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, 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.
(4) **DIRECTOR.**—The term “Director” means the Director of the National Science Foundation.

(5) **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.

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

(7) **FOUNDATION.**—The term “Foundation” means the National Science Foundation.

(8) **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)).

(9) **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.
(10) NSF INCLUDES.—The term “NSF includes” means the initiative carried out under section 6(c).

(11) PreK-12.—The term “preK-12” means pre-kindergarten through grade 12.

(12) 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.

(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,
(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.

(2) Specific allocations.—Of the amount authorized under paragraph (1)—

(A) $10,367,460,000 shall be made available to carry out research and related activities, of which—

(i) $227,070,000 shall be for the Graduate Research Fellowship Program;

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

(iii) $1,500,000,000 shall be for the Directorate for Science and Engineering Solutions;
(B) $1,391,320,000 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) $227,070,000 shall be for the Graduate Research Fellowship Program; and

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

(C) $355,000,000 shall be made available for major research equipment and facilities construction, of which $75,000,000 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 $14,148,200,000 for fiscal year 2024.

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

(A) $11,702,420,000 shall be made available to carry out research and related activities, of which—

(i) $245,990,000 shall be for the Graduate Research Fellowship Program;

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

and

(iii) $2,250,000,000 shall be for the Directorate for Science and Engineering Solutions;

(B) $1,457,590,000 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) $245,990,000 shall be for the Graduate Research Fellowship Program; and

(iv) $78,000,000 shall be for the Cyberscorps 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—
(i) $264,920,000 shall be for the Graduate Research Fellowship Program;
(ii) $75,000,000 shall be for the Mid-Scale Research Infrastructure Program; and
(iii) $3,375,000,000 shall be for the Directorate for Science and Engineering Solutions;

(B) $1,522,890,000 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) $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.

(2) Specific Allocations.—Of the amount authorized under paragraph (1)—

(A) $15,549,390,000 shall be made available to carry out research and related activities, of which—

(i) $283,840,000 shall be for the Graduate Research Fellowship Program;

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

and

(iii) $5,062,500,000 shall be for the Directorate for Science and Engineering Solutions;
(B) $1,601,470,000 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) $283,840,000 shall be for the Graduate Research Fellowship Program; and

   (iv) $90,000,000 shall be for the Cyberecords 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 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 de-
scription of how the proposed Center will—

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

(ii) support enhanced STEM edu-
cation infrastructure, including
cyberlearning technologies, to facilitate the
widespread adoption of promising, evi-
dence-based practices;

(iii) support research and development
on scaling practices, partnerships, and al-
ternative models to current approaches, in-
cluding 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

(v) 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 mak-
ing 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 meet-
ing of the Centers to foster collaboration among
the Centers and to further disseminate the re-
sults 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 para-
graph that includes—

(i) a description of the focus and pro-
posed goals of each Center; and

(ii) an assessment of the program’s
success in helping to promote scalable solu-
tions 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.

(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 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; and

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

(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, 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, 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 stu-
dents 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 pro-
grams, 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) 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 nonprofit 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 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 subpara-
graph, 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 ad-
ministrative supplements of up to $2,000 to exist-
ing research grants annually, on a competi-
tive basis, to support graduate student profes-
sional development experiences for graduate
students who receive a substantial portion of
their support under such grants, as determined
by the Director.

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

(i) the effects of traineeships, fellow-
ships, internships, and teaching and re-
search assistantships on outcomes for
graduate students;

(ii) the effects of graduate education
and mentoring policies and procedures on
degree completion, including differences
across gender, race and ethnicity, and citi-
zenship; and
(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.

(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 “up to $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.

(d) 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 Direc-
tor shall continue and accelerate efforts to en-
hance the usefulness of National Center for
Science and Engineering Statistics survey data
for longitudinal research and analysis.

(D) GOVERNMENT ACCOUNTABILITY OFFI-
FACE REVIEW.—Not later than 1 year after the
date of enactment of this Act, the Comptroller
General of the United States shall submit a re-
port 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.

(e) 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 (of a consortia of thereof) 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.

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 teach-
ers—” and inserting the following:

“(C) In selecting teachers for an award au-

thorized 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) emerging research institutions; and

(E) 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, 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 con-
sortia 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

(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”.

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.

(e) Research Integrity and Security.—

(1) Office of Research Security and Policy.—The Director shall maintain a Research Secu-
rity 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 de-
develop an online resource hosted on the Foundation’s
website containing up-to-date information, tailored
for institutions and individual researchers, includ-
ing—

(A) an explanation of Foundation research
security policies;

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

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

(D) promising practices for mitigating se-
curity risks that threaten research integrity;

and

(E) additional reference materials, includ-
ing tools that assist organizations seeking
Foundation funding and awardees in informa-
tion disclosure to the Foundation.

(5) RISK ASSESSMENT CENTER.—The Director
shall enter into an agreement with a qualified inde-
pendent 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) 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 adminis-
trative burden on institutions of higher edu-
cation 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 col-
laboration with the Director of the National In-
stitutes of Health, shall develop guidelines for
institutions of higher education and other orga-
nizations receiving Federal research and devel-
opment funds to use in developing their own
training programs to address the unique needs,
challenges, and risk profiles of such institu-
tions, 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.

(9) 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) inserting the following at the end: “, including mentor training”.

(10) 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: Cli-
mate, 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 re-
search design and review process for Federal
awards, may help mitigate potential harms be-
fore they happen;

(C) the Foundation’s agreement with the
Academies to conduct a study and make rec-
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 stake-
holder input, not later than 18 months after the
date of enactment of this Act, the Director shall
amend award proposal instructions to include a re-
quirement 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 con-
sideration any relevant input from the peer-reviewers
for the proposal, and shall factor into award deci-
sions 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, soft-
ware, 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 in-
formation, to be used by Federally funded re-
searchers for the sharing of data, software, and
code;

(B) work with stakeholders to identify sig-
nificant 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, up-
grades, and maintenance of open data reposi-
tories 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, soft-
ware, and code resulting from or used in Foun-
dation-supported projects;

(E) work with stakeholders to establish the
necessary policies and procedures and allocate
the necessary resources to ensure, as prac-
ticable, data underlying published findings re-
sulting 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;

(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 social strategies and tools for mitigating and adapting to climate change, including at the local level;

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

(F) 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; and

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

(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 building 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 Con-
vergence 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) FOOD-ENERGY-WATER RESEARCH.—The Director
shall award grants on a competitive basis to institutions
of higher education or non-profit organizations (or con-
sortia 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 prob-
lems; and

(4) grow the scientific workforce capable of
studying and managing the food-energy-water sys-
tem, through education and other professional devel-
one.
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.
(k) 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 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; and

(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.

(l) LEVERAGING INTERNATIONAL EXPERTISE IN RESEARCH.—The Director shall explore and advance oppor-
tunities for leveraging international capabilities and re-
sources 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 by sending teams of Foundation sci-
entific staff for site visits of scientific facilities and agen-
cies in other countries.

(m) BIOLOGICAL RESEARCH COLLECTIONS.—

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

(2) SPECIMEN MANAGEMENT PLAN.—The Di-
rector 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 as-
associated data will be accessioned into and perma-
nently 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.

(n) **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.

(o) 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.

(p) 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 man-
ufacturing”; and

(B) by striking the period at the end and
inserting “; and artificial intelligence and ma-
chine learning; and”; and

(3) by adding at the end the following:

“(7) additive manufacturing, including new ma-
terial 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 direc-
torate 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 multidisciplinary 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 capabili-
ties 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.

(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 Policy-making 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 dem-
onstration project. The National Secure Data Serv-
vice demonstration project shall be—

(A) aligned with the principles, best prac-
tices, 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 agen-
cies to collect, acquire, analyze, report, and dissemi-
nate statistical data in the United States and other
nations to support governmentwide evidence-building
activities consistent with the Foundations for Evi-
dence-Based Policymaking Act of 2018.

(4) PRIVACY AND CONFIDENTIALITY PROTEC-
tIONS.—If the Director issues a management con-
tract under paragraph (2), the awardee shall be des-
ignated as an “agent” under chapter 35 of title 44,
United States Code, subchapter III, section 3561 et
seq., with all requirements and obligations for pro-
tecting confidential information delineated in the
Confidential Information Protection and Statistical
(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 accelerate the translation of Foundation-supported fundamental research and to advance technologies, support use-inspired research, 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.

(e) ACTIVITIES.—The Director shall achieve the purposes described in subsection (a) 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, 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;
(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, businesses and other for-profit entities, Federal or State agencies, community organizations, other Foundation directorates, national labs, international entities as appropriate, 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 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; and

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

(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 or-
ganizations, 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.
(c) 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, technology transfer experts, and representatives of civil society and other non-governmental 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 in critical technologies.

   (3) Cybersecurity.

   (4) National security.

   (5) STEM education and workforce.

   (6) Social and economic inequality.

(h) 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.

(i) 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—

(A) make appointments of scientific, engineering, and professional personnel without regard to the civil service laws as the Director determines necessary 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; and

(B) fix the basic pay of such personnel at rates not in excess of the basic rate of pay of the Vice President under section 104 of title 3, United States Code, without regard to the civil service laws.

(j) **Ethical, Legal, and Societal Considerations.**—The Director shall establish policies 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.

(k) **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.

(l) **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.

(m) **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.”.

(e) 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.”.