

117TH CONGRESS
1ST SESSION

H. R. 2225

AN ACT

To authorize appropriations for fiscal years 2022, 2023, 2024, 2025, and 2026 for the National Science Foundation, and for other purposes.

1 *Be it enacted by the Senate and House of Representa-*
2 *tives of the United States of America in Congress assembled,*

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.

21 (4) As countries around the world increase in-
22 vestments in research and STEM education, United
23 States global leadership in science and engineering is
24 eroding, posing significant risks to economic com-
25 petitiveness, national security, and public well-being.

1 (5) To address major societal challenges and
2 sustain United States leadership in innovation, the
3 Federal Government must increase investments in
4 research, broaden participation in the STEM work-
5 force, and bolster collaborations among universities,
6 National Laboratories, field stations and marine lab-
7 oratories, companies, labor organizations, non-profit
8 funders of research, local policymakers, civil societies
9 and stakeholder communities, and international
10 partners.

11 **SEC. 3. DEFINITIONS.**

12 In this Act:

13 (1) **ACADEMIES.**—The term “Academies”
14 means the National Academies of Sciences, Engi-
15 neering, and Medicine.

16 (2) **ARTIFICIAL INTELLIGENCE.**—The term “ar-
17 tificial intelligence” has the meaning given such
18 term in section 5002 of the William M. (MAC)
19 Thornberry National Defense Authorization Act for
20 Fiscal Year 2021.

21 (3) **AWARDEE.**—The term “awardee” means
22 the legal entity to which Federal assistance is
23 awarded and that is accountable to the Federal Gov-
24 ernment for the use of the funds provided.

1 (4) BOARD.—The term “Board” means the Na-
2 tional Science Board.

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

5 (6) EMERGING RESEARCH INSTITUTION.—The
6 term “emerging research institution” means an in-
7 stitution of higher education with an established un-
8 dergraduate student program that has, on average
9 for 3 years prior to the time of application for an
10 award, received less than \$35,000,000 in Federal re-
11 search funding.

12 (7) FEDERAL RESEARCH AGENCY.—The term
13 “Federal research agency” means any Federal agen-
14 cy with an annual extramural research expenditure
15 of over \$100,000,000.

16 (8) FOUNDATION.—The term “Foundation”
17 means the National Science Foundation.

18 (9) HISTORICALLY BLACK COLLEGE AND UNI-
19 VERSITY.—The term “historically Black college and
20 university” has the meaning given the term “part B
21 institution” in section 322 of the Higher Education
22 Act of 1965 (20 U.S.C. 1061).

23 (10) INSTITUTION OF HIGHER EDUCATION.—
24 The 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 (11) 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 (12) MINORITY-SERVING INSTITUTION.—The
25 term “minority-serving institution” means a His-

panic-serving institution, an Alaska Native-serving institution, a Native Hawaiian-serving institutions, a Predominantly Black Institution, an Asian American and Native American Pacific Islander-serving institution, or a Native American-serving nontribal institution as described in section 371 of the Higher Education Act of 1965 (20 U.S.C. 1067q(a)).

(13) 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.

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

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

(16) 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

1 the procurement of goods or services to meet the ad-
2 ministrative needs of a Federal research agency.

3 (17) SKILLED TECHNICAL WORK.—The term
4 “skilled technical work” means an occupation that
5 requires a high level of knowledge in a technical do-
6 main and does not require a bachelor’s degree for
7 entry.

8 (18) STEM.—The term “STEM” has the
9 meaning given the term in section 2 of the America
10 COMPETES Reauthorization Act of 2010 (42
11 U.S.C. 6621 note).

12 (19) STEM EDUCATION.—The term “STEM
13 education” has the meaning given the term in sec-
14 tion 2 of the STEM Education Act of 2015 (42
15 U.S.C. 6621 note).

16 (20) TRIBAL COLLEGE OR UNIVERSITY.—The
17 term “Tribal College or University” has the meaning
18 given such term in section 316 of the Higher Edu-
19 cation Act of 1965 (20 U.S.C. 1059c).

20 **SEC. 4. AUTHORIZATION OF APPROPRIATIONS.**

21 (a) FISCAL YEAR 2022.—

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

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

3 (A) \$10,025,000,000 shall be made avail-
4 able to carry out research and related activities,
5 of which—

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

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

12 (B) \$1,583,160,000 shall be made avail-
13 able for education and human resources, of
14 which—

15 (i) \$73,700,000 shall be for the Rob-
16 ert Noyce Teacher Scholarship Program;

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

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

22 (iv) \$70,000,000 shall be for the
23 Cybercorps Scholarship for Service Pro-
24 gram;

1 (C) \$249,000,000 shall be made available
2 for major research equipment and facilities con-
3 struction, of which \$76,250,000 shall be for the
4 Mid-Scale Research Infrastructure Program;

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

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

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

11 (b) FISCAL YEAR 2023.—

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

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

17 (A) \$11,870,000,000 shall be made avail-
18 able to carry out research and related activities,
19 of which—

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

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

1 (B) \$1,654,520,000 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) \$454,140,000 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 \$80,000,000 shall be for the
17 Mid-Scale Research Infrastructure Program;

18 (D) \$710,000,000 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 \$15,945,020,000 for
3 fiscal year 2024.

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

6 (A) \$13,050,000,000 shall be made avail-
7 able to carry out research and related activities,
8 of which—

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

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

15 (B) \$1,739,210,000 shall be made avail-
16 able for education and human resources, of
17 which—

18 (i) \$87,100,000 shall be for the Rob-
19 ert Noyce Teacher Scholarship Program;

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

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

1 (iv) \$78,000,000 shall be for the
2 Cybercorps Scholarship for Service Pro-
3 gram;

4 (C) \$370,000,000 shall be made available
5 for major research equipment and facilities con-
6 struction, of which \$85,000,000 shall be for the
7 Mid-Scale Research Infrastructure Program;

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

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

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

14 (d) FISCAL YEAR 2025.—

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

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

20 (A) \$14,000,000,000 shall be made avail-
21 able to carry out research and related activities,
22 of which—

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

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

4 (B) \$1,823,470,000 shall be made avail-
5 able for education and human resources, of
6 which—

7 (i) \$93,800,000 shall be for the Rob-
8 ert Noyce Teacher Scholarship Program;

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

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

14 (iv) \$84,000,000 shall be for the
15 Cybercorps Scholarship for Service Pro-
16 gram;

17 (C) \$372,000,000 shall be made available
18 for major research equipment and facilities con-
19 struction, of which \$90,000,000 shall be for the
20 Mid-Scale Research Infrastructure Program;

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

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

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

3 (e) FISCAL YEAR 2026.—

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

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

9 (A) \$14,800,000,000 shall be made avail-
10 able to carry out research and related activities,
11 of which—

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

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

18 (B) \$1,921,600,000 shall be made avail-
19 able for education and human resources, of
20 which—

21 (i) \$100,500,000 shall be for the Rob-
22 ert Noyce Teacher Scholarship Program;

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

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

4 (iv) \$90,000,000 shall be for the
5 Cybercorps Scholarship for Service Pro-
6 gram;

7 (C) \$375,000,000 shall be made available
8 for major research equipment and facilities con-
9 struction, of which \$100,000,000 shall be for
10 the Mid-Scale Research Infrastructure Pro-
11 gram;

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

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

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

18 **SEC. 5. STEM EDUCATION.**

19 (a) PREK-12 STEM EDUCATION.—

20 (1) DECADAL SURVEY OF STEM EDUCATION RE-
21 SEARCH.—Not later than 45 days after the date of
22 enactment of this Act, the Director shall enter into
23 a contract with the Academies to review and assess
24 the status and opportunities for PreK–12 STEM

1 education research and make recommendations for
2 research priorities over the next decade.

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

5 (A) IN GENERAL.—The Director shall es-
6 tablish a program to award grants, on a com-
7 petitive basis, to institutions of higher edu-
8 cation or non-profit organizations (or consortia
9 of such institutions or organizations) to estab-
10 lish no fewer than 3 multidisciplinary Centers
11 for Transformative Education Research and
12 Translation (in this section referred to as “Cen-
13 ters”) to support research and development on
14 widespread and sustained implementation of
15 STEM education innovations.

16 (B) APPLICATION.—An institution of high-
17 er education or non-profit organization (or a
18 consortium of such institutions or organiza-
19 tions) seeking funding under subparagraph (A)
20 shall submit an application to the Director at
21 such time, in such manner, and containing such
22 information as the Director may require. The
23 application shall include, at a minimum, a de-
24 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.

1 “(B) REPORT ON EVALUATIONS.—Not
2 later than 180 days after the completion of the
3 evaluation under subparagraph (A), the Direc-
4 tor shall submit to Congress and make widely
5 available to the public a report that includes—

6 “(i) the results of the evaluation; and

7 “(ii) any recommendations for admin-
8 istrative and legislative action that could
9 optimize the effectiveness of the program
10 under this section.

11 “(6) COORDINATION.—In carrying out this sec-
12 tion, the Director shall, for purposes of enhancing
13 program effectiveness and avoiding duplication of ac-
14 tivities, consult, cooperate, and coordinate with the
15 programs and policies of other relevant Federal
16 agencies.”.

17 (b) UNDERGRADUATE STEM EDUCATION.—

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

24 (A) encourage greater collaboration and
25 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

(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—

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)—

1 (i) in paragraph (2), by striking
 2 “mathematics and science” and inserting
 3 “STEM fields”; and

4 (ii) in paragraph (4), by striking
 5 “mathematics and science instruction” and
 6 inserting “STEM instruction”.

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

10 (A) in the section heading, by striking
 11 “**SCIENTIFIC AND TECHNICAL EDUCATION**
 12 ” and inserting “**STEM EDUCATION**”;

13 (B) in subsection (a)—

14 (i) in the subsection heading, by strik-
 15 ing “**SCIENTIFIC AND TECHNICAL EDU-**
 16 **CATION** ” and inserting “**STEM EDU-**
 17 **CATION**”;

18 (ii) in the matter preceding paragraph
 19 (1)—

20 (I) by inserting “and education
 21 to prepare the skilled technical work-
 22 force to meet workforce demands” be-
 23 fore “, and to improve”;

24 (II) by striking “core education
 25 courses in science and mathematics”

1 and inserting “core education courses
2 in STEM fields”;

3 (III) by inserting “veterans and
4 individuals engaged in” before “work
5 in the home”; and

6 (IV) by inserting “and on build-
7 ing a pathway from secondary schools,
8 to associate-degree-granting institu-
9 tions, to careers that require technical
10 training” before “, and shall be de-
11 signed”;

12 (iii) in paragraph (1)—

13 (I) by inserting “and study”
14 after “development”; and

15 (II) by striking “core science and
16 mathematics courses” and inserting
17 “core STEM courses”;

18 (iv) in paragraph (2), by striking
19 “science, mathematics, and advanced-tech-
20 nology fields” and inserting “STEM and
21 advanced-technology fields”;

22 (v) in paragraph (3)(A), by inserting
23 “to support the advanced-technology indus-
24 tries 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 (c)—

12 (i) in paragraph (1)—

13 (I) in subparagraph (A)—

14 (aa) in the matter preceding
15 clause (i), by striking “to encour-
16 age” and all that follows through
17 “such means as—” and inserting
18 “to encourage the development of
19 career and educational pathways
20 with multiple entry and exit
21 points leading to credentials and
22 degrees, and to assist students
23 pursuing pathways in STEM
24 fields to transition from asso-
25 ciate-degree-granting colleges to

1 bachelor-degree-granting institu-
2 tions, through such means as—”;

3 (bb) in clause (i), by striking
4 “to ensure” and inserting “to de-
5 velop articulation agreements
6 that ensure”; and

7 (cc) in clause (ii), by strik-
8 ing “courses at the bachelor-de-
9 gree-granting institution” and in-
10 serting “the career and edu-
11 cational pathways supported by
12 the articulation agreements”;

13 (II) in subparagraph (B)—

14 (aa) in clause (i), by insert-
15 ing “veterans and individuals en-
16 gaged in” before “work in the
17 home”;

18 (bb) in clause (iii)—

19 (AA) by striking “bach-
20 elor’s-degree-granting insti-
21 tutions” and inserting “in-
22 stitutions or work sites”;
23 and

1 (BB) by inserting “or
2 industry internships” after
3 “summer programs”; and
4 (cc) by striking the flush
5 text following clause (iv); and
6 (III) by striking subparagraph
7 (C);
8 (ii) in paragraph (2)—
9 (I) by striking “mathematics and
10 science programs” and inserting
11 “STEM programs”;
12 (II) by inserting “and, as appro-
13 priate, elementary schools,” after
14 “with secondary schools”;
15 (III) by striking “mathematics
16 and science education” and inserting
17 “STEM education”;
18 (IV) by striking “secondary
19 school students” and inserting “stu-
20 dents at these schools”;
21 (V) by striking “science and ad-
22 vanced-technology fields” and insert-
23 ing “STEM and advanced-technology
24 fields”; and

1 (VI) by striking “agreements
2 with local educational agencies” and
3 inserting “articulation agreements or
4 dual credit courses with local sec-
5 ondary schools, or other means as the
6 Director determines appropriate,”;
7 and

8 (iii) in paragraph (3)—

9 (I) by striking subparagraph (B);

10 (II) by striking “shall—” and all
11 that follows through “establish a” and
12 inserting “shall establish a”;

13 (III) by striking “the fields of
14 science, technology, engineering, and
15 mathematics” and inserting “STEM
16 fields”; and

17 (IV) by striking “; and” and in-
18 serting “, including jobs at Federal
19 and academic laboratories.”;

20 (D) in subsection (d)(2)—

21 (i) in subparagraph (D), by striking
22 “and” after the semicolon;

23 (ii) in subparagraph (E), by striking
24 the period at the end and inserting a “;
25 and”; and

1 (iii) by adding at the end the fol-
2 lowing:

3 “(F) as appropriate, applications that
4 apply the best practices for STEM education
5 and technical skills education through distance
6 learning or in a simulated work environment, as
7 determined by research described in subsection
8 (f); and”;

9 (E) in subsection (g), by striking the sec-
10 ond sentence;

11 (F) in subsection (h)(1)—

12 (i) in subparagraph (A), by striking
13 “2022” and inserting “2026”;

14 (ii) in subparagraph (B), by striking
15 “2022” and inserting “2026”; and

16 (iii) in subparagraph (C)—

17 (I) by striking “up to
18 \$2,500,000” and inserting “not less
19 than \$3,000,000”; and

20 (II) by striking “2022” and in-
21 serting “2026”;

22 (G) in subsection (i)—

23 (i) by striking paragraph (3); and

1 (ii) by redesignating paragraphs (4)
2 and (5) as paragraphs (3) and (4), respec-
3 tively; and

4 (H) in subsection (j)—

5 (i) by striking paragraph (1) and in-
6 serting the following:

7 “(1) the term advanced-technology includes
8 technological fields such as advanced manufacturing,
9 agricultural-, biological- and chemical-technologies,
10 energy and environmental technologies, engineering
11 technologies, information technologies, micro and
12 nano-technologies, cybersecurity technologies,
13 geospatial technologies, and new, emerging tech-
14 nology areas;”;

15 (ii) in paragraph (4), by striking
16 “separate bachelor-degree-granting institu-
17 tions” and inserting “other entities”;

18 (iii) by striking paragraph (7);

19 (iv) by redesignating paragraphs (8)
20 and (9) as paragraphs (7) and (8), respec-
21 tively;

22 (v) in paragraph (7), as redesignated
23 by subparagraph (D), by striking “and”
24 after the semicolon;

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

3 (I) by striking “mathematics,
 4 science, engineering, or technology”
 5 and inserting “science, technology, en-
 6 gineering, or mathematics”; and

7 (II) by striking the period at the
 8 end and inserting “; and”; and

9 (vii) by adding at the end the fol-
 10 lowing:

11 “(9) the term skilled technical workforce means
 12 workers—

13 “(A) in occupations that use significant
 14 levels of science and engineering expertise and
 15 technical knowledge; and

16 “(B) whose level of educational attainment
 17 is less than a bachelor degree.”.

18 (3) AUTHORIZATION OF APPROPRIATIONS.—

19 Section 5 of the Scientific and Advanced-Technology
 20 Act of 1992 (42 U.S.C. 1862j) is amended to read
 21 as follows:

22 **“SEC. 5. AUTHORIZATION OF APPROPRIATIONS.**

23 “There are authorized to be appropriated to the Di-
 24 rector for carrying out sections 2 through 4, \$150,000,000
 25 for fiscal years 2022 through 2026.”.

1 (d) GRADUATE STEM EDUCATION.—

2 (1) MENTORING AND PROFESSIONAL DEVELOP-
3 MENT.—

4 (A) MENTORING PLANS.—

5 (i) UPDATE.—Section 7008 of the
6 America Creating Opportunities to Mean-
7 ingfully Promote Excellence in Technology,
8 Education, and Science Act (42 U.S.C.
9 1862o) is amended by—

10 (I) inserting “and graduate stu-
11 dent” after “postdoctoral”; and

12 (II) inserting “The requirement
13 may be satisfied by providing such in-
14 dividuals with access to mentors, in-
15 cluding individuals not listed on the
16 grant.” after “review criterion.”.

17 (ii) EVALUATION.—Not later than 45
18 days after the date of enactment of this
19 Act, the Director shall enter into an agree-
20 ment with a qualified independent organi-
21 zation to evaluate the effectiveness of the
22 postdoctoral mentoring plan requirement
23 for improving mentoring for Foundation-
24 supported postdoctoral researchers.

25 (B) CAREER EXPLORATION.—

1 (i) IN GENERAL.—The Director shall
2 award grants, on a competitive basis, to in-
3 stitutions of higher education and non-
4 profit organizations (or consortia of such
5 institutions or organizations) to develop in-
6 novative approaches for facilitating career
7 exploration of academic and non-academic
8 career options and for providing oppor-
9 tunity-broadening experiences, including
10 work-integrated opportunities, for graduate
11 students and postdoctoral scholars that
12 can then be considered, adopted, or adapt-
13 ed by other institutions and to carry out
14 research on the impact and outcomes of
15 such activities.

16 (ii) REVIEW OF PROPOSALS.—In se-
17 lecting grant recipients under this subpara-
18 graph, the Director shall consider, at a
19 minimum—

20 (I) the extent to which the ad-
21 ministrators of the institution are
22 committed to making the proposed ac-
23 tivity a priority; and

24 (II) the likelihood that the insti-
25 tution or organization will sustain or

1 expand the proposed activity effort be-
2 yond the period of the grant.

3 (C) DEVELOPMENT PLANS.—The Director
4 shall require that annual project reports for
5 awards that support graduate students and
6 postdoctoral scholars include certification by the
7 principal investigator that each graduate stu-
8 dent and postdoctoral scholar receiving substan-
9 tial support from such award, as determined by
10 the Director, in consultation with faculty advi-
11 sors, has developed and annually updated an in-
12 dividual development plan to map educational
13 goals, career exploration, and professional de-
14 velopment.

15 (D) PROFESSIONAL DEVELOPMENT SUP-
16 PLEMENT.—The Director shall carry out a five-
17 year pilot initiative to award up to 2,500 ad-
18 ministrative supplements of up to \$2,000 to ex-
19 isting research grants annually, on a competi-
20 tive basis, to support professional development
21 experiences for graduate students and
22 postdoctoral researchers who receive a substan-
23 tial portion of their support under such grants,
24 as determined by the Director. Not more than
25 10 percent of supplements awarded under this

1 subparagraph may be used to support profes-
2 sional development experiences for postdoctoral
3 researchers.

4 (E) GRADUATE EDUCATION RESEARCH.—

5 The Director shall award grants, on a competi-
6 tive basis, to institutions of higher education or
7 non-profit organizations (or consortia of such
8 institutions or organizations) to support re-
9 search on the graduate education system and
10 outcomes of various interventions and policies,
11 including—

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

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

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

23 (II) student debt load;

24 (iii) the development and assessment
25 of new or adapted interventions, including

1 approaches that improve mentoring rela-
2 tionships, develop conflict management
3 skills, and promote healthy research teams;
4 and

5 (iv) research, data collection, and as-
6 sessment of the state of graduate student
7 mental health and wellbeing, factors con-
8 tributing to and consequences of poor
9 graduate student mental health, and the
10 development, adaptation, and assessment
11 of evidence-based strategies and policies to
12 support emotional wellbeing and mental
13 health.

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 shall
25 award grants to institutions of higher edu-

1 cation to establish traineeship programs
2 for graduate students who pursue artificial
3 intelligence-related research leading to a
4 masters or doctorate degree by providing
5 funding and other assistance, and by pro-
6 viding graduate students opportunities for
7 research experiences in government or in-
8 dustry related to the students' artificial in-
9 telligence studies.

10 (ii) USE OF FUNDS.—A institution of
11 higher education shall use grant funds pro-
12 vided under clause (i) for the purposes
13 of—

14 (I) providing traineeships to stu-
15 dents who are pursuing research in
16 artificial intelligence leading to a mas-
17 ters or doctorate degree;

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

20 (III) creating and requiring
21 courses or training programs in tech-
22 nology ethics for students receiving
23 traineeships;

1 (IV) creating opportunities for
2 research in technology ethics for stu-
3 dents receiving traineeships;

4 (V) establishing scientific intern-
5 ship programs for students receiving
6 traineeships in artificial intelligence at
7 for-profit institutions, nonprofit re-
8 search institutions, or government lab-
9 oratories; and

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

12 (B) ARTIFICIAL INTELLIGENCE FELLOW-
13 SHIPS.—The Director shall award fellowships to
14 masters and doctoral students and postdoctoral
15 researchers who are pursuing degrees or re-
16 search in artificial intelligence and related
17 fields, including in the field of technology eth-
18 ics. In making such awards, the Director shall
19 conduct outreach, including through formal so-
20 licitations, to solicit proposals from students
21 and postdoctoral researchers seeking to carry
22 out research in aspects of technology ethics
23 with relevance to artificial intelligence systems.

24 (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 (2), the Director
18 shall—

19 (A) collaborate with the National Institute
20 of Standards and Technology, including the Na-
21 tional 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;

1 (B) align with or build on the National
2 Initiative on Cybersecurity Education Cyberse-
3 curity Workforce Framework wherever prac-
4 ticable and applicable;

5 (C) leverage the collective body of knowl-
6 edge from existing cyber workforce development
7 research and education activities; and

8 (D) engage with other Federal depart-
9 ments and agencies, research communities, and
10 potential users of information produced under
11 this subsection.

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

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

16 (A) since cybersecurity risks are constant
17 in the growing digital world, it is critical that
18 the United States stay ahead of malicious cyber
19 activity with a workforce that can safeguard
20 our innovation, research, and work environ-
21 ments; and

22 (B) Federal investments in the Federal
23 Cyber Scholarship-for-Service Program at the
24 National Science Foundation play a critical role
25 in preparing and sustaining a strong, talented,

1 and much-needed national cybersecurity work-
2 force and should be strengthened.

3 (2) IN GENERAL.—Section 302(b)(1) of the Cy-
4 bersecurity Enhancement Act of 2014 (15 U.S.C.
5 7442(b)(1)) is amended by striking the semicolon at
6 the end and inserting the following “and cybersecu-
7 rity-related aspects of other related fields as appro-
8 priate, including artificial intelligence, quantum com-
9 puting and aerospace.”.

10 (h) CYBERSECURITY WORKFORCE DATA INITIA-
11 TIVE.—The Director, acting through the National Center
12 for Science and Engineering Statistics established in sec-
13 tion 505 of the America COMPETES Reauthorization Act
14 of 2010 (42 U.S.C. 1862p) and in coordination with the
15 Director of the National Institute of Standards and Tech-
16 nology and other appropriate Federal statistical agencies,
17 shall establish a cybersecurity workforce data initiative
18 that—

19 (1) assesses the feasibility of providing nation-
20 ally representative estimates and statistical informa-
21 tion on the cybersecurity workforce;

22 (2) utilizes the National Initiative for Cyberse-
23 curity Education (NICE) Cybersecurity Workforce
24 Framework (NIST Special Publication 800–181), or

1 other frameworks, as appropriate, to enable a con-
2 sistent measurement of the cybersecurity workforce;

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

6 (4) consults key stakeholders and the broader
7 community of practice in cybersecurity workforce de-
8 velopment to determine data requirements needed to
9 strengthen the cybersecurity workforce;

10 (5) evaluates existing Federal survey data for
11 information pertinent to developing national esti-
12 mates of the cybersecurity workforce;

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

16 (7) collects statistical data, to the greatest ex-
17 tent practicable, on credential attainment and em-
18 ployment outcomes information for the cybersecurity
19 workforce.

20 **SEC. 6. BROADENING PARTICIPATION.**

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

23 (1) IN GENERAL.—Section 117(a) of the Na-
24 tional Science Foundation Authorization Act of 1988
25 (42 U.S.C. 1881b(a)) is amended—

1 (A) in subparagraph (B)—

2 (i) by striking “108” and inserting
3 “110”;

4 (ii) by striking clause (iv);

5 (iii) in clause (v), by striking the pe-
6 riod at the end and inserting “; and”;

7 (iv) by redesignating clauses (i), (ii),
8 (iii), and (v) as subclauses (I), (II), (III),
9 and (IV), respectively, and moving the
10 margins of such subclauses (as so redesign-
11 nated) two ems to the right; and

12 (v) by striking “In selecting teachers”
13 and all that follows through “two teach-
14 ers—” and inserting the following:

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

17 “(i) at least two teachers—”; and

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

21 “(ii) at least one teacher—

22 “(I) from the Commonwealth of the North-
23 ern Mariana Islands;

24 “(II) from American Samoa;

1 “(III) from the Virgin Islands of the
2 United States; and

3 “(IV) from Guam.”.

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

8 (b) ROBERT NOYCE TEACHER SCHOLARSHIP PRO-
9 GRAM UPDATE.—

10 (1) SENSE OF CONGRESS.—It is the sense of
11 Congress that over the next five years the Founda-
12 tion should increase the number of scholarships
13 awarded under the Robert Noyce Teacher Scholar-
14 ship program established under section 10 of the
15 National Science Foundation Authorization Act of
16 2002 (42 U.S.C. 1862n–1) by 50 percent.

17 (2) OUTREACH.—To increase the diversity of
18 participants, the Director shall support symposia, fo-
19 rums, conferences, and other activities to expand
20 and enhance outreach to—

21 (A) historically Black colleges and univer-
22 sities that are part B institutions, as defined in
23 section 322(2) of the Higher Education Act of
24 1965 (20 U.S.C. 1061(2));

25 (B) Tribal Colleges or Universities;

- 1 (C) Minority serving institutions;
- 2 (D) institutions of higher education that
- 3 are located near or serve rural communities;
- 4 (E) labor organizations;
- 5 (F) emerging research institutions; and
- 6 (G) higher education programs that serve
- 7 or support veterans.

8 (c) NSF INCLUDES INITIATIVE.—The Director
9 shall award grants and cooperative agreements, on a com-
10 petitive basis, to institutions of higher education or non-
11 profit organizations (or consortia of such institutions or
12 organizations) to carry out a comprehensive national ini-
13 tiative to facilitate the development of networks and part-
14 nerships to build on and scale up effective practices in
15 broadening participation in STEM studies and careers of
16 groups historically underrepresented in such studies and
17 careers.

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

1 (e) PARTNERSHIPS WITH EMERGING RESEARCH IN-
2 STITUTIONS.—The Director shall establish a five-year
3 pilot program to enhance partnerships between emerging
4 research institutions and institutions classified as very
5 high research activity by the Carnegie Classification of In-
6 stitutions of Higher Education at the time of application.
7 In carrying out this program, the Director shall—

8 (1) require that each proposal submitted by a
9 multi-institution collaboration for an award, includ-
10 ing those under section 9, that exceeds \$1,000,000,
11 as appropriate, specify how the applicants will sup-
12 port substantive, meaningful, and mutually-bene-
13 ficial partnerships with one or more emerging re-
14 search institutions;

15 (2) require awardees funded under paragraph
16 (1) to direct no less than 25 percent of the total
17 award to one or more emerging research institutions
18 to build research capacity, including through support
19 for faculty salaries and training, field and laboratory
20 research experiences for undergraduate and grad-
21 uate students, and maintenance and repair of re-
22 search equipment and instrumentation;

23 (3) require awardees funded under paragraph
24 (1) to report on the partnership activities as part of

1 the annual reporting requirements of the Founda-
2 tion;

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

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

8 (A) an assessment, drawing on feedback
9 from the research community and other sources
10 of information, of the effectiveness of the pilot
11 program for improving the quality of partner-
12 ships with emerging research institutions; and

13 (B) if deemed effective, a plan for perma-
14 nent implementation of the pilot program.

15 (f) TRIBAL COLLEGES AND UNIVERSITIES PROGRAM
16 UPDATE.—

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

20 (A) in subsection (a) by—

21 (i) striking “Native American” and
22 inserting “American Indian, Alaska Na-
23 tive, and Native Hawaiian”;

24 (ii) inserting “post-secondary creden-
25 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 (h) CONTINUING SUPPORT FOR EPSCoR.—

23 (1) SENSE OF CONGRESS.—

24 (A) IN GENERAL.—It is the sense of Con-
25 gress that—

1 (i) since maintaining the Nation’s sci-
2 entific and economic leadership requires
3 the participation of talented individuals na-
4 tionwide, EPSCoR investments into State
5 research and education capacities are in
6 the Federal interest and should be sus-
7 tained; and

8 (ii) EPSCoR should maintain its ex-
9 perimental component by supporting inno-
10 vative methods for improving research ca-
11 pacity and competitiveness.

12 (B) DEFINITION OF EPSCOR.—In this sub-
13 section, the term “EPSCoR” has the meaning
14 given the term in section 502 of the America
15 COMPETES Reauthorization Act of 2010 (42
16 U.S.C. 1862p note).

17 (2) UPDATE OF EPSCOR.—Section 517(f)(2) of
18 the America COMPETES Reauthorization Act of
19 2010 (42 U.S.C. 1862p–9(f)(2)) is amended—

20 (A) in subparagraph (A), by striking
21 “and” at the end; and

22 (B) by adding at the end the following:

23 “(C) to increase the capacity of rural com-
24 munities to provide quality STEM education

1 and STEM workforce development program-
2 ming to students, and teachers; and”.

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

5 (1) IN GENERAL.—The Director shall establish
6 a program to make awards on a competitive, merit-
7 reviewed basis to eligible institutions to implement
8 and study innovative approaches for building re-
9 search capacity in order to engage and retain stu-
10 dents from a range of institutions and diverse back-
11 grounds in STEM.

12 (2) ELIGIBLE INSTITUTION DEFINED.—In this
13 subsection the term “eligible institution” means an
14 institution of higher education that, according to the
15 data published by the National Center for Science
16 and Engineering Statistics, is not, on average,
17 among the top 100 institutions in Federal research
18 and development expenditures during the 3 year pe-
19 riod prior to the year of the award.

20 (3) PURPOSE.—The program established in
21 paragraph (1) shall be focused on achieving simulta-
22 neous impacts at the student, faculty, and institu-
23 tional levels by increasing the research capacity at
24 eligible institutions and the number of under-

1 graduate and graduate students pursuing STEM de-
2 grees from eligible institutions.

3 (4) REQUIREMENTS.—In carrying out this pro-
4 gram, the Director shall—

5 (A) require eligible institutions seeking
6 funding under this subsection to submit an ap-
7 plication to the Director at such time, in such
8 manner, containing such information and assur-
9 ances as the Director may require. The applica-
10 tion shall include, at a minimum a description
11 of how the eligible institution plans to sustain
12 the proposed activities beyond the duration of
13 the grant;

14 (B) require applicants to identify dis-
15 ciplines and focus areas in which the eligible in-
16 stitution can excel, and explain how the appli-
17 cant will use the award to build capacity to bol-
18 ster the institutional research competitiveness
19 of eligible entities to support grants awarded by
20 the Foundation and increase regional and na-
21 tional capacity in STEM;

22 (C) require the awards funded under this
23 subsection to support research and related ac-
24 tivities, which may include—

1 (i) development or expansion of re-
2 search programs in disciplines and focus
3 areas in subparagraph (B);

4 (ii) faculty recruitment and profes-
5 sional development in disciplines and focus
6 areas in subparagraph (B), including for
7 early-career researchers;

8 (iii) stipends for undergraduate and
9 graduate students participating in research
10 in disciplines and focus areas in subpara-
11 graph (B);

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

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

18 (vi) administrative research develop-
19 ment support; and

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

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

1 (5) ADDITIONAL CONSIDERATIONS.—In award-
2 ing a grant under this subsection, the Director may
3 also consider—

4 (A) the extent to which the applicant will
5 support students from diverse backgrounds, in-
6 cluding first-generation undergraduate stu-
7 dents;

8 (B) the geographic and institutional diver-
9 sity of the applying institutions; and

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

13 (6) DUPLICATION.—The Director shall ensure
14 the awards made under this subsection are com-
15 plementary and not duplicative of existing programs.

16 (7) REPORT.—The Director shall submit a re-
17 port to Congress after the third year of the program
18 that includes—

19 (A) an assessment of the effectiveness of
20 the program for growing the geographic and in-
21 stitutional diversity of institutions of higher
22 education receiving research awards from the
23 Foundation;

24 (B) an assessment of the quality, quantity
25 and geographic and institutional diversity of in-

stitutions 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 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.

1 (B) PARTNERSHIPS.—An eligible institu-
2 tion receiving a grant under this subsection
3 may carry out the activities of the grant
4 through a partnership with other entities, in-
5 cluding community colleges and other eligible
6 institutions.

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

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

18 (B) enhance institutional resources to pro-
19 vide administrative research development sup-
20 port to faculty at an eligible institution;

21 (C) bolster the institutional research com-
22 petitiveness of an eligible institution to support
23 grants awarded by the Foundation;

24 (D) support the acquisition of instrumen-
25 tation necessary to build research capacity at

1 an eligible institution in research areas directly
2 associated with the Foundation;

3 (E) increase capability of an eligible insti-
4 tution to move technology into the marketplace;

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

10 (G) provide student engagement and re-
11 search training opportunities at the under-
12 graduate, graduate, and postdoctoral levels at
13 an eligible institution;

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

18 (I) address plans and prospects for long-
19 term sustainability of institutional enhance-
20 ments at an eligible institution resulting from
21 the award including, if applicable, how the
22 award may be leveraged by an eligible institu-
23 tion to build a broader base of support.

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

4 (5) AUTHORIZATION OF APPROPRIATIONS.—
5 There are authorized to be appropriated to the Di-
6 rector \$100,000,000 for each of fiscal years 2022
7 through 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) DEFINITIONS.—In this section:

8 (1) COVERED INDIVIDUAL.—The term “covered
9 individual” means the principal investigator, co-prin-
10 cipal investigators, and any other person at the in-
11 stitution who is responsible for the design, conduct,
12 or reporting of research or educational activities
13 funded or proposed for funding by the Foundation.

14 (2) FOREIGN COUNTRY OF CONCERN.—The
15 term “foreign country of concern” means the Peo-
16 ple’s Republic of China, the Democratic People’s Re-
17 public of Korea, the Russian Federation, the Islamic
18 Republic of Iran, or any other country deemed to be
19 a country of concern as determined by the Depart-
20 ment of State.

21 (3) MALIGN FOREIGN GOVERNMENT TALENT
22 RECRUITMENT PROGRAM.—The term “malign for-
23 eign government talent recruitment program” means
24 any program or activity that includes compensation,
25 including cash, research funding, honorific titles,

1 promised future compensation, or other types of re-
2 muneration, provided by the foreign state or an enti-
3 ty sponsored by the foreign state to the targeted in-
4 dividual in exchange for the individual transferring
5 knowledge and expertise to the foreign country.

6 (b) BROADER IMPACTS.—

7 (1) ASSESSMENT.—Not later than 45 days
8 after the date of enactment of this Act, the Director
9 shall enter into an agreement with a qualified inde-
10 pendent organization to assess how the Broader Im-
11 pacts review criterion is applied across the Founda-
12 tion and make recommendations for improving the
13 effectiveness for meeting the goals established in sec-
14 tion 526 of the America Creating Opportunities to
15 Meaningfully Promote Excellence in Technology,
16 Education, and Science Reauthorization Act of 2010
17 (42 U.S.C. 1862p–14).

18 (2) ACTIVITIES.—The Director shall award
19 grants on a competitive basis, to institutions of high-
20 er education or non-profit organizations (or con-
21 sortia of such institutions or organizations) to sup-
22 port activities to increase the efficiency, effective-
23 ness, and availability of resources for implementing
24 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 (c) 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 (d) 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 research 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 dislo-
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.

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
20 of higher education or other organization
21 has been made aware of the requirement
22 under this subsection.

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

1 (i) making scholarly presentations re-
2 garding scientific information not other-
3 wise controlled under current law;

4 (ii) participation in international con-
5 ferences or other international exchanges,
6 partnerships or programs that involve open
7 and reciprocal exchange of scientific infor-
8 mation, and which are aimed at advancing
9 international scientific understanding; and

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

12 (C) LIMITATION.—The policy developed
13 under subparagraph (A) shall not apply retro-
14 actively to research and development awards
15 made prior to the establishment of the policy by
16 the Director.

17 (9) SECURITY TRAINING MODULES.—

18 (A) IN GENERAL.—Not later than 90 days
19 after the date of enactment of this Act, the Di-
20 rector, in collaboration with the Director of the
21 National Institutes of Health and other relevant
22 Federal research agencies, shall enter into an
23 agreement or contract with a qualified entity
24 for the development of online research security
25 training modules for the research community,

1 including modules focused on international col-
2 laboration and international travel, foreign in-
3 terference, and rules for proper use of funds,
4 disclosure, conflict of commitment, and conflict
5 of interest.

6 (B) STAKEHOLDER INPUT.—Prior to en-
7 tering into the agreement under clause (A), the
8 Director shall seek input from academic, private
9 sector, intelligence, and law enforcement stake-
10 holders regarding the scope and content of
11 training modules, including the diversity of
12 needs across institutions of higher education
13 and other grantees of different sizes and types,
14 and recommendations for minimizing adminis-
15 trative burden on institutions of higher edu-
16 cation and researchers.

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

19 (i) develops modules that can be
20 adapted and utilized across Federal re-
21 search agencies; and

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

1 (D) GUIDELINES.—The Director, in col-
2 laboration with the Director of the National In-
3 stitutes of Health, shall develop guidelines for
4 institutions of higher education and other orga-
5 nizations receiving Federal research and devel-
6 opment funds to use in developing their own
7 training programs to address the unique needs,
8 challenges, and risk profiles of such institu-
9 tions, including adoption of training modules
10 developed under this paragraph.

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

18 (i) each covered individual listed on
19 the application for a research and develop-
20 ment award certify that they have com-
21 pleted research security training that
22 meets the guidelines developed under
23 clause (D) within one year of the applica-
24 tion; and

1 (ii) each institution of higher edu-
 2 cation or other organization applying for
 3 such award certify that each covered indi-
 4 vidual who is employed by the institution
 5 or organization and listed on the applica-
 6 tion has been made aware of the require-
 7 ment under this subparagraph.

8 (10) RESPONSIBLE CONDUCT IN RESEARCH
 9 TRAINING.—Section 7009 of the America Creating
 10 Opportunities to Meaningfully Promote Excellence in
 11 Technology, Education, and Science Act (42 U.S.C.
 12 1862o–1) is amended by—

13 (A) striking “and postdoctoral research-
 14 ers” and inserting “postdoctoral researchers,
 15 faculty, and other senior personnel”; and

16 (B) by inserting before the period at the
 17 end the following “, including mentor training”.

18 (11) NATIONAL ACADEMIES GUIDE TO RESPON-
 19 SIBLE CONDUCT IN RESEARCH.—

20 (A) IN GENERAL.—Not later than 180
 21 days after the date of enactment of this Act,
 22 the Director shall enter into an agreement with
 23 the Academies to update the report entitled
 24 “On Being a Scientist: A Guide to Responsible

1 Conduct in Research” issued by the Academies.

2 The report, as so updated, shall include—

3 (i) updated professional standards of
4 conduct in research;

5 (ii) promising practices for preventing,
6 addressing, and mitigating the negative
7 impact of harassment, including sexual
8 harassment and gender harassment as de-
9 fined in the 2018 Academies report enti-
10 tled “Sexual Harassment of Women: Cli-
11 mate, Culture, and Consequences in Aca-
12 demic Sciences, Engineering, and Medi-
13 cine”; and

14 (iii) promising practices for mitigating
15 potential security risks that threaten re-
16 search integrity.

17 (B) REPORT.—Not later than 18 months
18 after the effective date of the agreement under
19 subparagraph (A), the Academies, as part of
20 such agreement, shall submit to the Director
21 and the Committee on Science, Space, and
22 Technology of the House of Representatives
23 and the Committee on Commerce, Science, and
24 Transportation of the Senate the report re-

1 ferred to in such subparagraph, as updated pur-
2 suant to such subparagraph.

3 (e) RESEARCH ETHICS.—

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

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

10 (B) the incorporation of ethical, social,
11 safety, and security considerations into the re-
12 search design and review process for Federal
13 awards, may help mitigate potential harms be-
14 fore they happen;

15 (C) the Foundation's agreement with the
16 Academies to conduct a study and make rec-
17 ommendations with respect to governance of re-
18 search in emerging technologies is a positive
19 step toward accomplishing this goal; and

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

1 (2) ETHICS STATEMENTS.—Drawing on stake-
2 holder input, not later than 18 months after the
3 date of enactment of this Act, the Director shall
4 amend award proposal instructions to include a re-
5 quirement for an ethics statement to be included as
6 part of any proposal for funding prior to making the
7 award. Such statement shall be considered by the
8 Director in the review of proposals, taking into con-
9 sideration any relevant input from the peer-reviewers
10 for the proposal, and shall factor into award deci-
11 sions as deemed necessary by the Director. Such
12 statements may include, as appropriate—

13 (A) any foreseeable or quantifiable risks to
14 society, including how the research could enable
15 products, technologies, or other outcomes that
16 could intentionally or unintentionally cause sig-
17 nificant societal harm;

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

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

24 (3) GUIDANCE.—The Director shall solicit
25 stakeholder input to develop clear guidance on what

1 constitutes a foreseeable or quantifiable risk as de-
2 scribed in paragraph (2)(A), and to the extent prac-
3 ticable harmonize this policy with existing ethical
4 policies or related requirements for human subjects.

5 (4) RESEARCH.—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—

10 (A) research to assess the potential ethical
11 and societal implications of Foundation-sup-
12 ported research and products or technologies
13 enabled by such research, including the benefits
14 and risks identified pursuant to paragraph
15 (2)(A); and

16 (B) the development and verification of ap-
17 proaches to proactively mitigate foreseeable
18 risks to society, including the technical and so-
19 cial solutions identified pursuant to paragraph
20 (2)(B).

21 (5) ANNUAL REPORT.—The Director shall en-
22 courage awardees to update their ethics statements
23 as appropriate as part of the annual reports re-
24 quired by all awardees under the award terms and
25 conditions.

1 (f) RESEARCH REPRODUCIBILITY AND
2 REPLICABILITY.—Consistent with existing Federal law for
3 privacy, intellectual property, and security, the Director
4 shall facilitate the public access to research products, in-
5 cluding data, software, and code, developed as part of
6 Foundation-supported projects.

7 (1) DATA MANAGEMENT PLANS.—

8 (A) The Director shall require that every
9 proposal for funding for research include a ma-
10 chine-readable data management plan that in-
11 cludes a description of how the awardee will ar-
12 chive and preserve public access to data, soft-
13 ware, and code developed as part of the pro-
14 posed project.

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

17 (i) provide necessary resources, in-
18 cluding trainings and workshops, to edu-
19 cate researchers and students on how to
20 develop and review high quality data man-
21 agement plans;

22 (ii) ensure program officers and merit
23 review panels are equipped with the re-
24 sources and training necessary to review
25 the quality of data management plans; and

1 (iii) ensure program officers and
2 merit review panels treat data management
3 plans as essential elements of grant pro-
4 posals, where appropriate.

5 (2) OPEN REPOSITORIES.—The Director
6 shall—

7 (A) coordinate with the heads of other
8 Federal research agencies, and solicit input
9 from the scientific community, to develop and
10 widely disseminate a set of criteria for trusted
11 open repositories, accounting for discipline-spe-
12 cific needs and necessary protections for sen-
13 sitive information, to be used by federally fund-
14 ed researchers for the sharing of data, software,
15 and code;

16 (B) work with stakeholders to identify sig-
17 nificant gaps in available repositories meeting
18 the criteria developed under subparagraph (A)
19 and options for supporting the development of
20 additional or enhanced repositories;

21 (C) award grants on a competitive basis to
22 institutions of higher education or non-profit
23 organizations (or consortia of such institutions
24 or organizations) for the development, up-
25 grades, and maintenance of open data reposi-

1 tories that meet the criteria developed under
2 subparagraph (A);

3 (D) work with stakeholders and build on
4 existing models, where appropriate, to establish
5 a single, public, web-based point of access to
6 help users locate repositories storing data, soft-
7 ware, and code resulting from or used in Foun-
8 dation-supported projects;

9 (E) work with stakeholders to establish the
10 necessary policies and procedures and allocate
11 the necessary resources to ensure, as prac-
12 ticable, data underlying published findings re-
13 sulting from Foundation-supported projects are
14 deposited in repositories meeting the criteria
15 developed under subparagraph (A) at the time
16 of publication;

17 (F) incentivize the deposition of data, soft-
18 ware, and code into repositories that meet the
19 criteria developed under subparagraph (A); and

20 (G) coordinate with the scientific pub-
21 lishing community to develop uniform consensus
22 standards around data archiving and sharing.

23 (3) RESEARCH, DEVELOPMENT, AND EDU-
24 CATION.—The Director shall award grants, on a
25 competitive basis to institutions of higher education

1 or non-profit organizations (or consortia of such in-
2 stitutions or organizations) to—

3 (A) support research and development of
4 open source, sustainable, usable tools and infra-
5 structure that support reproducibility for a
6 broad range of studies across different dis-
7 ciplines;

8 (B) support research on computational re-
9 producibility, including the limits of reproduc-
10 ibility and the consistency of computational re-
11 sults in the development of new computation
12 hardware, tools, and methods; and

13 (C) support the education and training of
14 students, faculty, and researchers on computa-
15 tional methods, tools, and techniques to improve
16 the quality and sharing of data, code, and sup-
17 porting metadata to produce reproducible re-
18 search.

19 (g) CLIMATE CHANGE RESEARCH.—

20 (1) IN GENERAL.—The Director shall award
21 grants, on a competitive basis, to institutions of
22 higher education or non-profit organizations (or con-
23 sortia of such institutions or organizations) to sup-
24 port research to improve our understanding of the

1 climate system and related human and environ-
2 mental systems.

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

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

9 (B) research on climate-related human be-
10 haviors and institutions;

11 (C) research on climate-related risk, vul-
12 nerability, resilience, and adaptive capacity of
13 coupled human-environment systems, including
14 risks to ecosystem stability and risks to vulner-
15 able populations;

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

22 (E) research on the design, development,
23 and assessment of effective information and de-
24 cision-support systems, including understanding

1 and developing effective dissemination path-
2 ways;

3 (F) improved modeling, projections, anal-
4 yses, and assessments of climate and other
5 Earth system changes;

6 (G) research to understand the atmos-
7 pheric processes related to solar radiation man-
8 agement strategies and technologies and exam-
9 ine related economic, geopolitical, societal, envi-
10 ronmental, and ethical implications, not includ-
11 ing research designed to advance future deploy-
12 ment of these strategies and technologies;

13 (H) the development of effective strategies
14 for educating and training future climate
15 change researchers, and climate change re-
16 sponse and mitigation professionals, in both re-
17 search and development methods, as well as
18 community engagement and science commu-
19 nication;

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

1 (J) partnerships with other agencies to ad-
2 dress climate related challenges for specific
3 agency missions.

4 (h) 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 (i) 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 agency priority activities,
10 and the Mid-Scale Research Infrastructure program;
11 and

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

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

24 (k) FOOD-ENERGY-WATER RESEARCH.—The Direc-
25 tor shall award grants on a competitive basis to institu-

1 tions of higher education or non-profit organizations (or
2 consortia 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 (l) 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 (m) 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 (n) 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;

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 and

23 (5) advancements in multidisciplinary wildfire
24 science, including those related to air quality im-

1 pacts, human behavior, and early detection and
2 warning.

3 (o) UAV TECHNOLOGIES.—The Director shall carry
4 out a program of research and related activities for un-
5 manned aerial vehicle technologies, which may include a
6 prize competition pursuant to section 24 of the Stevenson-
7 Wylder Technology Innovation Act of 1980 (15 U.S.C.
8 3719) and support for undergraduate and graduate cur-
9 riculum development.

10 (p) LEVERAGING INTERNATIONAL EXPERTISE IN RE-
11 SEARCH.—The Director shall explore and advance oppor-
12 tunities for leveraging international capabilities and re-
13 sources that align with the Foundation and United States
14 research community priorities and have the potential to
15 benefit United States prosperity, security, health, and
16 well-being, including through binational research and de-
17 velopment organizations and foundations and by sending
18 teams of Foundation scientific staff for site visits of sci-
19 entific facilities and agencies in other countries.

20 (q) BIOLOGICAL RESEARCH COLLECTIONS.—

21 (1) IN GENERAL.—The Director shall continue
22 to support databases, tools, methods, and other ac-
23 tivities that secure and improve existing physical and
24 digital biological research collections, improve the ac-
25 cessibility of collections and collection-related data

1 for research and educational purposes, develop ca-
2 pacity for curation and collection management, and
3 to transfer ownership of collections that are signifi-
4 cant to the biological research community, including
5 to museums and universities.

6 (2) SPECIMEN MANAGEMENT PLAN.—In con-
7 sultation with other relevant Federal research agen-
8 cies, the Director shall require that every proposal
9 for funding for research that involves collecting or
10 generating specimens include a specimen manage-
11 ment plan that includes a description of how the
12 specimens and associated data will be accessioned
13 into and permanently maintained in an established
14 biological collection.

15 (3) ACTION CENTER FOR BIOLOGICAL COLLEC-
16 TIONS.—The Director shall award grants on a com-
17 petitive basis to institutions of higher education or
18 non-profit organizations (or consortia of such insti-
19 tutions or organizations) to establish an Action Cen-
20 ter for Biological Collections to facilitate coordina-
21 tion and data sharing among communities of prac-
22 tice for research, education, workforce training, eval-
23 uation, and business model development.

24 (F) CLEAN WATER RESEARCH AND TECHNOLOGY
25 ACCELERATION.—The Director shall award grants on a

1 competitive, merit-reviewed basis to institutions of higher
2 education or non-profit organizations (or consortia of such
3 institutions or organizations) to—

4 (1) support transdisciplinary research to signifi-
5 cantly advance our understanding of water avail-
6 ability, quality, and dynamics and the impact of
7 human activity and a changing climate on urban and
8 rural water and wastewater systems;

9 (2) develop, pilot and deploy innovative tech-
10 nologies, systems, and other approaches to identi-
11 fying and addressing challenges that affect water
12 availability, quality, and security, including through
13 direct engagement with affected communities and
14 partnerships with the private sector, State, tribal,
15 and local governments, non-profit organizations and
16 water management professionals; and

17 (3) grow the scientific workforce capable of
18 studying and managing water and wastewater sys-
19 tems, through education, training, and other profes-
20 sional development.

21 (s) TECHNOLOGY AND BEHAVIORAL SCIENCE RE-
22 SEARCH.—The Director shall award grants on a merit-
23 based, competitive basis for research to—

24 (1) increase understanding of social media and
25 consumer technology access and use patterns and re-

1 lated psychological and behavioral issues, particu-
2 larly for adolescents; and

3 (2) explore the role of social media and con-
4 sumer technology in rising rates of depressive symp-
5 toms, suicidal ideation, drug use, and deaths of de-
6 spair, particularly for communities experiencing
7 long-term economic distress.

8 (t) MANUFACTURING RESEARCH AMENDMENT.—

9 Section 506(a) of the America COMPETES Reauthoriza-
10 tion Act of 2010 (42 U.S.C. 1862p–1(a)) is amended—

11 (1) in paragraph (5), by striking “and” at the
12 end;

13 (2) in paragraph (6)—

14 (A) by striking “and” before “virtual man-
15 ufacturing”; and

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

19 (3) by adding at the end the following:

20 “(7) additive manufacturing, including new ma-
21 terial designs, complex materials, rapid printing
22 techniques, and real-time process controls; and

23 “(8) continuous manufacturing of biological
24 products and similar innovative monitoring and con-
25 trol techniques.”.

1 (u) CRITICAL MINERALS MINING RESEARCH AND
2 DEVELOPMENT.—

3 (1) IN GENERAL.—The Director shall award
4 grants, on a competitive basis, to institutions of
5 higher education or nonprofit organizations (or con-
6 sortium of such institutions or organizations) to sup-
7 port basic research that will accelerate innovation to
8 advance critical minerals mining strategies and tech-
9 nologies for the purpose of making better use of do-
10 mestic resources and eliminating national reliance on
11 minerals and mineral materials that are subject to
12 supply disruptions.

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

15 (A) advancing mining research and devel-
16 opment activities to develop new mapping and
17 mining technologies and techniques, including
18 advanced critical mineral extraction, production,
19 separation, alloying, or processing techniques
20 and technologies that can decrease energy in-
21 tensity, potential environmental impact and
22 costs of those activities;

23 (B) conducting long-term Earth observa-
24 tion of reclaimed mine sites, including the study

1 of the evolution of microbial diversity at such
2 sites;

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

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

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

14 (F) improved understanding of the geologi-
15 cal and geochemical processes through which
16 critical minerals form and are concentrated into
17 economically viable deposits; or

18 (G) providing training and researcher op-
19 portunities to undergraduate and graduate stu-
20 dents to prepare the next generation of mining
21 engineers and researchers.

22 (3) EXISTING PROGRAMS.—The Director shall
23 ensure awards made under this subsection are com-
24plementary and not duplicative of existing programs
25 across the foundation and Federal Government.

1 (v) STUDY OF AI RESEARCH CAPACITY.—

2 (1) IN GENERAL.—The Director shall conduct a
3 study, or support the development of a study
4 through the Science and Technology Policy Institute
5 or by any other appropriate organization as deter-
6 mined by the Director, on artificial intelligence re-
7 search capacity at U.S. institutions of higher edu-
8 cation.

9 (2) STUDY CONTENTS.—The Director shall en-
10 sure that, at a minimum, the study under subsection
11 (a) addresses the following topics:

12 (A) Which universities are putting out sig-
13 nificant peer-reviewed artificial intelligence re-
14 search, including based on quantity and number
15 of citations.

16 (B) For each of the universities described
17 in paragraph (1), what specific factors enable
18 their AI research, including computing power,
19 data sets and availability, specialized cur-
20 riculum, and industry and other partnerships.

21 (C) How universities not included in para-
22 graph (1) could implement the factors in para-
23 graph (2) to produce AI research, as well as
24 case studies that universities can look to as ex-
25 amples and potential pilot programs that the

1 Federal Government could develop or support
2 to help universities produce AI research.

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

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

10 (w) ADVANCING IOT FOR PRECISION AGRI-
11 CULTURE.—

12 (1) NATIONAL SCIENCE FOUNDATION DIREC-
13 TIVE ON AGRICULTURAL SENSOR RESEARCH.—In
14 awarding grants under its sensor systems and
15 networked systems programs, the Director shall in-
16 clude in consideration of portfolio balance research
17 and development on sensor connectivity in environ-
18 ments of intermittent connectivity and intermittent
19 computation—

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

23 (B) that considers—

24 (i) direct gateway access for locally
25 stored data;

- 1 (ii) attenuation of signal transmission;
- 2 (iii) loss of signal transmission; and
- 3 (iv) at-scale performance for wireless
- 4 power.

5 (2) UPDATING CONSIDERATIONS FOR PRECI-
6 SION AGRICULTURE TECHNOLOGY WITHIN THE NSF
7 ADVANCED TECHNICAL EDUCATION PROGRAM.—Sec-
8 tion 3 of the Scientific and Advanced-Technology
9 Act of 1992 (42 U.S.C. 1862i) is amended in sub-
10 section (e)(3)—

11 (A) in subparagraph (C), by striking
12 “and” after the semicolon;

13 (B) in subparagraph (D), by striking the
14 period at the end and inserting “; and”; and

15 (C) by adding at the end the following:

16 “(E) applications that incorporate distance
17 learning tools and approaches.”.

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

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

24 (i) sensors, scanners, radio-frequency
25 identification, and related technologies that

1 can monitor soil properties, irrigation con-
2 ditions, and plant physiology;

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

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

10 (iv) aerial imagery generated by sat-
11 ellites or unmanned aerial vehicles;

12 (v) ground-based robotics;

13 (vi) control systems design and
14 connectivity, such as smart irrigation con-
15 trol systems;

16 (vii) Global Positioning System-based
17 applications; and

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

22 (B) a review of Federal programs that pro-
23 vide support for precision agriculture research,
24 development, adoption, education, or training,

1 in existence on the date of enactment of this
2 Act.

3 (x) ASTRONOMY AND SATELLITE CONSTELLA-
4 TIONS.—The Director shall support research into and the
5 design, development, and testing of mitigation measures
6 to address the impact of satellite constellations on Foun-
7 dation scientific programs by—

8 (1) awarding grants on a competitive basis to
9 support investigations into the impacts of satellite
10 constellations on ground-based optical, infrared, and
11 radio astronomy, including through existing pro-
12 grams such Spectrum and Wireless Innovation en-
13 abled by Future Technologies (SWIFT) and the
14 Spectrum Innovation Initiative;

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

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

24 **SEC. 8. RESEARCH INFRASTRUCTURE.**

25 (a) FACILITY OPERATION AND MAINTENANCE.—

1 (1) IN GENERAL.—The Director shall continue
2 the Facility Operation Transition pilot program for
3 a total of 5 years.

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

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

12 (B) the capacity of the managing direc-
13 torate or division to absorb such costs.

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

17 (A) an assessment, that includes feedback
18 from the research community, of the effective-
19 ness of the pilot program for—

20 (i) supporting research directorates
21 and divisions in balancing investments in
22 research grants and funding for the initial
23 operation and maintenance of major facili-
24 ties;

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

3 (iii) facilitating interagency and inter-
4 national partnerships;

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

7 (v) supporting facility divestment
8 costs; and

9 (B) if deemed effective, a plan for perma-
10 nent implementation of the pilot program.

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

16 (c) HELIUM CONSERVATION.—

17 (1) MAJOR RESEARCH INSTRUMENTATION SUP-
18 PORT.—

19 (A) IN GENERAL.—The Director shall sup-
20 port, through the Major Research Instrumenta-
21 tion program, proposal requests that include
22 the purchase, installation, operation, and main-
23 tenance of equipment and instrumentation to
24 reduce consumption of helium.

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

10 (2) ANNUAL REPORT.—No later than 1 year
11 after the date of enactment of this Act and annually
12 for the subsequent two years, the Director shall sub-
13 mit an annual report to Congress on the use of
14 funding awarded by the Foundation for the purchase
15 and conservation of helium. The report should in-
16 clude—

17 (A) the volume and price of helium pur-
18 chased;

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

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

23 (d) ADVANCED COMPUTING.—

24 (1) COMPUTING NEEDS.—To gather informa-
25 tion about the computational needs of Foundation-

1 funded projects, the Director shall require grant pro-
2 posals submitted to the Foundation, as appropriate,
3 to include estimates of computational resource needs
4 for projects that require use of advanced computing.
5 The Director shall encourage and provide access to
6 tools that facilitate the inclusion of these measures,
7 including those identified in the 2016 Academies re-
8 port entitled “Future Directions for NSF Advanced
9 Computing Infrastructure to Support U.S. Science
10 and Engineering in 2017–2020”.

11 (2) REPORTS.—The Director shall document
12 and publish every two years a summary of the
13 amount and types of advanced computing capabili-
14 ties that are needed to fully meet the Foundation’s
15 project needs as identified under paragraph (1).

16 (3) ROADMAP.—To set priorities and guide
17 strategic decisions regarding investments in ad-
18 vanced computing capabilities, the Director shall de-
19 velop, publish, and regularly update a 5-year ad-
20 vanced computing roadmap that—

21 (A) describes the advanced computing re-
22 sources and capabilities that would fully meet
23 anticipated project needs, including through in-
24 vestments in the Mid-Scale Research Infra-

1 structure program and the Major Research
2 Equipment and Facilities Construction account;

3 (B) draws on community input, informa-
4 tion contained in research proposals, allocation
5 requests, insights from Foundation-funded
6 cyber-infrastructure operators, and Foundation-
7 wide information gathering regarding commu-
8 nity needs;

9 (C) considers computational needs of
10 planned major facilities;

11 (D) reflects anticipated technology trends;

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

14 (F) addresses the needs of groups histori-
15 cally underrepresented in STEM and geo-
16 graphic regions with low availability and high
17 demand for advanced computing resources;

18 (G) considers how Foundation-supported
19 advanced computing capabilities can be lever-
20 aged for activities through the Directorate for
21 Science and Engineering Solutions; and

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

1 (4) SECURING AMERICAN RESEARCH FROM
2 CYBER THEFT.—

3 (A) NETWORKING AND INFORMATION
4 TECHNOLOGY RESEARCH AND DEVELOPMENT
5 UPDATE.—Section 101(a)(1) of the High-Per-
6 formance Computing Act of 1991 (15 U.S.C.
7 5511) is amended—

8 (i) by moving the margins of subpara-
9 graphs (D) and (J) through (O) two ems
10 to the left;

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

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

16 “(J) provide for improving the security, reli-
17 ability, and resiliency of computing and networking
18 systems used by institutions of higher education and
19 other nonprofit research institutions for the proc-
20 essing, storage and transmission of sensitive feder-
21 ally funded research and associated data;”.

22 (B) COMPUTING ENCLAVE PILOT PRO-
23 GRAM.—

24 (i) IN GENERAL.—The Director, in
25 consultation with the Director of the Na-

1 tional Institute of Standards and Tech-
2 nology and the Secretary of Energy, shall
3 establish a pilot program to award grants
4 to ensure the security of federally-sup-
5 ported research data and to assist regional
6 institutions of higher education and their
7 researchers in compliance with regulations
8 regarding the safeguarding of sensitive in-
9 formation and other relevant regulations
10 and Federal guidelines.

11 (ii) STRUCTURE.—In carrying out the
12 pilot program established pursuant to
13 clause (i), the Director shall select three
14 institutions of higher education from
15 among institutions classified under the In-
16 diana University Center for Postsecondary
17 Research Carnegie Classification as a doc-
18 torate-granting university with a very high
19 level of research activity, and with a his-
20 tory of working with secure information for
21 the development, installation, maintenance,
22 or sustainment of secure computing en-
23 claves.

24 (iii) REGIONALIZATION.—

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

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

11 (iv) PROGRAM ELEMENTS.—The Di-
12 rector shall work with institutions of high-
13 er education selected pursuant to clause
14 (ii) to—

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

18 (II) develop a comprehensive and
19 confidential list, or a bill of materials,
20 of each binary component of the soft-
21 ware, firmware, or product that is re-
22 quired to deploy additional secure
23 computing enclaves;

24 (III) develop templates for all
25 policies and procedures required to

1 operate the secure computing enclave
2 in a research setting;

3 (IV) develop a system security
4 plan template; and

5 (V) develop a process for man-
6 aging a plan of action and milestones
7 for the secure computing enclave.

8 (v) DURATION.—Subject to other
9 availability of appropriations, the pilot pro-
10 gram established pursuant to clause (i)
11 shall operate for not less than 3 years.

12 (vi) REPORT.—

13 (I) IN GENERAL.—The Director
14 shall report to Congress not later than
15 6 months after the completion of the
16 pilot program under clause (i).

17 (II) CONTENTS.—The report re-
18 quired under subclause (I) shall in-
19 clude—

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

1 (bb) recommendations re-
2 lated to the value of expanding
3 the network of secure computing
4 enclaves; and

5 (cc) recommendations on the
6 efficacy of the use of secure com-
7 puting enclaves by other Federal
8 agencies in a broader effort to
9 expand security of Federal re-
10 search.

11 (vii) AUTHORIZATION OF APPROPRIA-
12 TIONS.—There is authorized to be appro-
13 priated to the Director, \$38,000,000 for
14 fiscal years 2022 through 2024, to carry
15 out the activities outlined in this section.

16 (e) NATIONAL SECURE DATA SERVICE.—

17 (1) IN GENERAL.—The Director, in consulta-
18 tion with the Chief Statistician of the United States,
19 shall establish a demonstration project to develop,
20 refine and test models to inform the full implemen-
21 tation of the Commission on Evidence-Based Policy-
22 making recommendation for a government-wide data
23 linkage and access infrastructure for statistical ac-
24 tivities conducted for statistical purposes, as defined
25 in chapter 35 of title 44, United States Code.

1 (2) ESTABLISHMENT.—Not later than one year
2 after the date of enactment of this Act, the Director
3 shall establish a National Secure Data Service dem-
4 onstration project. The National Secure Data Serv-
5 ice demonstration project shall be—

6 (A) aligned with the principles, best prac-
7 tices, and priority actions recommended by the
8 Advisory Committee on Data for Evidence
9 Building, to the extent feasible; and

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

13 (3) DATA.—In carrying out this subsection, the
14 Director shall engage with Federal and State agen-
15 cies to collect, acquire, analyze, report, and dissemi-
16 nate statistical data in the United States and other
17 nations to support government-wide evidence-build-
18 ing activities consistent with the Foundations for
19 Evidence-Based Policymaking Act of 2018.

20 (4) PRIVACY AND CONFIDENTIALITY PROTEC-
21 TIONS.—If the Director issues a management con-
22 tract under paragraph (2), the awardee shall be des-
23 ignated as an “agent” under chapter 35 of title 44,
24 United States Code, subchapter III, section 3561 et
25 seq., with all requirements and obligations for pro-

1 tecting confidential information delineated in the
2 Confidential Information Protection and Statistical
3 Efficiency Act of 2018 and the Privacy Act of 1974.

4 (5) TECHNOLOGY.—In carrying out this sub-
5 section, the Director shall consider application and
6 use of systems and technologies that incorporate
7 protection measures to reasonably ensure confiden-
8 tial data and statistical products are protected in ac-
9 cordance with obligations under chapter 35 of title
10 44, United States Code, subchapter III, section
11 3561 et seq., including systems and technologies
12 that ensure raw data and other sensitive inputs are
13 not accessible to recipients of statistical outputs
14 from the National Secure Data Service demonstra-
15 tion project.

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

20 (7) REPORT.—Not later than 2 years after the
21 date of enactment of this Act, the National Secure
22 Data Service demonstration project established
23 under paragraph (2) shall submit a report to Con-
24 gress that includes—

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

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

6 (C) an assessment of the effectiveness of
 7 the demonstration project for mitigating risks
 8 and removing barriers to a sustained implemen-
 9 tation of the National Secure Data Service as
 10 recommended by the Commission on Evidence-
 11 Based Policymaking; and

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

16 (8) AUTHORIZATION OF APPROPRIATIONS.—
 17 There are authorized to be appropriated to the Di-
 18 rector to carry out this subsection \$9,000,000 for
 19 each of fiscal years 2022 through 2026.

20 **SEC. 9. DIRECTORATE FOR SCIENCE AND ENGINEERING**
 21 **SOLUTIONS.**

22 (a) ESTABLISHMENT.—Subject to the availability of
 23 appropriated funds, there is established within the Foun-
 24 dation the Directorate for Science and Engineering Solu-
 25 tions to advance research and development solutions to ad-

1 dress societal and national challenges for the benefit of
2 all Americans.

3 (b) PURPOSE.—The purpose of the Directorate estab-
4 lished under subsection (a) is to support use-inspired re-
5 search, accelerate the translation of Foundation-supported
6 fundamental research and to advance technologies, facili-
7 tate commercialization and use of federally funded re-
8 search, and expand the pipeline of United States students
9 and researchers in areas of societal and national impor-
10 tance.

11 (c) ACTIVITIES.—The Director shall achieve the pur-
12 poses described in subsection (b) by awarding financial as-
13 sistance through the Directorate to—

14 (1) support transformational advances in use-
15 inspired and translational research through diverse
16 funding mechanisms and models, including conver-
17 gence accelerators;

18 (2) translate research into science and engineer-
19 ing innovations, including through developing inno-
20 vative approaches to connect research with societal
21 outcomes, developing approaches to technology
22 transfer that do not rely only on traditional market
23 and commercialization tools, education and training
24 for students and researchers on engaging with end
25 users and the public, partnerships that facilitate re-

1 search uptake, application, and scaling, prototype
2 development, entrepreneurial education, developing
3 tech-to-market strategies, and partnerships that con-
4 nect research products to businesses, accelerators,
5 and incubators and encourage the formation and
6 growth of new companies;

7 (3) develop and expand sustainable and mutu-
8 ally-beneficial use-inspired and translational research
9 and development partnerships and collaborations
10 among institutions of higher education, including
11 minority serving institutions and emerging research
12 institutions, non-profit organizations, labor organiza-
13 tions, businesses and other for-profit entities, Fed-
14 eral or State agencies, community organizations,
15 other Foundation directorates, national labs, field
16 stations and marine laboratories, international enti-
17 ties as appropriate, binational research and develop-
18 ment foundations and funds, excluding foreign enti-
19 ties of concern, and other organizations;

20 (4) build capacity for use-inspired and
21 translational research at institutions of higher edu-
22 cation, including necessary administrative support;

23 (5) expand opportunities for researchers to con-
24 tribute to use-inspired and translational research in-
25 cluding through support for workshops and con-

1 ferences, targeted incentives and training, and multi-
2 disciplinary research centers;

3 (6) support the education, mentoring, and
4 training of undergraduate students, graduate stu-
5 dents, and postdoctoral researchers in use-inspired
6 and translational approaches to research and entre-
7 preneurship in key focus areas identified under sub-
8 section (g) through scholarships, fellowships, and
9 traineeships;

10 (7) support translational research infrastruc-
11 ture, including platforms and testbeds, data manage-
12 ment and software tools, and networks and commu-
13 nication platforms for interactive and collective
14 learning and information sharing;

15 (8) identify social, behavioral, and economic
16 drivers and consequences of technological innova-
17 tions; and

18 (9) ensure the programmatic work of the Direc-
19 torate and Foundation incorporates a worker per-
20 spective through participation by labor organizations
21 and workforce training organizations.

22 (d) ASSISTANT DIRECTOR.—

23 (1) IN GENERAL.—The Director shall appoint
24 an Assistant Director responsible for the manage-

1 ment of the Directorate established under this sec-
2 tion.

3 (2) TERM LIMIT.—The Assistant Director ap-
4 pointed under paragraph (1) shall serve a term last-
5 ing no longer than 4 years.

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

10 (A) advise the Director on all matters per-
11 taining to use-inspired and translational re-
12 search, development, and commercialization at
13 the Foundation, including partnership with the
14 private sector and other users of Foundation
15 funded research; and

16 (B) develop and implement the necessary
17 policies and procedures to promote a culture of
18 use-inspired and translational research within
19 the Directorate and across the Foundation and
20 carry out the responsibilities under paragraph
21 (4).

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

24 (A) advising the Director on all matters
25 pertaining to use-inspired and translational re-

1 search and development activities at the Foun-
2 dation, including effective practices for conver-
3 gence research;

4 (B) identifying opportunities for and facili-
5 tating coordination and collaboration, where ap-
6 propriate, on use-inspired and translational re-
7 search, development, commercialization, and so-
8 cietal application activities—

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

11 (ii) between the Foundation and
12 stakeholders in academia, the private sec-
13 tor, including non-profit entities, labor or-
14 ganizations, Federal or State agencies, and
15 international entities, as appropriate;

16 (C) ensuring that the activities carried out
17 under this section are not duplicative of activi-
18 ties supported by other parts of the Foundation
19 or other relevant Federal agencies;

20 (D) approving all new programs within the
21 Directorate;

22 (E) developing and testing diverse merit-
23 review models and mechanisms for selecting
24 and providing awards for use-inspired and
25 translational research and development at dif-

ferent 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

1 knowledge of the technical and social dimen-
2 sions of science and technology, technology
3 transfer experts, labor organizations, and rep-
4 resentatives of civil society, community organi-
5 zations, and other nongovernmental organiza-
6 tions; and

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

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

14 (A) reviewing and evaluating activities car-
15 ried out under this section; and

16 (B) assessing the success of the Direc-
17 torate in and proposing new strategies for ful-
18 filling the purposes in subsection (b).

19 (f) EXISTING PROGRAMS.—The Convergence Accel-
20 erator, the Growing Convergence Research Big Idea, and
21 any other program, at the discretion of the Director, may
22 be managed by the Directorate.

23 (g) FOCUS AREAS.—In consultation with the Assist-
24 ant Director, the Board, and other Federal agencies and
25 taking into account advice under subsection (e), the Direc-

1 tor shall identify, and regularly update, up to 5 focus
2 areas to guide activities under this section. In selecting
3 such focus areas, the Director shall consider the following
4 societal challenges:

5 (1) Climate change and environmental sustain-
6 ability.

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

9 (3) Cybersecurity.

10 (4) National security.

11 (5) STEM education and workforce.

12 (6) Social and economic inequality.

13 (h) TECHNOLOGY RESEARCH INSTITUTES.—

14 (1) IN GENERAL.—The Director may award
15 grants and cooperative agreements to institutions of
16 higher education, or consortia thereof, for the plan-
17 ning, establishment, and support of Technology Re-
18 search Institutes in key technology areas, as deter-
19 mined by the Director.

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

23 (A) conduct fundamental research to ad-
24 vance innovation in a key technology;

1 (B) conduct research involving a key tech-
2 nology to solve challenges with social, economic,
3 health, scientific, and national security implica-
4 tions;

5 (C) further the development, adoption, and
6 commercialization of innovations in key tech-
7 nology focus areas, including through partner-
8 ship with other Federal agencies and Federal
9 laboratories, industry, including startup compa-
10 nies, labor organizations, civil society organiza-
11 tions, and state and local, and Tribal govern-
12 ments;

13 (D) develop and manage multi-user re-
14 search testbeds and instrumentation for key
15 technologies;

16 (E) develop and manage an accessible re-
17 pository, as appropriate, for research data and
18 computational models relevant to the relevant
19 key technology field, consistent with applicable
20 privacy and intellectual property laws;

21 (F) convene national workshops for re-
22 searchers and other stakeholders in that tech-
23 nology area;

24 (G) establish traineeship programs for
25 graduate students who pursue research related

1 to the technology leading to a masters or doc-
2 torate degree by providing funding and other
3 assistance, and by providing graduate students
4 opportunities for research experiences in gov-
5 ernment or industry related to the students'
6 studies in that technology area;

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

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

12 (3) CONSIDERATIONS.—In making awards
13 under this section, the Director may consider the ex-
14 tent to which the activities proposed—

15 (A) have the potential to create an innova-
16 tion ecosystem, or enhance existing ecosystems,
17 to translate Technology Research Institute re-
18 search into applications and products, as appro-
19 priate to the topic of each Institute;

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

23 (C) support transdisciplinary education ac-
24 tivities, including curriculum development, re-
25 search experiences, and faculty professional de-

1 velopment across undergraduate, graduate, and
2 professional academic programs;

3 (D) involve partnerships with multiple
4 types of institutions, including emerging re-
5 search institutions, historically Black colleges
6 and universities, Tribal Colleges or Universities,
7 and minority serving institutions, and with
8 other Federal agencies, Federal laboratories, in-
9 dustry, state, local, and Tribal governments,
10 labor organizations, civil society organizations,
11 and other entities that may use or be affected
12 by the technology; and

13 (E) include a component that addresses
14 the ethical, societal, safety, and security impli-
15 cations relevant to the application of the tech-
16 nology.

17 (4) DURATION.—

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

21 (B) RENEWAL.—An established Tech-
22 nology Institute may apply for, and the Direc-
23 tor may grant, extended funding for periods of
24 5 years on a merit-reviewed basis.

1 (5) APPLICATION.—An institution of higher
2 education or consortia thereof seeking financial as-
3 sistance under this section shall submit to the Direc-
4 tor an application at such time, in such manner, and
5 containing such information as the Director may re-
6 quire.

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

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

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

18 (7) COLLABORATION.—In making awards under
19 this section, the Director may collaborate with Fed-
20 eral departments and agencies whose missions con-
21 tribute to or are affected by the technology focus
22 area of the institute.

23 (i) PLANNING AND CAPACITY BUILDING GRANTS.—
24 Section 602 of the American Innovation and Competitive-
25 ness Act (42 U.S.C. 1862s–9) is amended—

1 (1) by redesignating subsection (e) as sub-
2 section (f); and

3 (2) by inserting after subsection (d), the fol-
4 lowing:

5 “(e) PLANNING AND CAPACITY BUILDING GRANTS.—

6 “(1) IN GENERAL.—Under the program estab-
7 lished in section 508 of the America COMPETES
8 Reauthorization Act of 2010 (42 U.S.C. 1862p–2)
9 and the activities authorized under this section, the
10 Director shall award grants to eligible entities for
11 planning and capacity building at institutions of
12 higher education.

13 “(2) ELIGIBLE ENTITY DEFINED.—In this sub-
14 section, the term ‘eligible entity’ means an institu-
15 tion of higher education (or a consortium of such in-
16 stitutions) that, according to the data published by
17 the National Center for Science and Engineering
18 Statistics, is not, on average, among the top 100 in-
19 stitutions in Federal R&D expenditures during the 3
20 year period prior to the year of the award.

21 “(3) USE OF FUNDS.—In addition to activities
22 listed under subsection (c), an eligible entity receiv-
23 ing a grant under this subsection may use funds
24 to—

1 “(A) ensure the availability of staff, includ-
2 ing technology transfer professionals, entre-
3 preneurs in residence, and other mentors as re-
4 quired to accomplish the purpose of this sub-
5 section;

6 “(B) revise institution policies, including
7 policies related to intellectual property and fac-
8 ulty entrepreneurship, and taking other nec-
9 essary steps to implement relevant best prac-
10 tices for academic technology transfer;

11 “(C) develop new local and regional part-
12 nerships among institutions of higher education
13 and between institutions of higher education
14 and private sector entities and other relevant
15 organizations with the purpose of building net-
16 works, expertise, and other capacity to identify
17 promising research that may have potential
18 market value and enable researchers to pursue
19 further development and transfer of their ideas
20 into possible commercial or other use;

21 “(D) develop seminars, courses, and other
22 educational opportunities for students, post-doc-
23 toral researchers, faculty, and other relevant
24 staff at institutions of higher education to in-
25 crease awareness and understanding of entre-

preneurship, patenting, business planning, and
other areas relevant to technology transfer, and
connect students and researchers to relevant re-
sources, including mentors in the private sector;
and

“(E) create and fund competitions to allow
entrepreneurial students and faculty to illus-
trate 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 appli-
cation to the Director of the Foundation at such
time, in such manner, and containing such informa-
tion and assurances as such Director may require.
The application shall include, at a minimum, a de-
scription of how the eligible entity submitting an ap-
plication plans to sustain the proposed activities be-
yond the duration of the grant.

“(6) AUTHORIZATION OF APPROPRIATIONS.—
From within funds authorized for the Directorate
for Science and Engineering Solutions, there are au-

1 thorized to carry out the activities under this sub-
2 section \$40 million for each of fiscal years 2022
3 through 2026.”.

4 (j) ENTREPRENEURIAL FELLOWSHIPS.—

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

11 (2) APPLICATIONS.—An applicant for a fellow-
12 ship under this subsection shall submit to the Direc-
13 tor an application at such time, in such manner, and
14 containing such information as the Director may re-
15 quire. At a minimum, the Director shall require that
16 applicants—

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

20 (B) have included in the application a let-
21 ter of support from the intended host institu-
22 tion that describes how the fellow will be em-
23 bedded in that institution’s research environ-
24 ment.

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

3 (A) from diverse research institutions;

4 (B) from all regions of the country; and

5 (C) from groups historically underrep-
6 resented in STEM fields;

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

10 (5) AUTHORIZATION OF APPROPRIATIONS.—

11 There is authorized to be appropriated to the Direc-
12 tor \$100,000,000 for fiscal years 2022 through
13 2026, to carry out the activities outlined in this sub-
14 section.

15 (k) LOW-INCOME SCHOLARSHIP PROGRAM.—

16 (1) IN GENERAL.—The Director shall award
17 scholarships to low-income individuals to enable such
18 individuals to pursue associate, undergraduate, or
19 graduate level degrees in mathematics, engineering,
20 or computer science.

21 (2) ELIGIBILITY.—

22 (A) IN GENERAL.—To be eligible to receive
23 a scholarship under this section, an indi-
24 vidual—

1 (i) must be a citizen of the United
2 States, a national of the United States (as
3 defined in section 1101(a) of title 8), an
4 alien admitted as a refugee under section
5 1157 of title 8, or an alien lawfully admit-
6 ted to the United States for permanent
7 residence;

8 (ii) shall prepare and submit to the
9 Director an application at such time, in
10 such manner, and containing such infor-
11 mation as the Director may require; and

12 (iii) shall certify to the Director that
13 the individual intends to use amounts re-
14 ceived under the scholarship to enroll or
15 continue enrollment at an institution of
16 higher education (as defined in section
17 1001(a) of title 20) in order to pursue an
18 associate, undergraduate, or graduate level
19 degree in mathematics, engineering, com-
20 puter science, or other technology and
21 science programs designated by the Direc-
22 tor.

23 (B) ABILITY.—Awards of scholarships
24 under this section shall be made by the Director
25 solely on the basis of the ability of the appli-

1 cant, except that in any case in which 2 or
2 more applicants for scholarships are deemed by
3 the Director to be possessed of substantially
4 equal ability, and there are not sufficient schol-
5 arships available to grant one to each of such
6 applicants, the available scholarship or scholar-
7 ships shall be awarded to the applicants in a
8 manner that will tend to result in a geographi-
9 cally wide distribution throughout the United
10 States of recipients' places of permanent resi-
11 dence.

12 (3) SCHOLARSHIP AMOUNT AND RENEWAL.—

13 The amount of a scholarship awarded under this
14 section shall be determined by the Director. The Di-
15 rector may renew scholarships for up to 5 years.

16 (4) AUTHORIZATION.—Of amounts authorized
17 for the Directorate for Science and Engineering So-
18 lutions, \$100,000,000 shall be authorized for this
19 program.

20 (1) TRANSFER OF FUNDS.—

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

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

6 (m) AUTHORITIES.—In addition to existing authori-
7 ties available to the Foundation, the Director may exercise
8 the following authorities in carrying out the activities
9 under this section:

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

14 (2) APPOINTMENTS.—The Director shall have
15 the authority to make appointments of scientific, en-
16 gineering, and professional personnel for carrying
17 out research and development functions which re-
18 quire the services of specially qualified personnel re-
19 lating to the focus areas identified under subsection
20 (g) and such other areas of national research prior-
21 ities as the Director may determine.

22 (n) ETHICAL, LEGAL, AND SOCIETAL CONSIDER-
23 ATIONS.—The Director shall establish policies regarding
24 engagement with experts in the social dimensions of
25 science and technology and set up formal avenues for pub-

1 lie input, as appropriate, to ensure that ethical, legal, and
2 societal considerations are explicitly integrated into the
3 priorities for the Directorate, including the selection of
4 focus areas under subsection (g), the award-making proc-
5 ess, and throughout all stages of supported projects.

6 (o) REPORTS AND ROADMAPS.—

7 (1) ANNUAL REPORT.—The Director shall pro-
8 vide to the relevant authorizing and appropriations
9 committees of Congress an annual report describing
10 projects supported by the Directorate during the
11 previous year.

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

18 (p) EVALUATION.—

19 (1) IN GENERAL.—After the Directorate has
20 been in operation for 6 years, the National Science
21 Board shall evaluate how well the Directorate is
22 achieving the purposes identified in subsection (b),
23 including an assessment of the impact of Directorate
24 activities on the Foundation’s primary science mis-
25 sion.

1 (2) INCLUSIONS.—The evaluation shall in-
2 clude—

3 (A) a recommendation on whether the Di-
4 rectorate should be continued or terminated;
5 and

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

8 (3) AVAILABILITY.—On completion of the eval-
9 uation, the evaluation shall be made available to
10 Congress and the public.

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”.

Passed the House of Representatives June 28, 2021.

Attest:

Clerk.

117TH CONGRESS
1ST SESSION

H. R. 2225

AN ACT

To authorize appropriations for fiscal years 2022, 2023, 2024, 2025, and 2026 for the National Science Foundation, and for other purposes.