.

Ms. BONAMICI. Thank you, Madam Chair.

I want to thank my colleagues, Mr. Perlmutter and Ms. Lofgren, for offering this important amendment. As we heard about Colorado, my home State of Oregon had the most devastating year last year with wildfires. About 1 million acres burned, 11 people lost their lives, and thousands of homes were destroyed. Anything we can do to get more research and prevention and prediction will be beneficial. I urge all of my colleagues to support this important amendment, which of course I would have cosponsored with Mr. Perlmutter, but at this point I'm proud and happy to speak in favor

of, so thank you to Mr. Perlmutter and Ms. Lofgren for offering this. I hope you will all support it. And I yield back the balance of my time.

Mr. PERLMUTTER. Will the gentlelady yield?

Ms. BONAMICI. If I can. I already yielded back, but——

Mr. PERLMUTTER. Well, I thought you didn't cosponsor it because the Nuggets beat the Trailblazers, but I'll yield back.

Ms. BONAMICI. I definitely will yield back now.

Chairwoman JOHNSON. Thank you. Any further discussion?

The vote occurs on the amendment.

All those in favor, say aye.

Those opposed, no.

The ayes have it, and the amendment is adopted.

The next amendment is Mr. Waltz. The Clerk will report the amendment.

The CLERK. Amendment number 12, amendment to the amendment in the nature of a substitute to H.R. 2225 offered by Mr. Waltz of Florida.

[The amendment of Mr. Waltz follows:]

AMENDMENT TO THE AMENDMENT IN THE NATURE OF A SUBSTITUTE TO H.R. 2225 OFFERED BY MR. WALTZ OF FLORIDA

Page 98, line 10, after "including", insert "through binational research and development organizations and foundations and".

Page 123, line 4, after "appropriate", insert "binational research and development foundations and funds, excluding foreign entities of concern,".

☒

Chairwoman JOHNSON. I ask unanimous consent to dispose with the reading of the amendment. Without objection, so ordered.

I now recognize the gentleman for 5 minutes to explain his amendment.

Mr. WALTZ. Thank you, Chairwoman Johnson, for the opportunity to speak on this amendment.

When making these investments in *NSF for the Future*, we must also consider the benefits of collaborative research with our allies. The United States and its partner nations are capable of addressing 21st-century challenges together in a manner that safeguards intellectual property. For example, we have experienced significant gains in binational research efforts with Israel.

For over nearly 50 years, the United States-Israel binational foundations have combined—combined have supported more than 7,300 projects, and the United States-Israel Binational Science Foundation has awarded over $700 million to more than 5,000 research projects. The economic and scientific successes attributed to binational R&D partnership cannot be overlooked. It is imperative that we take advantage of these opportunities to work with our partner nations in reaching our R&D goals.

I firmly believe the United States can maintain its global competitive edge in the R&D space, and I urge my colleagues to support the amendment. And I yield back.

Chairwoman JOHNSON. Thank you very much. Any further discussion?

Hearing none, then the vote occurs on the amendment.

All those in favor, say aye.

Those opposed, say nay.

The ayes have it, and the amendment is adopted.

The next amendment on the roster is offered by the gentleman from California, Mr. McNerney. He's recognized for his amendment.

Mr. MCNERNEY. I thank the Chair. I have an amendment at the desk.

Chairwoman JOHNSON. The Clerk will report the amendment.

The CLERK. Amendment number 13, amendment to the amendment in the nature of a substitute to H.R. 2225 offered by Mr. McNerney of California and Mr. Feenstra of Iowa.

[The amendment of Mr. McNerney and Mr. Feenstra follows:]

AMENDMENT TO THE AMENDMENT IN THE NATURE OF A SUBSTITUTE TO H.R. 2225

OFFERED BY MR. MCNERNEY OF CALIFORNIA

and Mr. Feenstra of Iowa

Page 108, line 3, strike "and" at the end.

Page 108, after line 3, insert the following:

1 (vii) Global Positioning System-based
2 applications; and

Page 108, line 4, strike "(VII)" and insert "(VIII)".

☒

Chairwoman JOHNSON. I ask unanimous consent to dispense with the reading. And I recognize the gentleman for 5 minutes to explain his amendment.

Mr. MCNERNEY. Well, I thank the Chair and the Ranking Member and the staff on both sides for their work. And I also especially want to thank my colleague from Iowa Mr. Feenstra for his work and support on this legislation.

Agriculture is the biggest single sector in my district, so this is really important to me. Accurate, reliable, and continuously available GPS (Global Positioning System) enables formers to increase crop yields, crop efficiencies, and environmental sustainability to the precise application of seed, water, fertilizers, and pesticides. GPS is also used for protecting animal health. In practice, GPS helps farmers waste less seed, requires less fertilizer, less fuel, less pesticide, and ultimately has better crop yields. So therefore, it's vital we include this to ensure that the GAO (Government Accountability Office) considers GPS applications in their technology assessment of precision agriculture technologies. I yield back.

Chairwoman JOHNSON. The Chair now recognizes Mr. Feenstra.

Mr. FEENSTRA. Thank you, Madam Chair. I would like to speak on this amendment.

Chairwoman JOHNSON. The gentleman is recognized.

Mr. FEENSTRA. Thank you, Congressman McNerney, for the opportunity to work together with you on advancing the *IoT for Precision Agriculture Act*. I am proud to have helped lead this legislation, which is included in H.R. 2225 and the underlying text of this bill. I'm also glad to cosponsor the amendment to make sure GPS application potential is assessed.

In my district, many farmers rely on precision agriculture technology to effectively utilize resources in the field to maintain their farms. These technologies help them manage their crops, the health of the soil, and then the application of fertilizer. Precision agriculture principles not only help farmers manage farms effectively, they also benefit the environment and improve sustainability.

This amendment focuses on the GAO review portion of advancing IoT (internet of things) for precision agriculture, including GPS-based applications in the GAO's assessment is crucial to ensuring progress. Precision agriculture relies on geolocation to determine the health of soil and crops in specific sections of land on farmland that can be used on thousands of acres without ensuring specific focus on GPS applications. The GAO review may miss vital technologies that could benefit farmers.

I'm happy to work with Representative McNerney on this act and amendment. Advancing precision agriculture is a bipartisan issue, and I hope that we as a Committee will vote to include the GPS application amendment. I yield back the remaining part of my time. Thank you.

Chairwoman JOHNSON. Thank you very much. Any further discussion?

Then the vote occurs on the amendment.

All those in favor, say aye.

Those opposed, nay—I mean, yes, nay.

The ayes have it, and the amendment is agreed to.

The next amendment on the roster is offered by the gentleman from Virginia, Mr. Beyer.

Mr. BEYER. Thank you, Madam Chair. I have an amendment with the Clerk.

Chairwoman JOHNSON. The Clerk will read the amendment.

The CLERK. Amendment number 14, amendment to the amendment in the nature of a substitute to H.R. 2225 offered by Mr. Beyer.

[The amendment of Mr. Beyer follows:]

AMENDMENT TO THE AMENDMENT IN THE NATURE OF A SUBSTITUTE TO H.R. 2225

OFFERED BY MR. BEYER

Page 108, after line 12, insert the following:

1 (w) ASTRONOMY AND SATELLITE CONSTELLA-
2 TIONS.—The Director shall support research into and the
3 design, development, and testing of mitigation measures
4 to address the impact of satellite constellations on Foun-
5 dation scientific programs by—
6 (1) awarding grants on a competitive basis to
7 support investigations into the impacts of satellite
8 constellations on ground-based optical, infrared, and
9 radio astronomy, including through existing pro-
10 grams such Spectrum and Wireless Innovation en-
11 abled by Future Technologies (SWIFT) and the
12 Spectrum Innovation Initiative;
13 (2) supporting research on satellite impacts and
14 benefits and mitigation strategies to be carried out
15 at one or more Foundation supported Federally
16 Funded Research and Development Centers or large
17 facilities, as appropriate; and
18 (3) supporting workshops related to the impact
19 of satellite constellations on scientific research and

how those constellations could be used to improve scientific research.

☒

Chairwoman JOHNSON. I ask unanimous consent to dispense with the reading. Without objection, so ordered.

And I recognize the gentleman for 5 minutes to explain his amendment.

Mr. BEYER. Thank you, Chairman Johnson.

I'm introducing this amendment to support research to address the impact of commercial satellite constellations on ground-based astronomy. As we know, there are more than 3,000 operational satellites in low-Earth orbit right now with perhaps 10,000 more to be added next year and another 10,000 after that. This is a time-sensitive issue because more and more constellations are planned for launch, and we need to give astronomers the resources and tools necessary to minimize any negative impacts on their science through things like changes to observatory operations and new image analysis tools.

With the incredible promise of satellites in low-Earth orbit, we can't ignore the consequence on ground-based astronomy. So this is particularly the case with the Vera Rubin Observatory, which is coming online soon. So I urge my colleagues to support this measure just to study this research and authorize the National Science Foundation to do this important work. Thanks, Madam Chair, and I yield back.

Chairwoman JOHNSON. I'm sorry, I might have been muted. The vote occurs on the amendment.

All in favor, say aye.

All those opposed, say no.

The ayes have it, and the amendment is adopted.

Our next amendment is on—by Mr. Lamb, and the gentleman from Pennsylvania and the—he's recognized for his amendment.

Mr. LAMB. Thank you, Madam Chair. I have an amendment at the desk.

Chairwoman JOHNSON. The Clerk will report the amendment.

The CLERK. Amendment number 15, amendment to the amendment in the nature of a substitute to H.R. 2225 offered by Mr. Lamb.

[The amendment of Mr. Lamb follows:]

AMENDMENT TO THE AMENDMENT IN THE NATURE OF A SUBSTITUTE TO H.R. 2225

OFFERED BY MR. LAMB

Page 133, after line 10, insert the following (and redesignate subsequent subsections accordingly):

1 (i) ENTREPRENEURIAL FELLOWSHIPS.—

2 (1) IN GENERAL.—The Director shall award
3 fellowships to Ph.D.-trained scientists and engineers
4 to help develop leaders capable of maturing prom-
5 ising ideas and technologies from lab to market and
6 forge connections between academic research and
7 government, industry, and finance.

8 (2) APPLICATIONS.—An applicant for a fellow-
9 ship under this subsection shall submit to the Direc-
10 tor an application at such time, in such manner, and
11 containing such information as the Director may re-
12 quire. At a minimum, the Director shall require that
13 applicants

14 (A) have completed a doctoral degree in a
15 STEM field no more than 5 years prior to the
16 data of the application; and

17 (B) have included in the application a let-
18 ter of support from the intended host institu-

1 tion that describes how the fellow will be em-
2 bedded in that institution's research environ-
3 ment.
4 (3) OUTREACH.—The Director shall conduct
5 program outreach to recruit fellowship applicants—
6 (A) from diverse research institutions;
7 (B) from all regions of the country; and
8 (C) from groups historically underrep-
9 resented in STEM fields;
10 (4) The Director may enter into an agreement
11 with a third-party entity to administer the fellow-
12 ships, subject to the provisions of this subsection.
13 (5) AUTHORIZATION OF APPROPRIATIONS.—
14 There is authorized to be appropriated to the Direc-
15 tor $100,000,000 for fiscal years 2022 through
16 2026, to carry out the activities outlined in this sub-
17 section.

Chairwoman JOHNSON. I ask unanimous consent to dispense with the reading. Without objection, so ordered.

And I recognize the gentleman for 5 minutes to explain his amendment.

Mr. LAMB. Thank you, Madam Chair.

I offer this amendment because I think we're all circling around the problem of trying to eliminate or close the valley of death between research and taking some of the great research findings into products and processes that can be brought to market. And I want to make sure we remember that sometimes the most important ingredient in all of that is the people. Anyone who knows an entrepreneur knows that there are certain qualities that they bring, and a lot of times they can be spotted, and so this amendment will allow us to recruit recent Ph.D.'s who have entrepreneurial tendencies and desires and experience to receive a fellowship that will help them get their ideas off the ground and into a business setting. And it will ensure that they do so in the context of a research institution.

And it will also ensure that we reach out to a wide array of communities so that every American has a chance for this type of opportunity, including the communities that have so often in the past been ignored or deprived of these important opportunities, so it will ensure that we really market and extend this to everybody with a good idea and something to contribute.

So I ask the support of my fellow Committee Members on both sides, and I thank the Chair for the opportunity to make this amendment and I yield back.

Chairwoman JOHNSON. Thank you. Any further discussion?

Hearing none, then the—all those in favor of the amendment, say aye.

Those opposed, say nay.

The ayes have it and the amendment is adopted.

The next amendment on the roster is offered by the gentleman from Illinois, Mr. Foster. He is recognized to speak on his amendment.

Mr. FOSTER. Yes, I have an amendment at the desk.

Chairwoman JOHNSON. The Clerk will report the amendment.

The CLERK. Amendment number 16, amendment to the amendment in the nature of a substitute to H.R. 2225 offered by Mr. Foster of Illinois.

[The amendment of Mr. Foster follows:]

AMENDMENT TO THE AMENDMENT IN THE NATURE OF A SUBSTITUTE TO H.R. 2225

OFFERED BY MR. FOSTER OF ILLINOIS

On page 133, after line 10, insert the following (and redesignate subsequent subsections accordingly):

1 (i) LOW-INCOME SCHOLARSHIP PROGRAM .—

2 (1) IN GENERAL.—The Director of the National
3 Science Foundation (referred to in this section as
4 the "Director") shall award scholarships to low-in-
5 come individuals to enable such individuals to pursue
6 associate, undergraduate, or graduate level degrees
7 in mathematics, engineering, or computer science.

8 (2) ELIGIBILITY.—

9 (A) IN GENERAL.—To be eligible to receive
10 a scholarship under this section, an indi-
11 vidual—

12 (i) must be a citizen of the United
13 States, a national of the United States (as
14 defined in section 1101(a) of title 8), an
15 alien admitted as a refugee under section
16 1157 of title 8, or an alien lawfully admit-
17 ted to the United States for permanent
18 residence;

(ii) shall prepare and submit to the Director an application at such time, in such manner, and containing such information as the Director may require; and

(iii) shall certify to the Director that the individual intends to use amounts received under the scholarship to enroll or continue enrollment at an institution of higher education (as defined in section 1001(a) of title 20) in order to pursue an associate, undergraduate, or graduate level degree in mathematics, engineering, computer science, or other technology and science programs designated by the Director.

(B) ABILITY.—Awards of scholarships under this section shall be made by the Director solely on the basis of the ability of the applicant, except that in any case in which 2 or more applicants for scholarships are deemed by the Director to be possessed of substantially equal ability, and there are not sufficient scholarships available to grant one to each of such applicants, the available scholarship or scholarships shall be awarded to the applicants in a

1 manner that will tend to result in a geographi-
2 cally wide distribution throughout the United
3 States of recipients' places of permanent resi-
4 dence.

5 (3) SCHOLARSHIP AMOUNT AND RENEWAL.—
6 The amount of a scholarship awarded under this
7 section shall be determined by the Director. The Di-
8 rector may renew scholarships for up to 5 years.

9 (4) AUTHORIZATION.—Of amounts authorized
10 for the Directorate for Science and Engineering So-
11 lutions, $100,000,000 shall be authorized for this
12 program.

Chairwoman JOHNSON. I ask unanimous consent to dispense with the reading, and I recognize the gentleman for 5 minutes to explain his amendment.

Mr. FOSTER. Thank you, Madam Chairwoman.

Significant portions of this bill deal with ways in which our Nation can build and retain a STEM workforce that will keep our country innovating long into the future. One of the major ways that we build this workforce is through enhancing STEM education, especially for those coming from disadvantaged backgrounds. And there are a number of fantastic provisions in this bill to do just that.

Often our efforts to assist those coming from disadvantaged backgrounds fall short in the area of graduate STEM education, and we must recognize that the scars from an economically disadvantaged family background do not disappear at the moment of receiving an undergraduate degree even for the most brilliant students. And that economic stress is often a factor in the student failing to complete graduate STEM degrees. And also fees associated with nonfunded graduate programs may prevent very qualified and willing students from being able to afford pursuing a master's degree or another program.

The Graduate Research Fellowship program, for example, offers stipends to graduate students in STEM fields in order to help them pursue that degree. However, programs like this are missing a needs-based component in their award allocation. However, the NSF's existing Scholarships in Science, Technology, Engineering, and Mathematics program or S-STEM, provides funding to individuals, schools, and universities to fill this need by assisting STEM students at all levels of education. From this funding, 60 percent goes toward scholarships for low-income but academically talented students with demonstrated financial need who are pursuing associate baccalaureate or graduate degrees in STEM fields. Other funding goes toward curriculum professional and workforce development activities for the recipients of those scholarships. But it lacks adequate and predictable NSF-appropriated funds. This amendment would provide authorized funding for this program, allowing it to increase its impact on creating the STEM workforce of the future. I strongly encourage you all to support this amendment and yield back.

Chairwoman JOHNSON. Sorry. Ms. Moore is recognized.

Ms. MOORE. Thank you so much, Madam Chair. This is such a wonderful, wonderful amendment in the nature of a substitute, but I would ask if Dr. Foster would consider adding me as a cosponsor to this amazing amendment.

Mr. FOSTER. Absolutely.

Ms. MOORE. Thank you, and I yield back.

Mr. FOSTER. Without objection, I am pleased to associate Representative Moore's name with this amendment.

Chairwoman JOHNSON. Thank you. Any further comment?

Hearing none, then the vote occurs on the amendment with the addition of Ms. Moore's name as a sponsor.

All those in favor, say aye.

Those opposed, no.

The ayes have it, and the amendment is adopted.

Now, we will now vote on the amendment in the nature of a substitute, as amended. The vote occurs on the amendment.

All those in favor, say aye.

All those opposed, say no.

The ayes have it, and the amendment is agreed to.

Now, we are ready to report the bill. A quorum being present, I move that the Committee on Science, Space, and Technology report H.R. 2225, as amended, to the House with the recommendation that the bill be approved.

Those in favor of the motion will signify by saying aye.

Those opposed, no.

Hearing none, the ayes have it, and the bill is favorably reported.

Without objection, the motion to reconsider is laid upon the table, and I ask unanimous consent that the staff be authorized to make any necessary technical and conforming changes to the bill. Without objection, so ordered.

And Members will have 2 subsequent calendar days in which to submit supplementary minority or additional views to this measure.

Now that we are—we will now consider the next bill, 3593, after a 5-minute break. In 5 minutes I'll see you.

Recess

Endorsements for H.R. 2225

American Astronomical Society
American Chemical Society
American Geophysical Union
American Educational Research Association
American Institute of Biological Sciences
American Mathematical Society
American Physical Society
American Physiological Society
American Political Science Association
American Society for Engineering Education
American Society for Microbiology
Association for Psychological Science
American Society of Civil Engineers
American Society of Plant Biologists
Association of American Universities
Association of Science and Technology Centers
Boston University Carnegie Mellon University Carnegie Mellon University Graduate Student Assembly
Computing Alliance of Hispanic-Serving Institutions
Computing Research Association
Consortium of Social Science Associations
Council of Graduate Schools
Council on Undergraduate Research
Ecological Society of America
Entomological Society of America
Federation of Associations in the Behavioral and Brain Sciences
Georgia Institute of Technology
HIBAR Research Alliance MIT Graduate Student Council
National Center for Women & Information Technology (NCWIT)
Natural Science Collections Alliance
Organization of Biological Field Stations
OSA-The Optical Society Pennsylvania State University
Population Association of America
Princeton University Semiconductor Industry Association
Society for Industrial and Applied Mathematics
Society for the Preservation of Natural History Collections
State University System of Florida
University of California University of Cincinnati University of Colorado Boulder
University of Rochester University of Vermont University of Virginia U.S. R&D Community Members

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