

Suspend the Rules and Pass the Bill, H.R. 2225, With an Amendment

(The amendment strikes all after the enacting clause and inserts a new text)

117TH CONGRESS
1ST SESSION

H. R. 2225

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

IN THE HOUSE OF REPRESENTATIVES

MARCH 26, 2021

Ms. JOHNSON of Texas (for herself, Mr. LUCAS, Ms. STEVENS, and Mr. WALTZ) introduced the following bill; which was referred to the Committee on Science, Space, and Technology

A BILL

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,*

3 **SECTION 1. SHORT TITLE.**

4 This Act may be cited as the “National Science
5 Foundation for the Future Act”.

6 **SEC. 2. FINDINGS.**

7 Congress finds the following:

1 (1) Over the past seven decades, the National
2 Science Foundation has played a critical role in ad-
3 vancing the United States academic research enter-
4 prise by supporting fundamental research and edu-
5 cation across science and engineering disciplines.

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

11 (3) While the traditional approach to invest-
12 ment in research has delivered myriad benefits to so-
13 ciety, a concerted effort is needed to ensure the ben-
14 efits of federally funded science and engineering are
15 enjoyed by all Americans.

16 (4) As countries around the world increase in-
17 vestments in research and STEM education, United
18 States global leadership in science and engineering is
19 eroding, posing significant risks to economic com-
20 petitiveness, national security, and public well-being.

21 (5) To address major societal challenges and
22 sustain United States leadership in innovation, the
23 Federal Government must increase investments in
24 research, broaden participation in the STEM work-
25 force, and bolster collaborations among universities,

1 National Laboratories, field stations and marine lab-
2 oratories, companies, labor organizations, non-profit
3 funders of research, local policymakers, civil societies
4 and stakeholder communities, and international
5 partners.

6 **SEC. 3. DEFINITIONS.**

7 In this Act:

8 (1) **ACADEMIES.**—The term “Academies”
9 means the National Academies of Sciences, Engi-
10 neering, and Medicine.

11 (2) **ARTIFICIAL INTELLIGENCE.**—The term “ar-
12 tificial intelligence” has the meaning given such
13 term in section 5002 of the William M. (MAC)
14 Thornberry National Defense Authorization Act for
15 Fiscal Year 2021.

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

20 (4) **BOARD.**—The term “Board” means the Na-
21 tional Science Board.

22 (5) **DIRECTOR.**—The term “Director” means
23 the Director of the National Science Foundation.

24 (6) **EMERGING RESEARCH INSTITUTION.**—The
25 term “emerging research institution” means an in-

1 stitution of higher education with an established un-
2 dergraduate student program that has, on average
3 for 3 years prior to the time of application for an
4 award, received less than \$35,000,000 in Federal re-
5 search funding.

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

10 (8) FOUNDATION.—The term “Foundation”
11 means the National Science Foundation.

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

17 (10) INSTITUTION OF HIGHER EDUCATION.—
18 The term “institution of higher education” has the
19 meaning given the term in section 101(a) of the
20 Higher Education Act of 1965 (20 U.S.C. 1001(a)).

21 (11) LABOR ORGANIZATION.—The term “labor
22 organization” has the meaning given the term in
23 section 2(5) of the National Labor Relations Act (29
24 U.S.C. 152(5)), except that such term shall also in-
25 clude—

1 (A) any organization composed of labor or-
2 ganizations, such as a labor union federation or
3 a State or municipal labor body; and

4 (B) any organization which would be in-
5 cluded in the definition for such term under
6 such section (5) but for the fact that the orga-
7 nization represents—

8 (i) individuals employed by the United
9 States, any wholly owned Government cor-
10 poration, any Federal Reserve Bank, or
11 any State or political subdivision thereof;

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

15 (iii) individuals employed as agricul-
16 tural laborers.

17 (12) MINORITY-SERVING INSTITUTION.—The
18 term “minority-serving institution” means a His-
19 panic-serving institution, an Alaska Native-serving
20 institution, a Native Hawaiian-serving institutions, a
21 Predominantly Black Institution, an Asian American
22 and Native American Pacific Islander-serving insti-
23 tution, or a Native American-serving nontribal insti-
24 tution as described in section 371 of the Higher
25 Education Act of 1965 (20 U.S.C. 1067q(a)).

1 (13) NON-PROFIT ORGANIZATION.—The term
2 “non-profit organization” means an organization
3 which is described in section 501(c)(3) of the Inter-
4 nal Revenue Code of 1986 and exempt from tax
5 under section 501(a) of such code.

6 (14) NSF INCLUDES.—The term “NSF in-
7 cludes” means the initiative carried out under sec-
8 tion 6(c).

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

11 (16) RESEARCH AND DEVELOPMENT AWARD.—
12 The term “research and development award” means
13 support provided to an individual or entity by a Fed-
14 eral research agency to carry out research and devel-
15 opment activities, which may include support in the
16 form of a grant, contract, cooperative agreement, or
17 other such transaction. The term does not include a
18 grant, contract, agreement or other transaction for
19 the procurement of goods or services to meet the ad-
20 ministrative needs of a Federal research agency.

21 (17) SKILLED TECHNICAL WORK.—The term
22 “skilled technical work” means an occupation that
23 requires a high level of knowledge in a technical do-
24 main and does not require a bachelor’s degree for
25 entry.

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

5 (19) STEM EDUCATION.—The term “STEM
6 education” has the meaning given the term in sec-
7 tion 2 of the STEM Education Act of 2015 (42
8 U.S.C. 6621 note).

9 (20) TRIBAL COLLEGE OR UNIVERSITY.—The
10 term “Tribal College or University” has the meaning
11 given such term in section 316 of the Higher Edu-
12 cation Act of 1965 (20 U.S.C. 1059e).

13 **SEC. 4. AUTHORIZATION OF APPROPRIATIONS.**

14 (a) FISCAL YEAR 2022.—

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

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

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

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

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

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

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

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

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

14 (iv) \$70,000,000 shall be for the
15 Cybercorps Scholarship for Service Pro-
16 gram;

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

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

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

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

3 (b) FISCAL YEAR 2023.—

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

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

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

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

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

18 (B) \$1,654,520,000 shall be made avail-
19 able for education and human resources, of
20 which—

21 (i) \$80,400,000 shall be for the Rob-
22 ert Noyce Teacher Scholarship Program;

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

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

4 (iv) \$72,000,000 shall be for the
5 Cybercorps Scholarship for Service Pro-
6 gram;

7 (C) \$355,000,000 shall be made available
8 for major research equipment and facilities con-
9 struction, of which \$80,000,000 shall be for the
10 Mid-Scale Research Infrastructure Program;

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

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

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

17 (c) FISCAL YEAR 2024.—

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

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

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

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

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

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

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

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

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

17 (iv) \$78,000,000 shall be for the
18 Cybercorps Scholarship for Service Pro-
19 gram;

20 (C) \$370,000,000 shall be made available
21 for major research equipment and facilities con-
22 struction, of which \$85,000,000 shall be for the
23 Mid-Scale Research Infrastructure Program;

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

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

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

5 (d) FISCAL YEAR 2025.—

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

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

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

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

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

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

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

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

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

6 (iv) \$84,000,000 shall be for the
7 Cybercorps Scholarship for Service Pro-
8 gram;

9 (C) \$372,000,000 shall be made available
10 for major research equipment and facilities con-
11 struction, of which \$90,000,000 shall be for the
12 Mid-Scale Research Infrastructure Program;

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

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

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

19 (e) FISCAL YEAR 2026.—

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

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

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

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

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

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

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

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

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

20 (iv) \$90,000,000 shall be for the
21 Cybercorps Scholarship for Service Pro-
22 gram;

23 (C) \$375,000,000 shall be made available
24 for major research equipment and facilities con-
25 struction, of which \$100,000,000 shall be for

1 the Mid-Scale Research Infrastructure Pro-
2 gram;

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

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

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

9 **SEC. 5. STEM EDUCATION.**

10 (a) PREK-12 STEM EDUCATION.—

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

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

20 (A) IN GENERAL.—The Director shall es-
21 tablish a program to award grants, on a com-
22 petitive basis, to institutions of higher edu-
23 cation or non-profit organizations (or consortia
24 of such institutions or organizations) to estab-
25 lish no fewer than 3 multidisciplinary Centers

1 for Transformative Education Research and
2 Translation (in this section referred to as “Cen-
3 ters”) to support research and development on
4 widespread and sustained implementation of
5 STEM education innovations.

6 (B) APPLICATION.—An institution of high-
7 er education or non-profit organization (or a
8 consortium of such institutions or organiza-
9 tions) seeking funding under subparagraph (A)
10 shall submit an application to the Director at
11 such time, in such manner, and containing such
12 information as the Director may require. The
13 application shall include, at a minimum, a de-
14 scription of how the proposed Center will—

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

23 (ii) support enhanced STEM edu-
24 cation infrastructure, including
25 cyberlearning technologies, to facilitate the

1 widespread adoption of promising, evi-
2 dence-based practices;

3 (iii) support research and development
4 on scaling practices, partnerships, and al-
5 ternative models to current approaches, in-
6 cluding approaches sensitive to the unique
7 combinations of capabilities, resources, and
8 needs of varying localities, educators, and
9 learners;

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

18 (v) include a focus on the learning
19 needs and unique challenges facing stu-
20 dents with disabilities; and

21 (vi) support research and development
22 on scaling practices and models to support
23 and sustain highly-qualified STEM edu-
24 cators in urban and rural communities.

1 (C) ADDITIONAL CONSIDERATIONS.—In
2 awarding a grant under this paragraph, the Di-
3 rector may also consider the extent to which the
4 proposed Center will—

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

9 (ii) support research on and the devel-
10 opment and scaling of innovative ap-
11 proaches to distance learning and edu-
12 cation for various student populations;

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

17 (iv) include a commitment from local
18 or State education administrators to mak-
19 ing the proposed reforms and activities a
20 priority.

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

1 (E) ANNUAL MEETING.—The Director
2 shall encourage and facilitate an annual meet-
3 ing of the Centers to foster collaboration among
4 the Centers and to further disseminate the re-
5 sults of the Centers’ activities.

6 (F) REPORT.—Not later than 5 years after
7 the date of enactment of this Act, the Director
8 shall submit to Congress a report describing the
9 activities carried out pursuant to this para-
10 graph that includes—

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

13 (ii) an assessment of the program’s
14 success in helping to promote scalable solu-
15 tions in PreK-12 STEM education.

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

20 (A) review the research literature and iden-
21 tify research gaps regarding the interconnected
22 factors that foster and hinder successful imple-
23 mentation of promising, evidence-based PreK-
24 12 STEM education innovations at the local,
25 regional, and national level;

1 (B) present a compendium of promising,
2 evidence-based PreK-12 STEM education prac-
3 tices, models, programs, and technologies;

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

7 (D) make recommendations to the Founda-
8 tion, the Department of Education, the Na-
9 tional Science and Technology Council's Com-
10 mittee on Science, Technology, Engineering,
11 and Mathematics Education, State and local
12 educational agencies, and other relevant stake-
13 holders on measures to address such barriers.

14 (4) SUPPORTING PRE-K-8 INFORMAL STEM OP-
15 PORTUNITIES.—Section 3 of the STEM Education
16 Act of 2015 (42 U.S.C. 1862q) is amended by add-
17 ing at the end the following:

18 “(c) PRE-K-8 INFORMAL STEM PROGRAM.—

19 “(1) IN GENERAL.—The Director of the Na-
20 tional Science Foundation shall provide grants to in-
21 stitutions of higher education or a non-profit organi-
22 zations (or a consortia of such intuitions or organi-
23 zation) on a merit-reviewed, competitive basis for re-
24 search on programming that engages students in
25 grades PREK-8, including underrepresented and

1 rural students, in STEM in order to prepare such
2 students to pursue degrees or careers in STEM.

3 “(2) USE OF FUNDS.—

4 “(A) IN GENERAL.—Grants awarded under
5 this section shall be used toward research to ad-
6 vance the engagement of students, including
7 underrepresented and rural students, in grades
8 PREK-8 in STEM through providing before-
9 school, after-school, out-of-school, or summer
10 activities, including in single-gender environ-
11 ments or programming, that are designed to en-
12 courage interest, engagement, and skills devel-
13 opment for students in STEM.

14 “(B) PERMITTED ACTIVITIES.—The activi-
15 ties described in subparagraph (A) may in-
16 clude—

17 “(i) the provision of programming de-
18 scribed in such subparagraph for the pur-
19 pose of research described in such subpara-
20 graph;

21 “(ii) the use of a variety of engage-
22 ment methods, including cooperative and
23 hands-on learning;

1 “(iii) exposure of students to role
2 models in the fields of STEM and near-
3 peer mentors;

4 “(iv) training of informal learning
5 educators, youth-serving professionals, and
6 volunteers who lead informal STEM pro-
7 grams in using evidence-based methods
8 consistent with the target student popu-
9 lation being served;

10 “(v) education of students on the rel-
11 evance and significance of STEM careers,
12 provision of academic advice and assist-
13 ance, and activities designed to help stu-
14 dents make real-world connections to
15 STEM content;

16 “(vi) the attendance of students at
17 events, competitions, and academic pro-
18 grams to provide content expertise and en-
19 courage career exposure in STEM, which
20 may include the purchase of parts and sup-
21 plies needed to participate in such competi-
22 tions;

23 “(vii) activities designed to engage
24 parents and families of students in grades
25 PREK-8 in STEM;

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

6 “(ix) coordination with STEM-rich
7 environments, including other nonprofit,
8 nongovernmental organizations, out-of-
9 classroom settings, single-gender environ-
10 ments, institutions of higher education, vo-
11 cational facilities, corporations, museums,
12 or science centers; and

13 “(x) the acquisition of instructional
14 materials or technology-based tools to con-
15 duct applicable grant activity.

16 “(3) APPLICATION.—An applicant seeking
17 funding under the section shall submit an applica-
18 tion at such time, in such manner, and containing
19 such information as may be required. Applications
20 that include or partner with a nonprofit, nongovern-
21 mental organization that has extensive experience
22 and expertise in increasing the participation of stu-
23 dents in PREK-8 in STEM are encouraged. The ap-
24 plication may include the following:

1 “(A) A description of the target audience
2 to be served by the research activity or activi-
3 ties for which such funding is sought.

4 “(B) A description of the process for re-
5 cruitment and selection of students to partici-
6 pate in such activities.

7 “(C) A description of how such activity or
8 activities may inform programming that en-
9 gages students in grades PREK-8 in STEM.

10 “(D) A description of how such activity or
11 activities may inform programming that pro-
12 motes student academic achievement in STEM.

13 “(E) An evaluation plan that includes, at
14 a minimum, the use of outcome-oriented meas-
15 ures to determine the impact and efficacy of
16 programming being researched.

17 “(4) EVALUATIONS.—Each recipient of a grant
18 under this section shall provide, at the conclusion of
19 every year during which the grant funds are re-
20 ceived, an evaluation in a form prescribed by the Di-
21 rector.

22 “(5) ACCOUNTABILITY AND DISSEMINATION.—

23 “(A) EVALUATION REQUIRED.—The Direc-
24 tor shall evaluate the activities established
25 under this section. Such evaluation shall—

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

4 “(ii) to the extent practicable, inte-
5 grate the findings of the research resulting
6 from the activity or activities funded
7 through the grant with the current re-
8 search on serving students with respect to
9 the pursuit of degrees or careers in STEM,
10 including underrepresented and rural stu-
11 dents, in grades PREK-8.

12 “(B) REPORT ON EVALUATIONS.—Not
13 later than 180 days after the completion of the
14 evaluation under subparagraph (A), the Direc-
15 tor shall submit to Congress and make widely
16 available to the public a report that includes—

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

18 “(ii) any recommendations for admin-
19 istrative and legislative action that could
20 optimize the effectiveness of the program
21 under this section.

22 “(6) COORDINATION.—In carrying out this sec-
23 tion, the Director shall, for purposes of enhancing
24 program effectiveness and avoiding duplication of ac-
25 tivities, consult, cooperate, and coordinate with the

1 programs and policies of other relevant Federal
2 agencies.”.

3 (b) UNDERGRADUATE STEM EDUCATION.—

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

10 (A) encourage greater collaboration and
11 coordination between institutions of higher edu-
12 cation and industry to enhance education, foster
13 hands-on learn experiences, and improve align-
14 ment with workforce needs;

15 (B) understand the current composition of
16 the STEM workforce and the factors that influ-
17 ence growth, retention, and development of that
18 workforce;

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

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

24 (2) ADVANCED TECHNOLOGICAL EDUCATION
25 PROGRAM UPDATE.—Section 3(b) of the Scientific

1 and Advanced-Technology Act of 1992 (42 U.S.C.
2 1862i(b)) is amended to read as follows:

3 “(b) NATIONAL COORDINATION NETWORK FOR
4 SCIENCE AND TECHNICAL EDUCATION.—The Director
5 shall award grants to institutions of higher education,
6 non-profit organizations, and associate-degree granting
7 colleges (or consortia of such institutions or organizations)
8 to establish a network of centers for science and technical
9 education. The centers shall—

10 “(1) coordinate research, training, and edu-
11 cation activities funded by awards under subsection
12 (a) and share information and best practices across
13 the network of awardees;

14 “(2) serve as a national and regional clearing-
15 house and resource to communicate and coordinate
16 research, training, and educational activities across
17 disciplinary, organizational, geographic, and inter-
18 national boundaries and disseminate best practices;
19 and

20 “(3) develop national and regional partnerships
21 between PreK–12 schools, two-year colleges, institu-
22 tions of higher education, workforce development
23 programs, labor organizations, and industry to meet
24 workforce needs.”.

1 (3) INNOVATIONS IN STEM EDUCATION AT COM-
2 MUNITY COLLEGES.—

3 (A) IN GENERAL.—The Director shall
4 award grants on a merit-reviewed, competitive
5 basis to institutions of higher education or non-
6 profit organizations (or consortia of such insti-
7 tutions or organizations) to advance research on
8 the nature of learning and teaching at commu-
9 nity colleges and to improve outcomes for stu-
10 dents who enter the workforce upon completion
11 of their STEM degree or credential or transfer
12 to 4-year institutions, including by—

13 (i) examining how to scale up success-
14 ful programs at Community Colleges that
15 are improving student outcomes in
16 foundational STEM courses;

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

20 (iii) designing and developing new
21 STEM curricula;

22 (iv) providing STEM students with
23 hands-on training and research experi-
24 ences, internships, and other experiential
25 learning opportunities;

1 (v) increasing access to high quality
2 STEM education through new tech-
3 nologies;

4 (vi) re-skilling or up-skilling incum-
5 bent workers for new STEM jobs;

6 (vii) building STEM career and seam-
7 less transfer pathways; and

8 (viii) developing novel mechanisms to
9 identify and recruit talent into STEM pro-
10 grams, in particular talent from groups
11 historically underrepresented in STEM.

12 (B) PARTNERSHIPS.—In carrying out ac-
13 tivities under this paragraph, the Director shall
14 encourage applications to develop, enhance, or
15 expand cooperative STEM education and train-
16 ing partnerships between institutions of higher
17 education, industry, and labor organizations.

18 (c) ADVANCED TECHNOLOGICAL MANUFACTURING
19 ACT.—

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

23 (A) in subsection (a)—

24 (i) in paragraph (3), by striking
25 “science, mathematics, and technology”

1 and inserting “science, technology, engi-
2 neering, and mathematics or STEM”;

3 (ii) in paragraph (4), by inserting
4 “educated” and before “trained”; and

5 (iii) in paragraph (5), by striking
6 “scientific and technical education and
7 training” and inserting “STEM education
8 and training”; and

9 (B) in subsection (b)—

10 (i) in paragraph (2), by striking
11 “mathematics and science” and inserting
12 “STEM fields”; and

13 (ii) in paragraph (4), by striking
14 “mathematics and science instruction” and
15 inserting “STEM instruction”.

16 (2) MODERNIZING REFERENCES TO STEM.—

17 Section 3 of the Scientific and Advanced-Technology
18 Act of 1992 (42 U.S.C. 1862i) is amended—

19 (A) in the section heading, by striking
20 “**SCIENTIFIC AND TECHNICAL EDUCATION**
21 ” and inserting “**STEM EDUCATION**”;

22 (B) in subsection (a)—

23 (i) in the subsection heading, by strik-
24 ing “**SCIENTIFIC AND TECHNICAL EDU-**

1 CATION ” and inserting “STEM EDU-
2 CATION”;

3 (ii) in the matter preceding paragraph
4 (1)—

5 (I) by inserting “and education
6 to prepare the skilled technical work-
7 force to meet workforce demands” be-
8 fore “, and to improve”;

9 (II) by striking “core education
10 courses in science and mathematics”
11 and inserting “core education courses
12 in STEM fields”;

13 (III) by inserting “veterans and
14 individuals engaged in” before “work
15 in the home”; and

16 (IV) by inserting “and on build-
17 ing a pathway from secondary schools,
18 to associate-degree-granting institu-
19 tions, to careers that require technical
20 training” before “, and shall be de-
21 signed”;

22 (iii) in paragraph (1)—

23 (I) by inserting “and study”
24 after “development”; and

1 (II) by striking “core science and
2 mathematics courses” and inserting
3 “core STEM courses”;

4 (iv) in paragraph (2), by striking
5 “science, mathematics, and advanced-tech-
6 nology fields” and inserting “STEM and
7 advanced-technology fields”;

8 (v) in paragraph (3)(A), by inserting
9 “to support the advanced-technology indus-
10 tries that drive the competitiveness of the
11 United States in the global economy” be-
12 fore the semicolon at the end;

13 (vi) in paragraph (4), by striking “sci-
14 entific and advanced-technology fields” and
15 inserting “STEM and advanced-technology
16 fields”; and

17 (vii) in paragraph (5), by striking
18 “advanced scientific and technical edu-
19 cation” and inserting “advanced STEM
20 and advanced-technology”;

21 (C) in subsection (c)—

22 (i) in paragraph (1)—

23 (I) in subparagraph (A)—

24 (aa) in the matter preceding
25 clause (i), by striking “to encour-

1 age” and all that follows through
2 “such means as—” and inserting
3 “to encourage the development of
4 career and educational pathways
5 with multiple entry and exit
6 points leading to credentials and
7 degrees, and to assist students
8 pursuing pathways in STEM
9 fields to transition from asso-
10 ciate-degree-granting colleges to
11 bachelor-degree-granting institu-
12 tions, through such means as—”;

13 (bb) in clause (i), by striking
14 “to ensure” and inserting “to de-
15 velop articulation agreements
16 that ensure”; and

17 (cc) in clause (ii), by strik-
18 ing “courses at the bachelor-de-
19 gree-granting institution” and in-
20 sserting “the career and edu-
21 cational pathways supported by
22 the articulation agreements”;

23 (II) in subparagraph (B)—

24 (aa) in clause (i), by insert-
25 ing “veterans and individuals en-

1 gaged in” before “work in the
2 home”;

3 (bb) in clause (iii)—

4 (AA) by striking “bach-
5 elor’s-degree-granting insti-
6 tutions” and inserting “in-
7 stitutions or work sites”;
8 and

9 (BB) by inserting “or
10 industry internships” after
11 “summer programs”; and

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

14 (III) by striking subparagraph
15 (C);

16 (ii) in paragraph (2)—

17 (I) by striking “mathematics and
18 science programs” and inserting
19 “STEM programs”;

20 (II) by inserting “and, as appro-
21 priate, elementary schools,” after
22 “with secondary schools”;

23 (III) by striking “mathematics
24 and science education” and inserting
25 “STEM education”;

1 (IV) by striking “secondary
2 school students” and inserting “stu-
3 dents at these schools”;

4 (V) by striking “science and ad-
5 vanced-technology fields” and insert-
6 ing “STEM and advanced-technology
7 fields”; and

8 (VI) by striking “agreements
9 with local educational agencies” and
10 inserting “articulation agreements or
11 dual credit courses with local sec-
12 ondary schools, or other means as the
13 Director determines appropriate,”;
14 and

15 (iii) in paragraph (3)—

16 (I) by striking subparagraph (B);

17 (II) by striking “shall—” and all
18 that follows through “establish a” and
19 inserting “shall establish a”;

20 (III) by striking “the fields of
21 science, technology, engineering, and
22 mathematics” and inserting “STEM
23 fields”; and

1 (IV) by striking “; and” and in-
2 serting “, including jobs at Federal
3 and academic laboratories.”;

4 (D) in subsection (d)(2)—

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

7 (ii) in subparagraph (E), by striking
8 the period at the end and inserting a “;
9 and”; and

10 (iii) by adding at the end the fol-
11 lowing:

12 “(F) as appropriate, applications that
13 apply the best practices for STEM education
14 and technical skills education through distance
15 learning or in a simulated work environment, as
16 determined by research described in subsection
17 (f); and”;

18 (E) in subsection (g), by striking the sec-
19 ond sentence;

20 (F) in subsection (h)(1)—

21 (i) in subparagraph (A), by striking
22 “2022” and inserting “2026”;

23 (ii) in subparagraph (B), by striking
24 “2022” and inserting “2026”; and

25 (iii) in subparagraph (C)—

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

4 (II) by striking “2022” and in-
5 serting “2026”;

6 (G) in subsection (i)—

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

8 (ii) by redesignating paragraphs (4)
9 and (5) as paragraphs (3) and (4), respec-
10 tively; and

11 (H) in subsection (j)—

12 (i) by striking paragraph (1) and in-
13 serting the following:

14 “(1) the term advanced-technology includes
15 technological fields such as advanced manufacturing,
16 agricultural-, biological- and chemical-technologies,
17 energy and environmental technologies, engineering
18 technologies, information technologies, micro and
19 nano-technologies, cybersecurity technologies,
20 geospatial technologies, and new, emerging tech-
21 nology areas;”;

22 (ii) in paragraph (4), by striking
23 “separate bachelor-degree-granting institu-
24 tions” and inserting “other entities”;

25 (iii) by striking paragraph (7);

1 (iv) by redesignating paragraphs (8)
2 and (9) as paragraphs (7) and (8), respec-
3 tively;

4 (v) in paragraph (7), as redesignated
5 by subparagraph (D), by striking “and”
6 after the semicolon;

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

9 (I) by striking “mathematics,
10 science, engineering, or technology”
11 and inserting “science, technology, en-
12 gineering, or mathematics”; and

13 (II) by striking the period at the
14 end and inserting “; and”; and

15 (vii) by adding at the end the fol-
16 lowing:

17 “(9) the term skilled technical workforce means
18 workers—

19 “(A) in occupations that use significant
20 levels of science and engineering expertise and
21 technical knowledge; and

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

24 (3) AUTHORIZATION OF APPROPRIATIONS.—

25 Section 5 of the Scientific and Advanced-Technology

1 Act of 1992 (42 U.S.C. 1862j) is amended to read
2 as follows:

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

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

7 (d) GRADUATE STEM EDUCATION.—

8 (1) MENTORING AND PROFESSIONAL DEVELOP-
9 MENT.—

10 (A) MENTORING PLANS.—

11 (i) UPDATE.—Section 7008 of the
12 America Creating Opportunities to Mean-
13 ingfully Promote Excellence in Technology,
14 Education, and Science Act (42 U.S.C.
15 1862o) is amended by—

16 (I) inserting “and graduate stu-
17 dent” after “postdoctoral”; and

18 (II) inserting “The requirement
19 may be satisfied by providing such in-
20 dividuals with access to mentors, in-
21 cluding individuals not listed on the
22 grant.” after “review criterion.”.

23 (ii) EVALUATION.—Not later than 45
24 days after the date of enactment of this
25 Act, the Director shall enter into an agree-

1 ment with a qualified independent organi-
2 zation to evaluate the effectiveness of the
3 postdoctoral mentoring plan requirement
4 for improving mentoring for Foundation-
5 supported postdoctoral researchers.

6 (B) CAREER EXPLORATION.—

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

22 (ii) REVIEW OF PROPOSALS.—In se-
23 lecting grant recipients under this subpara-
24 graph, the Director shall consider, at a
25 minimum—

1 (I) the extent to which the ad-
2 ministrators of the institution are
3 committed to making the proposed ac-
4 tivity a priority; and

5 (II) the likelihood that the insti-
6 tution or organization will sustain or
7 expand the proposed activity effort be-
8 yond the period of the grant.

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

21 (D) PROFESSIONAL DEVELOPMENT SUP-
22 PLEMENT.—The Director shall carry out a five-
23 year pilot initiative to award up to 2,500 ad-
24 ministrative supplements of up to \$2,000 to ex-
25 isting research grants annually, on a competi-

1 tive basis, to support professional development
2 experiences for graduate students and
3 postdoctoral researchers who receive a substan-
4 tial portion of their support under such grants,
5 as determined by the Director. Not more than
6 10 percent of supplements awarded under this
7 subparagraph may be used to support profes-
8 sional development experiences for postdoctoral
9 researchers.

10 (E) GRADUATE EDUCATION RESEARCH.—

11 The Director shall award grants, on a competi-
12 tive basis, to institutions of higher education or
13 non-profit organizations (or consortia of such
14 institutions or organizations) to support re-
15 search on the graduate education system and
16 outcomes of various interventions and policies,
17 including—

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

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

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

4 (II) student debt load;

5 (iii) the development and assessment
6 of new or adapted interventions, including
7 approaches that improve mentoring rela-
8 tionships, develop conflict management
9 skills, and promote healthy research teams;
10 and

11 (iv) research, data collection, and as-
12 sessment of the state of graduate student
13 mental health and wellbeing, factors con-
14 tributing to and consequences of poor
15 graduate student mental health, and the
16 development, adaptation, and assessment
17 of evidence-based strategies and policies to
18 support emotional wellbeing and mental
19 health.

20 (2) GRADUATE RESEARCH FELLOWSHIP PRO-
21 GRAM UPDATE.—

22 (A) SENSE OF CONGRESS.—It is the sense
23 of Congress that the Foundation should in-
24 crease the number of new graduate research fel-

1 lows supported annually over the next 5 years
2 to no fewer than 3,000 fellows.

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

6 (i) in subsection (a), by inserting
7 “and as will address national workforce de-
8 mand in critical STEM fields” after
9 “throughout the United States”;

10 (ii) in subsection (b), by striking “of
11 \$12,000” and inserting “of at least
12 \$16,000”; and

13 (iii) by adding at the end the fol-
14 lowing:

15 “(c) OUTREACH.—The Director shall ensure program
16 outreach to recruit fellowship applicants from fields of
17 study that are in areas of critical national need, from all
18 regions of the country, and from historically underrep-
19 resented populations in STEM.”.

20 (C) CYBERSECURITY SCHOLARSHIPS AND
21 GRADUATE FELLOWSHIPS.—The Director shall
22 ensure that students pursuing master’s degrees
23 and doctoral degrees in fields relating to cyber-
24 security are considered as applicants for schol-
25 arships and graduate fellowships under the

1 Graduate Research Fellowship Program under
2 section 10 of the National Science Foundation
3 Act of 1950 (42 U.S.C. 1869).

4 (3) STUDY ON GRADUATE STUDENT FUND-
5 ING.—

6 (A) IN GENERAL.—Not later than 45 days
7 after the date of enactment of this Act, the Di-
8 rector shall enter into an agreement with a
9 qualified independent organization to evalu-
10 ate—

11 (i) the role of the Foundation in sup-
12 porting graduate student education and
13 training through fellowships, traineeships,
14 and other funding models; and

15 (ii) the impact of different funding
16 mechanisms on graduate student experi-
17 ences and outcomes, including whether
18 such mechanisms have differential impacts
19 on subsets of the student population.

20 (B) REPORT.—Not later than 1 year after
21 the date of enactment of this Act, the organiza-
22 tion charged with carrying out the study under
23 subparagraph (A) shall publish the results of its
24 evaluation, including a recommendation for the

1 appropriate balance between fellowships,
2 traineeships, and other funding models.

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

5 (A) ARTIFICIAL INTELLIGENCE
6 TRAINEESHIPS.—

7 (i) IN GENERAL.—The Director shall
8 award grants to institutions of higher edu-
9 cation to establish traineeship programs
10 for graduate students who pursue artificial
11 intelligence-related research leading to a
12 masters or doctorate degree by providing
13 funding and other assistance, and by pro-
14 viding graduate students opportunities for
15 research experiences in government or in-
16 dustry related to the students' artificial in-
17 telligence studies.

18 (ii) USE OF FUNDS.—A institution of
19 higher education shall use grant funds pro-
20 vided under clause (i) for the purposes
21 of—

22 (I) providing traineeships to stu-
23 dents who are pursuing research in
24 artificial intelligence leading to a mas-
25 ters or doctorate degree;

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

3 (III) creating and requiring
4 courses or training programs in tech-
5 nology ethics for students receiving
6 traineeships;

7 (IV) creating opportunities for
8 research in technology ethics for stu-
9 dents receiving traineeships;

10 (V) establishing scientific intern-
11 ship programs for students receiving
12 traineeships in artificial intelligence at
13 for-profit institutions, nonprofit re-
14 search institutions, or government lab-
15 oratories; and

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

18 (B) ARTIFICIAL INTELLIGENCE FELLOW-
19 SHIPS.—The Director shall award fellowships to
20 masters and doctoral students and postdoctoral
21 researchers who are pursuing degrees or re-
22 search in artificial intelligence and related
23 fields, including in the field of technology eth-
24 ics. In making such awards, the Director shall
25 conduct outreach, including through formal so-

1 licitations, to solicit proposals from students
2 and postdoctoral researchers seeking to carry
3 out research in aspects of technology ethics
4 with relevance to artificial intelligence systems.

5 (e) STEM WORKFORCE DATA.—

6 (1) SKILLED TECHNICAL WORKFORCE PORT-
7 FOLIO REVIEW.—

8 (A) IN GENERAL.—Not later than 1 year
9 after the date of enactment of this Act, the Di-
10 rector shall conduct a full portfolio analysis of
11 the Foundation's skilled technical workforce in-
12 vestments across all Directorates in the areas of
13 education, research, infrastructure, data collec-
14 tion, and analysis.

15 (B) REPORT.—Not later than 180 days
16 after the date of the review under subparagraph
17 (A) is complete, the Director shall submit to
18 Congress and make widely available to the pub-
19 lic a summary report of the portfolio review.

20 (2) SURVEY DATA.—

21 (A) ROTATING TOPIC MODULES.—To meet
22 evolving needs for data on the state of the
23 science and engineering workforce, the Director
24 shall assess, through coordination with other
25 Federal statistical agencies and drawing on

1 input from relevant stakeholders, the feasibility
2 and benefits of incorporating questions or topic
3 modules to existing National Center for Science
4 and Engineering Statistics surveys that would
5 vary from cycle to cycle.

6 (B) NEW DATA.—Not later than 1 year
7 after the date of enactment of this Act, the Di-
8 rector shall submit to Congress and the Board
9 the results of an assessment, carried out in co-
10 ordination with other Federal agencies and with
11 input from relevant stakeholders, of the feasi-
12 bility and benefits of incorporating new ques-
13 tions or topic modules to existing National Cen-
14 ter for Science and Engineering Statistics sur-
15 veys on—

- 16 (i) the skilled technical workforce;
17 (ii) working conditions and work-life
18 balance;
19 (iii) harassment and discrimination;
20 (iv) sexual orientation and gender
21 identity;
22 (v) immigration and emigration; and
23 (vi) any other topics at the discretion
24 of the Director.

1 (C) LONGITUDINAL DESIGN.—The Direc-
2 tor shall continue and accelerate efforts to en-
3 hance the usefulness of National Center for
4 Science and Engineering Statistics survey data
5 for longitudinal research and analysis.

6 (D) GOVERNMENT ACCOUNTABILITY OF-
7 FICE REVIEW.—Not later than 1 year after the
8 date of enactment of this Act, the Comptroller
9 General of the United States shall submit a re-
10 port to Congress that—

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

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

19 (f) CYBER WORKFORCE DEVELOPMENT RESEARCH
20 AND DEVELOPMENT.—

21 (1) IN GENERAL.—The Director shall award
22 grants on a merit-reviewed, competitive basis to in-
23 stitutions of higher education or non-profit organiza-
24 tions (or a consortia of such institutions or organiza-
25 tions) to carry out research on the cyber workforce.

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

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

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

10 (C) understand trends of the cyber work-
11 force, including demographic representation,
12 educational and professional backgrounds
13 present, competencies available, and factors
14 that shape employee recruitment, development,
15 and retention and how to increase the size, di-
16 versity, and capability of the cyber workforce;

17 (D) examine and evaluate training prac-
18 tices, models, programs, and technologies; and

19 (E) other closely related topics as the Di-
20 rector determines appropriate.

21 (3) REQUIREMENTS.—In carrying out the ac-
22 tivities described in paragraph (2), the Director
23 shall—

24 (A) collaborate with the National Institute
25 of Standards and Technology, including the Na-

1 tional Initiative for Cybersecurity Education,
2 the Department of Homeland Security, the De-
3 partment of Defense, the Office of Personnel
4 Management, and other Federal departments
5 and agencies, as appropriate;

6 (B) align with or build on the National
7 Initiative on Cybersecurity Education Cyberse-
8 curity Workforce Framework wherever prac-
9 ticable and applicable;

10 (C) leverage the collective body of knowl-
11 edge from existing cyber workforce development
12 research and education activities; and

13 (D) engage with other Federal depart-
14 ments and agencies, research communities, and
15 potential users of information produced under
16 this subsection.

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

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

21 (A) since cybersecurity risks are constant
22 in the growing digital world, it is critical that
23 the United States stay ahead of malicious cyber
24 activity with a workforce that can safeguard

1 our innovation, research, and work environ-
2 ments; and

3 (B) Federal investments in the Federal
4 Cyber Scholarship-for-Service Program at the
5 National Science Foundation play a critical role
6 in preparing and sustaining a strong, talented,
7 and much-needed national cybersecurity work-
8 force and should be strengthened.

9 (2) IN GENERAL.—Section 302(b)(1) of the Cy-
10 bersecurity Enhancement Act of 2014 (15 U.S.C.
11 7442(b)(1)) is amended by striking the semicolon at
12 the end and inserting the following “and cybersecu-
13 rity-related aspects of other related fields as appro-
14 priate, including artificial intelligence, quantum com-
15 puting and aerospace.”.

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

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

4 (2) utilizes the National Initiative for Cyberse-
5 curity Education (NICE) Cybersecurity Workforce
6 Framework (NIST Special Publication 800–181), or
7 other frameworks, as appropriate, to enable a con-
8 sistent measurement of the cybersecurity workforce;

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

12 (4) consults key stakeholders and the broader
13 community of practice in cybersecurity workforce de-
14 velopment to determine data requirements needed to
15 strengthen the cybersecurity workforce;

16 (5) evaluates existing Federal survey data for
17 information pertinent to developing national esti-
18 mates of the cybersecurity workforce;

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

22 (7) collects statistical data, to the greatest ex-
23 tent practicable, on credential attainment and em-
24 ployment outcomes information for the cybersecurity
25 workforce.

1 **SEC. 6. BROADENING PARTICIPATION.**

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

4 (1) IN GENERAL.—Section 117(a) of the Na-
5 tional Science Foundation Authorization Act of 1988
6 (42 U.S.C.1881b(a)) is amended—

7 (A) in subparagraph (B)—

8 (i) by striking “108” and inserting
9 “110”;

10 (ii) by striking clause (iv);

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

13 (iv) by redesignating clauses (i), (ii),
14 (iii), and (v) as subclauses (I), (II), (III),
15 and (IV), respectively, and moving the
16 margins of such subclauses (as so redesign-
17 ated) two ems to the right; and

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

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

23 “(i) at least two teachers—”; and

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

1 “(ii) at least one teacher—
2 “(I) from the Commonwealth of the North-
3 ern Mariana Islands;
4 “(II) from American Samoa;
5 “(III) from the Virgin Islands of the
6 United States; and
7 “(IV) from Guam.”.

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

12 (b) ROBERT NOYCE TEACHER SCHOLARSHIP PRO-
13 GRAM UPDATE.—

14 (1) SENSE OF CONGRESS.—It is the sense of
15 Congress that over the next five years the Founda-
16 tion should increase the number of scholarships
17 awarded under the Robert Noyce Teacher Scholar-
18 ship program established under section 10 of the
19 National Science Foundation Authorization Act of
20 2002 (42 U.S.C. 1862n–1) by 50 percent.

21 (2) OUTREACH.—To increase the diversity of
22 participants, the Director shall support symposia, fo-
23 rums, conferences, and other activities to expand
24 and enhance outreach to—

1 (A) historically Black colleges and univer-
2 sities that are part B institutions, as defined in
3 section 322(2) of the Higher Education Act of
4 1965 (20 U.S.C. 1061(2));

5 (B) Tribal Colleges or Universities;

6 (C) Minority serving institutions;

7 (D) institutions of higher education that
8 are located near or serve rural communities;

9 (E) labor organizations;

10 (F) emerging research institutions; and

11 (G) higher education programs that serve
12 or support veterans.

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

23 (d) BROADENING PARTICIPATION ON MAJOR FACILI-
24 TIES AWARDS.—The Director shall require organizations
25 seeking a cooperative agreement for the management of

1 the operations and maintenance of a Foundation project
2 to demonstrate prior experience and current capabilities
3 in employing best practices in broadening participation in
4 science and engineering and ensure implementation of
5 such practices is considered in oversight of the award.

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

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

20 (2) require awardees funded under paragraph
21 (1) to direct no less than 25 percent of the total
22 award to one or more emerging research institutions
23 to build research capacity, including through support
24 for faculty salaries and training, field and laboratory
25 research experiences for undergraduate and grad-

1 uate students, and maintenance and repair of re-
2 search equipment and instrumentation;

3 (3) require awardees funded under paragraph
4 (1) to report on the partnership activities as part of
5 the annual reporting requirements of the Founda-
6 tion;

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

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

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

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

19 (f) TRIBAL COLLEGES AND UNIVERSITIES PROGRAM
20 UPDATE.—

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

24 (A) in subsection (a) by—

1 (i) striking “Native American” and
2 inserting “American Indian, Alaska Na-
3 tive, and Native Hawaiian”; and

4 (ii) inserting “post-secondary creden-
5 tials and” before “associate’s”; and

6 (iii) striking “or baccalaureate de-
7 grees” and inserting “, baccalaureate, and
8 graduate degrees”; and

9 (B) in subsection (b) by striking “under-
10 graduate”; and

11 (C) in subsection (c) by inserting “and
12 STEM” after “laboratory”.

13 (2) AUTHORIZATION OF APPROPRIATIONS.—

14 There is authorized to be appropriated to the Direc-
15 tor to carry out this program \$107,250,000 for fis-
16 cal year 2022 through fiscal year 2026.

17 (g) DIVERSITY IN TECH RESEARCH.—The Director
18 shall award grants, on a competitive basis, to institutions
19 of higher education or non-profit organizations (or con-
20 sortia of such institutions or organizations) to support
21 basic and applied research that yields a scientific evidence
22 base for improving the design and emergence, development
23 and deployment, and management and ultimate effective-
24 ness of organizations of all kinds, including research re-

1 lated to diversity, equity, and inclusion in the technology
2 sector.

3 (h) CONTINUING SUPPORT FOR EPSCoR.—

4 (1) SENSE OF CONGRESS.—

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

7 (i) since maintaining the Nation’s sci-
8 entific and economic leadership requires
9 the participation of talented individuals na-
10 tionwide, EPSCoR investments into State
11 research and education capacities are in
12 the Federal interest and should be sus-
13 tained; and

14 (ii) EPSCoR should maintain its ex-
15 perimental component by supporting inno-
16 vative methods for improving research ca-
17 pacity and competitiveness.

18 (B) DEFINITION OF EPSCoR.—In this sub-
19 section, the term “EPSCoR” has the meaning
20 given the term in section 502 of the America
21 COMPETES Reauthorization Act of 2010 (42
22 U.S.C. 1862p note).

23 (2) UPDATE OF EPSCoR.—Section 517(f)(2) of
24 the America COMPETES Reauthorization Act of
25 2010 (42 U.S.C. 1862p–9(f)(2)) is amended—

1 (A) in subparagraph (A), by striking
2 “and” at the end; and

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

4 “(C) to increase the capacity of rural com-
5 munities to provide quality STEM education
6 and STEM workforce development program-
7 ming to students, and teachers; and”.

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

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

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

1 (3) PURPOSE.—The program established in
2 paragraph (1) shall be focused on achieving simulta-
3 neous impacts at the student, faculty, and institu-
4 tional levels by increasing the research capacity at
5 eligible institutions and the number of under-
6 graduate and graduate students pursuing STEM de-
7 grees from eligible institutions.

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

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

19 (B) require applicants to identify dis-
20 ciplines and focus areas in which the eligible in-
21 stitution can excel, and explain how the appli-
22 cant will use the award to build capacity to bol-
23 ster the institutional research competitiveness
24 of eligible entities to support grants awarded by

1 the Foundation and increase regional and na-
2 tional capacity in STEM;

3 (C) require the awards funded under this
4 subsection to support research and related ac-
5 tivities, which may include—

6 (i) development or expansion of re-
7 search programs in disciplines and focus
8 areas in subparagraph (B);

9 (ii) faculty recruitment and profes-
10 sional development in disciplines and focus
11 areas in subparagraph (B), including for
12 early-career researchers;

13 (iii) stipends for undergraduate and
14 graduate students participating in research
15 in disciplines and focus areas in subpara-
16 graph (B);

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

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

23 (vi) administrative research develop-
24 ment support; and

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

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

7 (5) ADDITIONAL CONSIDERATIONS.—In award-
8 ing a grant under this subsection, the Director may
9 also consider—

10 (A) the extent to which the applicant will
11 support students from diverse backgrounds, in-
12 cluding first-generation undergraduate stu-
13 dents;

14 (B) the geographic and institutional diver-
15 sity of the applying institutions; and

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

19 (6) DUPLICATION.—The Director shall ensure
20 the awards made under this subsection are com-
21plementary and not duplicative of existing programs;

22 (7) REPORT.—The Director shall submit a re-
23port to Congress after the third year of the program
24that includes—

1 (A) an assessment of the effectiveness of
2 the program for growing the geographic and in-
3 stitutional diversity of institutions of higher
4 education receiving research awards from the
5 Foundation;

6 (B) an assessment of the quality, quantity
7 and geographic and institutional diversity of in-
8 stitutions of higher education conducting Foun-
9 dation-sponsored research since the establish-
10 ment of the program in this subsection;

11 (C) an assessment of the quantity and di-
12 versity of undergraduate and graduate students
13 graduating from eligible institutions with
14 STEM degrees; and

15 (D) statistical summary data on the pro-
16 gram, including the geographic and institutional
17 allocation of award funding, the number and di-
18 versity of supported graduate and under-
19 graduate students, and how it contributes to ca-
20 pacity building at eligible entities.

21 (8) AUTHORIZATION OF APPROPRIATIONS.—

22 There is authorized to be appropriated to the Direc-
23 tor \$150,000,000 for each of the fiscal years 2022
24 through 2026 to carry out the activities under this
25 subsection.

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

3 (1) IN GENERAL.—The Director shall make
4 awards, on a competitive basis, to eligible institu-
5 tions described in paragraph (2) to support the mis-
6 sion of the Foundation and to build institutional re-
7 search capacity at eligible institutions.

8 (2) ELIGIBLE INSTITUTION.—

9 (A) IN GENERAL.—To be eligible to receive
10 an award under this subsection, an institu-
11 tion—

12 (i) shall be—

13 (I) a historically Black college or
14 university;

15 (II) a Tribal College or Univer-
16 sity;

17 (III) a minority-serving institu-
18 tion; or

19 (IV) an institution of higher edu-
20 cation with an established STEM ca-
21 pacity building program focused on
22 traditionally underrepresented popu-
23 lations in STEM, including Native
24 Hawaiians, Alaska Natives, and Indi-
25 ans; and

1 (ii) shall have not more than
2 \$50,000,000 in annual federally-financed
3 research and development expenditures for
4 science and engineering as reported
5 through the National Science Foundation
6 Higher Education Research and Develop-
7 ment Survey.

8 (B) PARTNERSHIPS.—An eligible institu-
9 tion receiving a grant under this subsection
10 may carry out the activities of the grant
11 through a partnership with other entities, in-
12 cluding community colleges and other eligible
13 institutions.

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

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

1 (B) enhance institutional resources to pro-
2 vide administrative research development sup-
3 port to faculty at an eligible institution;

4 (C) bolster the institutional research com-
5 petitiveness of an eligible institution to support
6 grants awarded by the Foundation;

7 (D) support the acquisition of instrumen-
8 tation necessary to build research capacity at
9 an eligible institution in research areas directly
10 associated with the Foundation;

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

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

18 (G) provide student engagement and re-
19 search training opportunities at the under-
20 graduate, graduate, and postdoctoral levels at
21 an eligible institution;

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

1 (I) address plans and prospects for long-
2 term sustainability of institutional enhance-
3 ments at an eligible institution resulting from
4 the award including, if applicable, how the
5 award may be leveraged by an eligible institu-
6 tion to build a broader base of support.

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

10 (5) AUTHORIZATION OF APPROPRIATIONS.—
11 There are authorized to be appropriated to the Di-
12 rector \$100,000,000 for each of fiscal years 2022
13 through 2026 to carry out the activities in this Act.

14 (k) CHIEF DIVERSITY OFFICER OF THE NSF.—

15 (1) CHIEF DIVERSITY OFFICER.—

16 (A) APPOINTMENT.—The Director shall
17 appoint a senior agency official within the Of-
18 fice of the Director as a Chief Diversity Officer.

19 (B) QUALIFICATIONS.—The Chief Diver-
20 sity Officer shall have significant experience,
21 within the Federal Government and the science
22 community, with diversity- and inclusion-related
23 matters, including—

24 (i) civil rights compliance;

1 (ii) harassment policy, reviews, and
2 investigations;

3 (iii) equal employment opportunity;
4 and

5 (iv) disability policy.

6 (C) OVERSIGHT.—The Chief Diversity Of-
7 ficer shall direct the Office of Diversity and In-
8 clusion of the Foundation and report directly to
9 the Director in the performance of the duties of
10 the Chief Diversity Officer under this sub-
11 section.

12 (2) DUTIES.—The Chief Diversity Officer is re-
13 sponsible for providing advice on policy, oversight,
14 guidance, and coordination with respect to matters
15 of the Foundation related to diversity and inclusion,
16 including ensuring the geographic diversity of the
17 Foundation programs. Other duties may include—

18 (A) establishing and maintaining a stra-
19 tegic plan that publicly states a diversity defini-
20 tion, vision, and goals for the Foundation;

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

23 (i) directly linked to key organiza-
24 tional priorities and goals;

25 (ii) actionable; and

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

3 (C) advising in the establishment of a stra-
4 tegic plan for diverse participation by individ-
5 uals and institutions of higher education, in-
6 cluding community colleges, historically Black
7 colleges and universities, Tribal colleges or uni-
8 versities, minority-serving institutions, institu-
9 tions of higher education with an established
10 STEM capacity building program focused on
11 traditionally underrepresented populations in
12 STEM, including Native Hawaiians, Alaska
13 Natives, and Indians, and institutions from ju-
14 risdictions eligible to participate under section
15 113 of the National Science Foundation Au-
16 thorization Act of 1988 (42 U.S.C. 1862g);

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

21 (E) advising on a diversity and inclusion
22 strategy for the Foundation's portfolio of PreK-
23 12 STEM education focused programs and ac-
24 tivities, including goals for addressing barriers
25 to participation;

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

4 (G) performing such additional duties and
5 exercise such powers as the Director may pre-
6 scribe.

7 (3) FUNDING.—From any amounts appro-
8 priated for the Foundation for each of fiscal years
9 2022 through 2026, the Director shall allocate
10 \$5,000,000 to carry out this subsection for each
11 such year.

12 **SEC. 7. FUNDAMENTAL RESEARCH.**

13 (a) DEFINITIONS.—In this section:

14 (1) COVERED INDIVIDUAL.—The term “covered
15 individual” means the principal investigator, co-prin-
16 cipal investigators, and any other person at the in-
17 stitution who is responsible for the design, conduct,
18 or reporting of research or educational activities
19 funded or proposed for funding by the Foundation.

20 (2) FOREIGN COUNTRY OF CONCERN.—The
21 term “foreign country of concern” means the Peo-
22 ple's Republic of China, the Democratic People's Re-
23 public of Korea, the Russian Federation, the Islamic
24 Republic of Iran, or any other country deemed to be

1 a country of concern as determined by the Depart-
2 ment of State.

3 (3) MALIGN FOREIGN GOVERNMENT TALENT
4 RECRUITMENT PROGRAM.—The term “malign for-
5 eign government talent recruitment program” means
6 any program or activity that includes compensation,
7 including cash, research funding, honorific titles,
8 promised future compensation, or other types of re-
9 munerations, provided by the foreign state or an enti-
10 ty sponsored by the foreign state to the targeted in-
11 dividual in exchange for the individual transferring
12 knowledge and expertise to the foreign country.

13 (b) BROADER IMPACTS.—

14 (1) ASSESSMENT.—Not later than 45 days
15 after the date of enactment of this Act, the Director
16 shall enter into an agreement with a qualified inde-
17 pendent organization to assess how the Broader Im-
18 pacts review criterion is applied across the Founda-
19 tion and make recommendations for improving the
20 effectiveness for meeting the goals established in sec-
21 tion 526 of the America Creating Opportunities to
22 Meaningfully Promote Excellence in Technology,
23 Education, and Science Reauthorization Act of 2010
24 (42 U.S.C. 1862p-14).

1 (2) ACTIVITIES.—The Director shall award
2 grants on a competitive basis, to institutions of high-
3 er education or non-profit organizations (or con-
4 sortia of such institutions or organizations) to sup-
5 port activities to increase the efficiency, effective-
6 ness, and availability of resources for implementing
7 the Broader Impacts review criterion, including—

8 (A) training and workshops for program
9 officers, merit review panelists, grant office ad-
10 ministrators, faculty, and students to improve
11 understanding of the goals and the full range of
12 potential broader impacts available to research-
13 ers to satisfy this criterion;

14 (B) repositories and clearinghouses for
15 sharing best practices and facilitating collabora-
16 tion; and

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

19 (c) SENSE OF CONGRESS.—It is the sense of Con-
20 gress that the Director should continue to identify oppor-
21 tunities to reduce the administrative burden on research-
22 ers.

23 (d) RESEARCH INTEGRITY AND SECURITY.—

24 (1) OFFICE OF RESEARCH SECURITY AND POL-
25 ICY.—The Director shall maintain a Research Secu-

1 rity and Policy office within the Office of the Direc-
2 tor with no fewer than 4 full-time equivalent posi-
3 tions, in addition to the Chief of Research Security
4 established in paragraph (2) of this subsection. The
5 functions of the Research Security and Policy office
6 shall be to coordinate all research security policy
7 issues across the Foundation, including by—

8 (A) consulting and coordinating with the
9 Foundation Office of Inspector General and
10 with other Federal research agencies and intel-
11 ligence and law enforcement agencies, as appro-
12 priate, through the National Science and Tech-
13 nology Council in accordance with the authority
14 provided under section 1746 of the National
15 Defense Authorization Act for Fiscal Year 2020
16 (Public Law 116–92; 42 U.S.C. 6601 note), to
17 identify and address potential security risks
18 that threaten research integrity and other risks
19 to the research enterprise;

20 (B) serving as the Foundation’s primary
21 resource for all issues related to the security
22 and integrity of the conduct of Foundation-sup-
23 ported research;

1 (C) conducting outreach and education ac-
2 tivities for awardees on research policies and
3 potential security risks;

4 (D) educating Foundation program man-
5 agers and other directorate staff on evaluating
6 Foundation awards and awardees for potential
7 security risks; and

8 (E) communicating reporting and disclo-
9 sure requirements to awardees and applicants
10 for funding.

11 (2) CHIEF OF RESEARCH SECURITY.—The Di-
12 rector shall appoint a senior agency official within
13 the Office of the Director as a Chief of Research Se-
14 curity, whose primary responsibility is to manage the
15 office established under paragraph (1).

16 (3) REPORT TO CONGRESS.—No later than 180
17 days after the date of enactment of this Act, the Di-
18 rector shall provide a report to the Committee on
19 Science, Space, and Technology of the House of
20 Representatives, the Committee on Commerce,
21 Science, and Transportation of the Senate, the Com-
22 mittee on Appropriations of the House of Represent-
23 atives, and the Committee on Appropriations of the
24 Senate on the resources and the number of full time

1 employees needed to carry out the functions of the
2 Office established in paragraph (1).

3 (4) ONLINE RESOURCE.—The Director shall de-
4 velop an online resource hosted on the Foundation’s
5 website containing up-to-date information, tailored
6 for institutions and individual researchers, includ-
7 ing—

8 (A) an explanation of Foundation research
9 security policies;

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

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

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

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

24 (5) RISK ASSESSMENT CENTER.—The Director
25 shall enter into an agreement with a qualified inde-

1 pendent organization to create a new risk assess-
2 ment center to—

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

5 (B) help awardees in assessing and identi-
6 fying issues related to nondisclosure of current
7 and pending research funding, risks to the
8 Foundation merit review process, and other
9 issues that may negatively affect the Founda-
10 tion proposal and award process due to undue
11 foreign interference.

12 (6) RESEARCH GRANTS.—The Director shall
13 continue to award grants, on a competitive basis, to
14 institutions of higher education or non-profit organi-
15 zations (or consortia of such institutions or organi-
16 zations) to support research on the conduct of re-
17 search and the research environment, including re-
18 search on research misconduct or breaches of re-
19 search integrity and detrimental research practices.

20 (7) AUTHORITIES.—

21 (A) IN GENERAL.—In addition to existing
22 authorities for preventing waste, fraud, abuse,
23 and mismanagement of federal funds, the Di-
24 rector, acting through the Office of Research
25 Security and Policy and in coordination with

1 the Foundation's Office of Inspector General,
2 shall have the authority to—

3 (i) conduct risk assessments, including
4 through the use of open-source analysis
5 and analytical tools, of research and devel-
6 opment award applications and disclosures
7 to the Foundation, in coordination with the
8 Risk Assessment Center established in
9 paragraph (5);

10 (ii) request the submission to the
11 Foundation, by an institution of higher
12 education or other organization applying
13 for a research and development award, of
14 supporting documentation, including copies
15 of contracts, grants, or any other agree-
16 ment specific to foreign appointments, em-
17 ployment with a foreign institution, partici-
18 pation in a foreign talent program and
19 other information reported as current and
20 pending support for all covered individuals
21 in a research and development award ap-
22 plication; and

23 (iii) upon receipt and review of the in-
24 formation provided under clause (ii) and in
25 consultation with the institution of higher

1 education or other organization submitting
2 such information, initiate the substitution
3 or removal of a covered individual from a
4 research and development award, reduce
5 the award funding amount, or suspend or
6 terminate the award if the Director deter-
7 mines such contracts, grants, or agree-
8 ments include obligations that—

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

12 (II) create duplication with
13 Foundation-supported activities.

14 (B) LIMITATIONS.—In exercising the au-
15 thorities under this paragraph, the Director
16 shall—

17 (i) take necessary steps, as prac-
18 ticable, to protect the privacy of all covered
19 individuals and other parties involved in
20 the application and disclosure assessments
21 under clause (A)(i);

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

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

3 (iv) as practicable, afford subjects an
4 opportunity to provide comments and re-
5 buttal and an opportunity to appeal before
6 final administrative action is taken.

7 (8) MALIGN FOREIGN TALENT RECRUITMENT
8 PROGRAM PROHIBITION.—

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

14 (i) each covered individual listed on
15 the application for a research and develop-
16 ment award certify that they are not an
17 active participant of a malign foreign tal-
18 ent recruitment program from a foreign
19 country of concern and will not be a par-
20 ticipant in such a program for the duration
21 of the award; and

22 (ii) each institution of higher edu-
23 cation or other organization applying for
24 such an award certify that each covered in-
25 dividual who is employed by the institution

1 of higher education or other organization
2 has been made aware of the requirement
3 under this subsection.

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

7 (i) making scholarly presentations re-
8 garding scientific information not other-
9 wise controlled under current law;

10 (ii) participation in international con-
11 ferences or other international exchanges,
12 partnerships or programs that involve open
13 and reciprocal exchange of scientific infor-
14 mation, and which are aimed at advancing
15 international scientific understanding; and

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

18 (C) LIMITATION.—The policy developed
19 under subparagraph (A) shall not apply retro-
20 actively to research and development awards
21 made prior to the establishment of the policy by
22 the Director.

23 (9) SECURITY TRAINING MODULES.—

24 (A) IN GENERAL.—Not later than 90 days
25 after the date of enactment of this Act, the Di-

1 rector, in collaboration with the Director of the
2 National Institutes of Health and other relevant
3 Federal research agencies, shall enter into an
4 agreement or contract with a qualified entity
5 for the development of online research security
6 training modules for the research community,
7 including modules focused on international col-
8 laboration and international travel, foreign in-
9 terference, and rules for proper use of funds,
10 disclosure, conflict of commitment, and conflict
11 of interest.

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

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

1 (i) develops modules that can be
2 adapted and utilized across Federal re-
3 search agencies; and

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

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

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

24 (i) each covered individual listed on
25 the application for a research and develop-

1 ment award certify that they have com-
2 pleted research security training that
3 meets the guidelines developed under
4 clause (D) within one year of the applica-
5 tion; and

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

13 (10) RESPONSIBLE CONDUCT IN RESEARCH
14 TRAINING.—Section 7009 of the America Creating
15 Opportunities to Meaningfully Promote Excellence in
16 Technology, Education, and Science Act (42 U.S.C.
17 1862o-1) is amended by—

18 (A) striking “and postdoctoral research-
19 ers” and inserting “postdoctoral researchers,
20 faculty, and other senior personnel”; and

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

23 (11) NATIONAL ACADEMIES GUIDE TO RESPON-
24 SIBLE CONDUCT IN RESEARCH.—

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

8 (i) updated professional standards of
9 conduct in research;

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

19 (iii) promising practices for mitigating
20 potential security risks that threaten re-
21 search integrity.

22 (B) REPORT.—Not later than 18 months
23 after the effective date of the agreement under
24 subparagraph (A), the Academies, as part of
25 such agreement, shall submit to the Director

1 and the Committee on Science, Space, and
2 Technology of the House of Representatives
3 and the Committee on Commerce, Science, and
4 Transportation of the Senate the report re-
5 ferred to in such subparagraph, as updated pur-
6 suant to such subparagraph.

7 (e) RESEARCH ETHICS.—

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

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

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

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

24 (D) the Foundation should continue to
25 work with stakeholders to understand and

1 adopt policies that promote best practices for
2 governance of research in emerging technologies
3 at every stage of research.

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

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

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

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

4 (3) GUIDANCE.—The Director shall solicit
5 stakeholder input to develop clear guidance on what
6 constitutes a foreseeable or quantifiable risk as de-
7 scribed in paragraph (2)(A), and to the extent prac-
8 ticable harmonize this policy with existing ethical
9 policies or related requirements for human subjects.

10 (4) RESEARCH.—The Director shall award
11 grants, on a competitive basis, to institutions of
12 higher education or non-profit organizations (or con-
13 sortia of such institutions or organizations) to sup-
14 port—

15 (A) research to assess the potential ethical
16 and societal implications of Foundation-sup-
17 ported research and products or technologies
18 enabled by such research, including the benefits
19 and risks identified pursuant to paragraph
20 (2)(A); and

21 (B) the development and verification of ap-
22 proaches to proactively mitigate foreseeable
23 risks to society, including the technical and so-
24 cial solutions identified pursuant to paragraph
25 (2)(B).

1 (5) ANNUAL REPORT.—The Director shall en-
2 courage awardees to update their ethics statements
3 as appropriate as part of the annual reports re-
4 quired by all awardees under the award terms and
5 conditions.

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

12 (1) DATA MANAGEMENT PLANS.—

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

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

22 (i) provide necessary resources, in-
23 cluding trainings and workshops, to edu-
24 cate researchers and students on how to

1 develop and review high quality data man-
2 agement plans;

3 (ii) ensure program officers and merit
4 review panels are equipped with the re-
5 sources and training necessary to review
6 the quality of data management plans; and

7 (iii) ensure program officers and
8 merit review panels treat data management
9 plans as essential elements of grant pro-
10 posals, where appropriate.

11 (2) OPEN REPOSITORIES.—The Director
12 shall—

13 (A) coordinate with the heads of other
14 Federal research agencies, and solicit input
15 from the scientific community, to develop and
16 widely disseminate a set of criteria for trusted
17 open repositories, accounting for discipline-spe-
18 cific needs and necessary protections for sen-
19 sitive information, to be used by Federally
20 funded researchers for the sharing of data, soft-
21 ware, and code;

22 (B) work with stakeholders to identify sig-
23 nificant gaps in available repositories meeting
24 the criteria developed under subparagraph (A)

1 and options for supporting the development of
2 additional or enhanced repositories;

3 (C) award grants on a competitive basis to
4 institutions of higher education or non-profit
5 organizations (or consortia of such institutions
6 or organizations) for the development, up-
7 grades, and maintenance of open data reposi-
8 tories that meet the criteria developed under
9 subparagraph (A);

10 (D) work with stakeholders and build on
11 existing models, where appropriate, to establish
12 a single, public, web-based point of access to
13 help users locate repositories storing data, soft-
14 ware, and code resulting from or used in Foun-
15 dation-supported projects;

16 (E) work with stakeholders to establish the
17 necessary policies and procedures and allocate
18 the necessary resources to ensure, as prac-
19 ticable, data underlying published findings re-
20 sulting from Foundation-supported projects are
21 deposited in repositories meeting the criteria
22 developed under subparagraph (A) at the time
23 of publication;

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

4 (G) coordinate with the scientific pub-
5 lishing community to develop uniform consensus
6 standards around data archiving and sharing.

7 (3) RESEARCH, DEVELOPMENT, AND EDU-
8 CATION.—The Director shall award grants, on a
9 competitive basis to institutions of higher education
10 or non-profit organizations (or consortia of such in-
11 stitutions or organizations) to—

12 (A) support research and development of
13 open source, sustainable, usable tools and infra-
14 structure that support reproducibility for a
15 broad range of studies across different dis-
16 ciplines;

17 (B) support research on computational re-
18 producibility, including the limits of reproduc-
19 ibility and the consistency of computational re-
20 sults in the development of new computation
21 hardware, tools, and methods; and

22 (C) support the education and training of
23 students, faculty, and researchers on computa-
24 tional methods, tools, and techniques to improve
25 the quality and sharing of data, code, and sup-

1 porting metadata to produce reproducible re-
2 search.

3 (g) CLIMATE CHANGE RESEARCH.—

4 (1) IN GENERAL.—The Director shall award
5 grants, on a competitive basis, to institutions of
6 higher education or non-profit organizations (or con-
7 sortia of such institutions or organizations) to sup-
8 port research to improve our understanding of the
9 climate system and related human and environ-
10 mental systems.

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

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

17 (B) research on climate-related human be-
18 haviors and institutions;

19 (C) research on climate-related risk, vul-
20 nerability, resilience, and adaptive capacity of
21 coupled human-environment systems, including
22 risks to ecosystem stability and risks to vulner-
23 able populations;

24 (D) research to support the development
25 and implementation of effective strategies and

1 tools for mitigating and adapting to climate
2 change, including social strategies and research
3 focused on local level forecasting, impacts, and
4 challenges;

5 (E) research on the design, development,
6 and assessment of effective information and de-
7 cision-support systems, including understanding
8 and developing effective dissemination path-
9 ways;

10 (F) improved modeling, projections, anal-
11 yses, and assessments of climate and other
12 Earth system changes;

13 (G) research to understand the atmos-
14 pheric processes related to solar radiation man-
15 agement strategies and technologies and exam-
16 ine related economic, geopolitical, societal, envi-
17 ronmental, and ethical implications, not includ-
18 ing research designed to advance future deploy-
19 ment of these strategies and technologies.

20 (H) the development of effective strategies
21 for educating and training future climate
22 change researchers, and climate change re-
23 sponse and mitigation professionals, in both re-
24 search and development methods, as well as

1 community engagement and science commu-
2 nication;

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

7 (J) partnerships with other agencies to ad-
8 dress climate related challenges for specific
9 agency missions.

10 (h) VIOLENCE RESEARCH.—

11 (1) IN GENERAL.—The Director shall award
12 grants, on a competitive basis, to institutions of
13 higher education or non-profit organizations (or con-
14 sortia of such institutions or organizations) to sup-
15 port research to improve our understanding of the
16 nature, scope, causes, consequences, prevention, and
17 response to all forms of violence.

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

20 (A) research on the magnitude and dis-
21 tribution of fatal and nonfatal violence;

22 (B) research on risk and protective factors;

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

1 (D) research on scaling up effective inter-
2 ventions; and

3 (E) one or more interdisciplinary research
4 centers to conduct violence research, foster new
5 and expanded collaborations, and support ca-
6 pacity building activities to increase the number
7 and diversity of new researchers trained in
8 cross-disciplinary violence research.

9 (i) SOCIAL, BEHAVIORAL, AND ECONOMIC
10 SCIENCES.—The Director shall—

11 (1) actively communicate opportunities and so-
12 licit proposals for social, behavioral, and economic
13 science researchers to participate in cross-cutting
14 and interdisciplinary programs, including the Con-
15 vergence Accelerator and agency priority activities,
16 and the Mid-Scale Research Infrastructure program;
17 and

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

21 (j) MEASURING IMPACTS OF FEDERALLY FUNDED
22 R&D.—The Director shall award grants on a competitive,
23 merit-reviewed basis to institutions of higher education or
24 non-profit organizations (or consortia of such institutions
25 or organizations) to support research and development of

1 data, models, indicators, and associated analytical tools to
2 improve our understanding of the impacts of Federally
3 funded research on society, the economy, and the work-
4 force, including domestic job creation.

5 (k) FOOD-ENERGY-WATER RESEARCH.—The Direc-
6 tor shall award grants on a competitive basis to institu-
7 tions of higher education or non-profit organizations (or
8 consortia of such institutions or organizations) to—

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

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

17 (3) support research that will lead to innovative
18 solutions to critical food-energy-water system prob-
19 lems; and

20 (4) grow the scientific workforce capable of
21 studying and managing the food-energy-water sys-
22 tem, through education and other professional devel-
23 opment.

24 (l) BIOLOGICAL FIELD STATIONS AND MARINE LAB-
25 ORATORIES.—The Director shall continue to support en-

1 hancing, repairing and maintaining research instrumenta-
2 tion, laboratories, telecommunications and housing at bio-
3 logical field stations and marine laboratories.

4 (m) SUSTAINABLE CHEMISTRY RESEARCH AND EDU-
5 CATION.—In accordance with section 263 of the National
6 Defense Authorization Act for Fiscal Year 2021, the Di-
7 rector shall carry out activities in support of sustainable
8 chemistry, including—

9 (1) establishing a program to award grants, on
10 a competitive basis, to institutions of higher edu-
11 cation or non-profit organizations (or consortia of
12 such institutions or organizations) to support—

13 (A) individual investigators and teams of
14 investigators, including to the extent prac-
15 ticable, early career investigators for research
16 and development;

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

20 (C) integrating sustainable chemistry prin-
21 ciples into elementary, secondary, under-
22 graduate, and graduate chemistry and chemical
23 engineering curriculum and research training,
24 as appropriate to that level of education and
25 training; and

1 (2) incorporating sustainable chemistry into ex-
2 isting Foundation research and development pro-
3 grams.

4 (n) RISK AND RESILIENCE RESEARCH.—The Direc-
5 tor shall award grants on a competitive basis to institu-
6 tions of higher education or non-profit organizations (or
7 consortia of such institutions or organizations) to advance
8 knowledge of risk assessment and predictability and to
9 support the creation of tools and technologies, including
10 advancing data analytics and utilization of artificial intel-
11 ligence, for increased resilience through—

12 (1) improvements in our ability to understand,
13 model, and predict extreme events and natural haz-
14 ards, including pandemics;

15 (2) the creation of novel engineered systems so-
16 lutions for resilient complex infrastructures, particu-
17 larly those that address critical interdependence
18 among infrastructures and leverage the growing in-
19 fusion of cyber-physical-social components into the
20 infrastructures;

21 (3) development of equipment and instrumenta-
22 tion for innovation in resilient engineered infrastruc-
23 tures;

24 (4) multidisciplinary research on the behaviors
25 individuals and communities engage in to detect,

1 perceive, understand, predict, assess, mitigate, and
2 prevent risks and to improve and increase resilience.

3 (5) advancements in multidisciplinary wildfire
4 science, including those related to air quality im-
5 pacts, human behavior, and early detection and
6 warning; and

7 (o) UAV TECHNOLOGIES.—The Director shall carry
8 out a program of research and related activities for un-
9 manned aerial vehicle technologies, which may include a
10 prize competition pursuant to section 24 of the Stevenson-
11 Wydler Technology Innovation Act of 1980 (15 U.S.C.
12 3719) and support for undergraduate and graduate cur-
13 riculum development.

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

24 (q) BIOLOGICAL RESEARCH COLLECTIONS.—

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

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

20 (3) ACTION CENTER FOR BIOLOGICAL COLLEC-
21 TIONS.—The Director shall award grants on a com-
22 petitive basis to institutions of higher education or
23 non-profit organizations (or consortia of such insti-
24 tutions or organizations) to establish an Action Cen-
25 ter for Biological Collections to facilitate coordina-

1 tion and data sharing among communities of prac-
2 tice for research, education, workforce training, eval-
3 uation, and business model development.

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

9 (1) support transdisciplinary research to signifi-
10 cantly advance our understanding of water avail-
11 ability, quality, and dynamics and the impact of
12 human activity and a changing climate on urban and
13 rural water and wastewater systems;

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

22 (3) grow the scientific workforce capable of
23 studying and managing water and wastewater sys-
24 tems, through education, training, and other profes-
25 sional development.

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

4 (1) increase understanding of social media and
5 consumer technology access and use patterns and re-
6 lated psychological and behavioral issues, particu-
7 larly for adolescents; and

8 (2) explore the role of social media and con-
9 sumer technology in rising rates of depressive symp-
10 toms, suicidal ideation, drug use, and deaths of de-
11 spair, particularly for communities experiencing
12 long-term economic distress.

13 (t) MANUFACTURING RESEARCH AMENDMENT.—
14 Section 506(a) of the America COMPETES Reauthoriza-
15 tion Act of 2010 (42 U.S.C. 1862p–1(a)) is amended—

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

18 (2) in paragraph (6)—

19 (A) by striking “and” before “virtual man-
20 ufacturing”; and

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

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

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

4 “(8) continuous manufacturing of biological
5 products and similar innovative monitoring and con-
6 trol techniques.”.

7 (u) CRITICAL MINERALS MINING RESEARCH AND
8 DEVELOPMENT.—

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

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

21 (A) advancing mining research and devel-
22 opment activities to develop new mapping and
23 mining technologies and techniques, including
24 advanced critical mineral extraction, production,
25 separation, alloying, or processing techniques

1 and technologies that can decrease energy in-
2 tensity, potential environmental impact and
3 costs of those activities;

4 (B) conducting long-term Earth observa-
5 tion of reclaimed mine sites, including the study
6 of the evolution of microbial diversity at such
7 sites;

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

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

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

19 (F) improved understanding of the geologi-
20 cal and geochemical processes through which
21 critical minerals form and are concentrated into
22 economically viable deposits; or

23 (G) providing training and researcher op-
24 portunities to undergraduate and graduate stu-

1 dents to prepare the next generation of mining
2 engineers and researchers.

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

7 (v) STUDY OF AI RESEARCH CAPACITY.—

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

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

18 (A) Which universities are putting out sig-
19 nificant peer-reviewed artificial intelligence re-
20 search, including based on quantity and number
21 of citations.

22 (B) For each of the universities described
23 in paragraph (1), what specific factors enable
24 their AI research, including computing power,

1 data sets and availability, specialized cur-
2 riculum, and industry and other partnerships.

3 (C) How universities not included in para-
4 graph (1) could implement the factors in para-
5 graph (2) to produce AI research, as well as
6 case studies that universities can look to as ex-
7 amples and potential pilot programs that the
8 Federal Government could develop or support
9 to help universities produce AI research.

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

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

17 (w) ADVANCING IOT FOR PRECISION AGRI-
18 CULTURE.—

19 (1) NATIONAL SCIENCE FOUNDATION DIREC-
20 TIVE ON AGRICULTURAL SENSOR RESEARCH.—In
21 awarding grants under its sensor systems and
22 networked systems programs, the Director shall in-
23 clude in consideration of portfolio balance research
24 and development on sensor connectivity in environ-

1 ments of intermittent connectivity and intermittent
2 computation—

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

6 (B) that considers—

7 (i) direct gateway access for locally
8 stored data;

9 (ii) attenuation of signal transmission;

10 (iii) loss of signal transmission; and

11 (iv) at-scale performance for wireless
12 power.

13 (2) UPDATING CONSIDERATIONS FOR PRECI-
14 SION AGRICULTURE TECHNOLOGY WITHIN THE NSF
15 ADVANCED TECHNICAL EDUCATION PROGRAM.—Sec-
16 tion 3 of the Scientific and Advanced-Technology
17 Act of 1992 (42 U.S.C. 1862i) is amended in sub-
18 section (e)(3)—

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

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

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

24 “(E) applications that incorporate distance
25 learning tools and approaches.”.

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

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

7 (i) sensors, scanners, radio-frequency
8 identification, and related technologies that
9 can monitor soil properties, irrigation con-
10 ditions, and plant physiology;

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

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

18 (iv) aerial imagery generated by sat-
19 ellites or unmanned aerial vehicles;

20 (v) ground-based robotics;

21 (vi) control systems design and
22 connectivity, such as smart irrigation con-
23 trol systems;

24 (vii) Global Positioning System-based
25 applications; and

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

5 (B) a review of Federal programs that pro-
6 vide support for precision agriculture research,
7 development, adoption, education, or training,
8 in existence on the date of enactment of this
9 Act.

10 (x) ASTRONOMY AND SATELLITE CONSTELLA-
11 TIONS.—The Director shall support research into and the
12 design, development, and testing of mitigation measures
13 to address the impact of satellite constellations on Foun-
14 dation scientific programs by—

15 (1) awarding grants on a competitive basis to
16 support investigations into the impacts of satellite
17 constellations on ground-based optical, infrared, and
18 radio astronomy, including through existing pro-
19 grams such Spectrum and Wireless Innovation en-
20 abled by Future Technologies (SWIFT) and the
21 Spectrum Innovation Initiative;

22 (2) supporting research on satellite impacts and
23 benefits and mitigation strategies to be carried out
24 at one or more Foundation supported Federally

1 Funded Research and Development Centers or large
2 facilities, as appropriate; and

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

7 **SEC. 8. RESEARCH INFRASTRUCTURE.**

8 (a) FACILITY OPERATION AND MAINTENANCE.—

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

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

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

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

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

1 (A) an assessment, that includes feedback
2 from the research community, of the effective-
3 ness of the pilot program for—

4 (i) supporting research directorates
5 and divisions in balancing investments in
6 research grants and funding for the initial
7 operation and maintenance of major facili-
8 ties;

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

11 (iii) facilitating interagency and inter-
12 national partnerships;

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

15 (v) supporting facility divestment
16 costs; and

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

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

24 (c) **HELIUM CONSERVATION.**—

1 (1) MAJOR RESEARCH INSTRUMENTATION SUP-
2 PORT.—

3 (A) IN GENERAL.—The Director shall sup-
4 port, through the Major Research Instrumenta-
5 tion program, proposal requests that include
6 the purchase, installation, operation, and main-
7 tenance of equipment and instrumentation to
8 reduce consumption of helium.

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

18 (2) ANNUAL REPORT.—No later than 1 year
19 after the date of enactment of this Act and annually
20 for the subsequent two years, the Director shall sub-
21 mit an annual report to Congress on the use of
22 funding awarded by the Foundation for the purchase
23 and conservation of helium. The report should in-
24 clude—

1 (A) the volume and price of helium pur-
2 chased;

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

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

7 (d) ADVANCED COMPUTING.—

8 (1) COMPUTING NEEDS.—To gather informa-
9 tion about the computational needs of Foundation-
10 funded projects, the Director shall require grant pro-
11 posals submitted to the Foundation, as appropriate,
12 to include estimates of computational resource needs
13 for projects that require use of advanced computing.
14 The Director shall encourage and provide access to
15 tools that facilitate the inclusion of these measures,
16 including those identified in the 2016 Academies re-
17 port entitled “Future Directions for NSF Advanced
18 Computing Infrastructure to Support U.S. Science
19 and Engineering in 2017–2020”.

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

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

6 (A) describes the advanced computing re-
7 sources and capabilities that would fully meet
8 anticipated project needs, including through in-
9 vestments in the Mid-Scale Research Infra-
10 structure program and the Major Research
11 Equipment and Facilities Construction account;

12 (B) draws on community input, informa-
13 tion contained in research proposals, allocation
14 requests, insights from Foundation-funded
15 cyber-infrastructure operators, and Foundation-
16 wide information gathering regarding commu-
17 nity needs;

18 (C) considers computational needs of
19 planned major facilities;

20 (D) reflects anticipated technology trends;

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

23 (F) addresses the needs of groups histori-
24 cally underrepresented in STEM and geo-

1 graphic regions with low availability and high
2 demand for advanced computing resources;

3 (G) considers how Foundation-supported
4 advanced computing capabilities can be lever-
5 aged for activities through the Directorate for
6 Science and Engineering Solutions; and

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

11 (4) SECURING AMERICAN RESEARCH FROM
12 CYBER THEFT.—

13 (A) NETWORKING AND INFORMATION
14 TECHNOLOGY RESEARCH AND DEVELOPMENT
15 UPDATE.—Section 101(a)(1) of the High-Per-
16 formance Computing Act of 1991 (15 U.S.C.
17 5511) is amended—

18 (i) by moving the margins of subpara-
19 graphs (D) and (J) through (O) two ems
20 to the left;

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

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

1 “(J) provide for improving the security, reli-
2 ability, and resiliency of computing and networking
3 systems used by institutions of higher education and
4 other nonprofit research institutions for the proc-
5 essing, storage and transmission of sensitive feder-
6 ally funded research and associated data;”.

7 (B) COMPUTING ENCLAVE PILOT PRO-
8 GRAM.—

9 (i) IN GENERAL.—The Director, in
10 consultation with the Director of the Na-
11 tional Institute of Standards and Tech-
12 nology and the Secretary of Energy, shall
13 establish a pilot program to award grants
14 to ensure the security of federally-sup-
15 ported research data and to assist regional
16 institutions of higher education and their
17 researchers in compliance with regulations
18 regarding the safeguarding of sensitive in-
19 formation and other relevant regulations
20 and Federal guidelines.

21 (ii) STRUCTURE.—In carrying out the
22 pilot program established pursuant to
23 clause (i), the Director shall select three
24 institutions of higher education from
25 among institutions classified under the In-

1 diana University Center for Postsecondary
2 Research Carnegie Classification as a doc-
3 torate-granting university with a very high
4 level of research activity, and with a his-
5 tory of working with secure information for
6 the development, installation, maintenance,
7 or sustainment of secure computing en-
8 claves.

9 (iii) REGIONALIZATION.—

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

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

20 (iv) PROGRAM ELEMENTS.—The Di-
21 rector shall work with institutions of high-
22 er education selected pursuant to clause
23 (ii) to—

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

4 (II) develop a comprehensive and
5 confidential list, or a bill of materials,
6 of each binary component of the soft-
7 ware, firmware, or product that is re-
8 quired to deploy additional secure
9 computing enclaves;

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

14 (IV) develop a system security
15 plan template; and

16 (V) develop a process for man-
17 aging a plan of action and milestones
18 for the secure computing enclave.

19 (v) DURATION.—Subject to other
20 availability of appropriations, the pilot pro-
21 gram established pursuant to clause (i)
22 shall operate for not less than 3 years.

23 (vi) REPORT.—

24 (I) IN GENERAL.—The Director
25 shall report to Congress not later than

1 6 months after the completion of the
2 pilot program under clause (i).

3 (II) CONTENTS.—The report re-
4 quired under subclause (I) shall in-
5 clude—

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

11 (bb) recommendations re-
12 lated to the value of expanding
13 the network of secure computing
14 enclaves; and

15 (cc) recommendations on the
16 efficacy of the use of secure com-
17 puting enclaves by other Federal
18 agencies in a broader effort to
19 expand security of Federal re-
20 search.

21 (vii) AUTHORIZATION OF APPROPRIA-
22 TIONS.—There is authorized to be appro-
23 priated to the Director, \$38,000,000 for
24 fiscal years 2022 through 2024, to carry
25 out the activities outlined in this section.

1 (e) NATIONAL SECURE DATA SERVICE.—

2 (1) IN GENERAL.—The Director, in consulta-
3 tion with the Chief Statistician of the United States,
4 shall establish a demonstration project to develop,
5 refine and test models to inform the full implemen-
6 tation of the Commission on Evidence-Based Policy-
7 making recommendation for a government-wide data
8 linkage and access infrastructure for statistical ac-
9 tivities conducted for statistical purposes, as defined
10 in chapter 35 of title 44, United States Code.

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

16 (A) aligned with the principles, best prac-
17 tices, and priority actions recommended by the
18 Advisory Committee on Data for Evidence
19 Building, to the extent feasible; and

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

23 (3) DATA.—In carrying out this subsection, the
24 Director shall engage with Federal and State agen-
25 cies to collect, acquire, analyze, report, and dissemi-

1 nate statistical data in the United States and other
2 nations to support government-wide evidence-build-
3 ing activities consistent with the Foundations for
4 Evidence-Based Policymaking Act of 2018.

5 (4) PRIVACY AND CONFIDENTIALITY PROTEC-
6 TIONS.—If the Director issues a management con-
7 tract under paragraph (2), the awardee shall be des-
8 ignated as an “agent” under chapter 35 of title 44,
9 United States Code, subchapter III, section 3561 et
10 seq., with all requirements and obligations for pro-
11 tecting confidential information delineated in the
12 Confidential Information Protection and Statistical
13 Efficiency Act of 2018 and the Privacy Act of 1974.

14 (5) TECHNOLOGY.—In carrying out this sub-
15 section, the Director shall consider application and
16 use of systems and technologies that incorporate
17 protection measures to reasonably ensure confiden-
18 tial data and statistical products are protected in ac-
19 cordance with obligations under chapter 35 of title
20 44, United States Code, subchapter III, section
21 3561 et seq., including systems and technologies
22 that ensure raw data and other sensitive inputs are
23 not accessible to recipients of statistical outputs
24 from the National Secure Data Service demonstra-
25 tion project.

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

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

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

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

15 (C) an assessment of the effectiveness of
16 the demonstration project for mitigating risks
17 and removing barriers to a sustained implemen-
18 tation of the National Secure Data Service as
19 recommended by the Commission on Evidence-
20 Based Policymaking; and

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

1 (8) AUTHORIZATION OF APPROPRIATIONS.—

2 There are authorized to be appropriated to the Di-
3 rector to carry out this subsection \$9,000,000 for
4 each of fiscal years 2022 through 2026.

5 **SEC. 9. DIRECTORATE FOR SCIENCE AND ENGINEERING**
6 **SOLUTIONS.**

7 (a) ESTABLISHMENT.—Subject to the availability of
8 appropriated funds, there is established within the Foun-
9 dation the Directorate for Science and Engineering Solu-
10 tions to advance research and development solutions to ad-
11 dress societal and national challenges for the benefit of
12 all Americans.

13 (b) PURPOSE.—The purpose of the Directorate estab-
14 lished under subsection (a) is to support use-inspired re-
15 search, accelerate the translation of Foundation-supported
16 fundamental research and to advance technologies, facili-
17 tate commercialization and use of Federally funded re-
18 search, and expand the pipeline of United States students
19 and researchers in areas of societal and national impor-
20 tance.

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

24 (1) support transformational advances in use-
25 inspired and translational research through diverse

1 funding mechanisms and models, including conver-
2 gence accelerators;

3 (2) translate research into science and engineer-
4 ing innovations, including through developing inno-
5 vative approaches to connect research with societal
6 outcomes, developing approaches to technology
7 transfer that do not rely only on traditional market
8 and commercialization tools, education and training
9 for students and researchers on engaging with end
10 users and the public, partnerships that facilitate re-
11 search uptake, application, and scaling, prototype
12 development, entrepreneurial education, developing
13 tech-to-market strategies, and partnerships that con-
14 nect research products to businesses, accelerators,
15 and incubators and encourage the formation and
16 growth of new companies;

17 (3) develop and expand sustainable and mutu-
18 ally-beneficial use-inspired and translational research
19 and development partnerships and collaborations
20 among institutions of higher education, including
21 minority serving institutions and emerging research
22 institutions, non-profit organizations, labor organiza-
23 tions, businesses and other for-profit entities, Fed-
24 eral or State agencies, community organizations,
25 other Foundation directorates, national labs, field

1 stations and marine laboratories, international enti-
2 ties as appropriate, binational research and develop-
3 ment foundations and funds, excluding foreign enti-
4 ties of concern, and other organizations;

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

8 (5) expand opportunities for researchers to con-
9 tribute to use-inspired and translational research in-
10 cluding through support for workshops and con-
11 ferences, targeted incentives and training, and multi-
12 disciplinary research centers;

13 (6) support the education, mentoring, and
14 training of undergraduate students, graduate stu-
15 dents, and postdoctoral researchers in use-inspired
16 and translational approaches to research and entre-
17 preneurship in key focus areas identified under sub-
18 section (g) through scholarships, fellowships, and
19 traineeships;

20 (7) support translational research infrastruc-
21 ture, including platforms and testbeds, data manage-
22 ment and software tools, and networks and commu-
23 nication platforms for interactive and collective
24 learning and information sharing;

1 (8) identify social, behavioral, and economic
2 drivers and consequences of technological innova-
3 tions; and

4 (9) ensure the programmatic work of the Direc-
5 torate and Foundation incorporates a worker per-
6 spective through participation by labor organizations
7 and workforce training organizations.

8 (d) ASSISTANT DIRECTOR.—

9 (1) IN GENERAL.—The Director shall appoint
10 an Assistant Director responsible for the manage-
11 ment of the Directorate established under this sec-
12 tion.

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

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

20 (A) advise the Director on all matters per-
21 taining to use-inspired and translational re-
22 search, development, and commercialization at
23 the Foundation, including partnership with the
24 private sector and other users of Foundation
25 funded research; and

1 (B) develop and implement the necessary
2 policies and procedures to promote a culture of
3 use-inspired and translational research within
4 the Directorate and across the Foundation and
5 carry out the responsibilities under paragraph
6 (4).

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

9 (A) advising the Director on all matters
10 pertaining to use-inspired and translational re-
11 search and development activities at the Foun-
12 dation, including effective practices for conver-
13 gence research;

14 (B) identifying opportunities for and facili-
15 tating coordination and collaboration, where ap-
16 propriate, on use-inspired and translational re-
17 search, development, commercialization, and so-
18 cietal application activities—

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

21 (ii) between the Foundation and
22 stakeholders in academia, the private sec-
23 tor, including non-profit entities, labor or-
24 ganizations, Federal or State agencies, and
25 international entities, as appropriate;

1 (C) ensuring that the activities carried out
2 under this section are not duplicative of activi-
3 ties supported by other parts of the Foundation
4 or other relevant Federal agencies;

5 (D) approving all new programs within the
6 Directorate;

7 (E) developing and testing diverse merit-
8 review models and mechanisms for selecting
9 and providing awards for use-inspired and
10 translational research and development at dif-
11 ferent scales, from individual investigator
12 awards to large multi-institution collaborations;

13 (F) assessing the success of programs;

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

16 (H) performing other such duties per-
17 taining to the purposes in subsection (b) as are
18 required by the Director.

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

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

24 (e) ADVISORY COMMITTEE.—

1 (1) IN GENERAL.—In accordance with the Fed-
2 eral Advisory Committee Act (5 U.S.C. App.) the
3 Director shall establish an advisory committee to as-
4 sess, and make recommendations regarding, the ac-
5 tivities carried out under this section.

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

8 (A) be individuals with relevant experience
9 or expertise, including individuals from industry
10 and national labs, educators, academic subject
11 matter experts, including individuals with
12 knowledge of the technical and social dimen-
13 sions of science and technology, technology
14 transfer experts, labor organizations, and rep-
15 resentatives of civil society, community organi-
16 zations, and other nongovernmental organiza-
17 tions; and

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

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

1 (A) reviewing and evaluating activities car-
2 ried out under this section; and

3 (B) assessing the success of the Direc-
4 torate in and proposing new strategies for ful-
5 filling the purposes in subsection (b).

6 (f) EXISTING PROGRAMS.—The Convergence Accel-
7 erator, the Growing Convergence Research Big Idea, and
8 any other program, at the discretion of the Director, may
9 be managed by the Directorate.

10 (g) FOCUS AREAS.—In consultation with the Assist-
11 ant Director, the Board, and other Federal agencies and
12 taking into account advice under subsection (e), the Direc-
13 tor shall identify, and regularly update, up to 5 focus
14 areas to guide activities under this section. In selecting
15 such focus areas, the Director shall consider the following
16 societal challenges:

17 (1) Climate change and environmental sustain-
18 ability.

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

21 (3) Cybersecurity.

22 (4) National security.

23 (5) STEM education and workforce.

24 (6) Social and economic inequality.

25 (h) TECHNOLOGY RESEARCH INSTITUTES.—

1 (1) IN GENERAL.—The Director may award
2 grants and cooperative agreements to institutions of
3 higher education, or consortia thereof, for the plan-
4 ning, establishment, and support of Technology Re-
5 search Institutes in key technology areas, as deter-
6 mined by the Director.

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

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

12 (B) conduct research involving a key tech-
13 nology to solve challenges with social, economic,
14 health, scientific, and national security implica-
15 tions;

16 (C) further the development, adoption, and
17 commercialization of innovations in key tech-
18 nology focus areas, including through partner-
19 ship with other Federal agencies and Federal
20 laboratories, industry, including startup compa-
21 nies, labor organizations, civil society organiza-
22 tions, and state and local, and Tribal govern-
23 ments.

1 (D) develop and manage multi-user re-
2 search testbeds and instrumentation for key
3 technologies;

4 (E) develop and manage an accessible re-
5 pository, as appropriate, for research data and
6 computational models relevant to the relevant
7 key technology field, consistent with applicable
8 privacy and intellectual property laws;

9 (F) convene national workshops for re-
10 searchers and other stakeholders in that tech-
11 nology area;

12 (G) establish traineeship programs for
13 graduate students who pursue research related
14 to the technology leading to a masters or doc-
15 torate degree by providing funding and other
16 assistance, and by providing graduate students
17 opportunities for research experiences in gov-
18 ernment or industry related to the students'
19 studies in that technology area;

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

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

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

4 (A) have the potential to create an innova-
5 tion ecosystem, or enhance existing ecosystems,
6 to translate Technology Research Institute re-
7 search into applications and products, as appro-
8 priate to the topic of each Institute;

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

12 (C) support transdisciplinary education ac-
13 tivities, including curriculum development, re-
14 search experiences, and faculty professional de-
15 velopment across undergraduate, graduate, and
16 professional academic programs;

17 (D) involve partnerships with multiple
18 types of institutions, including emerging re-
19 search institutions, historically Black colleges
20 and universities, Tribal Colleges or Universities,
21 and minority serving institutions, and with
22 other Federal agencies, Federal laboratories, in-
23 dustry, state, local, and Tribal governments,
24 labor organizations, civil society organizations,

1 and other entities that may use or be affected
2 by the technology; and

3 (E) include a component that addresses
4 the ethical, societal, safety, and security impli-
5 cations relevant to the application of the tech-
6 nology.

7 (4) DURATION.—

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

11 (B) RENEWAL.—An established Tech-
12 nology Institute may apply for, and the Direc-
13 tor may grant, extended funding for periods of
14 5 years on a merit-reviewed basis.

15 (5) APPLICATION.—An institution of higher
16 education or consortia thereof seeking financial as-
17 sistance under this section shall submit to the Direc-
18 tor an application at such time, in such manner, and
19 containing such information as the Director may re-
20 quire.

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

23 (A) use a competitive, merit review process
24 that includes peer review by a diverse group of

1 individuals with relevant expertise from both
2 the private and public sectors; and

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

8 (7) COLLABORATION.—In making awards under
9 this section, the Director may collaborate with Fed-
10 eral departments and agencies whose missions con-
11 tribute to or are affected by the technology focus
12 area of the institute.

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

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

18 (2) by inserting after subsection (d), the fol-
19 lowing:

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

21 “(1) IN GENERAL.—Under the program estab-
22 lished in section 508 of the America COMPETES
23 Reauthorization Act of 2010 (42 U.S.C. 1862p–2)
24 and the activities authorized under this section, the
25 Director shall award grants to eligible entities for

1 planning and capacity building at institutions of
2 higher education.

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

11 “(3) USE OF FUNDS.—In addition to activities
12 listed under subsection (c), an eligible entity receiv-
13 ing a grant under this subsection may use funds
14 to—

15 “(A) ensure the availability of staff, includ-
16 ing technology transfer professionals, entre-
17 preneurs in residence, and other mentors as re-
18 quired to accomplish the purpose of this sub-
19 section;

20 “(B) revise institution policies, including
21 policies related to intellectual property and fac-
22 ulty entrepreneurship, and taking other nec-
23 essary steps to implement relevant best prac-
24 tices for academic technology transfer;

1 “(C) develop new local and regional part-
2 nerships among institutions of higher education
3 and between institutions of higher education
4 and private sector entities and other relevant
5 organizations with the purpose of building net-
6 works, expertise, and other capacity to identify
7 promising research that may have potential
8 market value and enable researchers to pursue
9 further development and transfer of their ideas
10 into possible commercial or other use;

11 “(D) develop seminars, courses, and other
12 educational opportunities for students, post-doc-
13 toral researchers, faculty, and other relevant
14 staff at institutions of higher education to in-
15 crease awareness and understanding of entre-
16 preneurship, patenting, business planning, and
17 other areas relevant to technology transfer, and
18 connect students and researchers to relevant re-
19 sources, including mentors in the private sector;
20 and

21 “(E) create and fund competitions to allow
22 entrepreneurial students and faculty to illus-
23 trate the commercialization potential of their
24 ideas.

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

5 “(5) APPLICATION.—An eligible entity seeking
6 funding under this subsection shall submit an appli-
7 cation to the Director of the Foundation at such
8 time, in such manner, and containing such informa-
9 tion and assurances as such Director may require.
10 The application shall include, at a minimum, a de-
11 scription of how the eligible entity submitting an ap-
12 plication plans to sustain the proposed activities be-
13 yond the duration of the grant.

14 “(6) AUTHORIZATION OF APPROPRIATIONS.—
15 From within funds authorized for the Directorate
16 for Science and Engineering Solutions, there are au-
17 thorized to carry out the activities under this sub-
18 section \$40 million for each of fiscal years 2022
19 through 2026.”.

20 (j) ENTREPRENEURIAL FELLOWSHIPS.—

21 (1) IN GENERAL.—The Director shall award
22 fellowships to Ph.D.-trained scientists and engineers
23 to help develop leaders capable of maturing prom-
24 ising ideas and technologies from lab to market and

1 forge connections between academic research and
2 government, industry, and finance.

3 (2) APPLICATIONS.—An applicant for a fellow-
4 ship under this subsection shall submit to the Direc-
5 tor an application at such time, in such manner, and
6 containing such information as the Director may re-
7 quire. At a minimum, the Director shall require that
8 applicants—

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

12 (B) have included in the application a let-
13 ter of support from the intended host institu-
14 tion that describes how the fellow will be em-
15 bedded in that institution’s research environ-
16 ment.

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

19 (A) from diverse research institutions;

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

21 (C) from groups historically underrep-
22 resented in STEM fields;

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

1 (5) AUTHORIZATION OF APPROPRIATIONS.—

2 There is authorized to be appropriated to the Direc-
3 tor \$100,000,000 for fiscal years 2022 through
4 2026, to carry out the activities outlined in this sub-
5 section.

6 (k) LOW-INCOME SCHOLARSHIP PROGRAM.—

7 (1) IN GENERAL.—The Director shall award
8 scholarships to low-income individuals to enable such
9 individuals to pursue associate, undergraduate, or
10 graduate level degrees in mathematics, engineering,
11 or computer science.

12 (2) ELIGIBILITY.—

13 (A) IN GENERAL.—To be eligible to receive
14 a scholarship under this section, an indi-
15 vidual—

16 (i) must be a citizen of the United
17 States, a national of the United States (as
18 defined in section 1101(a) of title 8), an
19 alien admitted as a refugee under section
20 1157 of title 8, or an alien lawfully admit-
21 ted to the United States for permanent
22 residence;

23 (ii) shall prepare and submit to the
24 Director an application at such time, in

1 such manner, and containing such infor-
2 mation as the Director may require; and

3 (iii) shall certify to the Director that
4 the individual intends to use amounts re-
5 ceived under the scholarship to enroll or
6 continue enrollment at an institution of
7 higher education (as defined in section
8 1001(a) of title 20) in order to pursue an
9 associate, undergraduate, or graduate level
10 degree in mathematics, engineering, com-
11 puter science, or other technology and
12 science programs designated by the Direc-
13 tor.

14 (B) ABILITY.—Awards of scholarships
15 under this section shall be made by the Director
16 solely on the basis of the ability of the appli-
17 cant, except that in any case in which 2 or
18 more applicants for scholarships are deemed by
19 the Director to be possessed of substantially
20 equal ability, and there are not sufficient schol-
21 arships available to grant one to each of such
22 applicants, the available scholarship or scholar-
23 ships shall be awarded to the applicants in a
24 manner that will tend to result in a geographi-
25 cally wide distribution throughout the United

1 States of recipients' places of permanent resi-
2 dence.

3 (3) SCHOLARSHIP AMOUNT AND RENEWAL.—

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

7 (4) AUTHORIZATION.—Of amounts authorized
8 for the Directorate for Science and Engineering So-
9 lutions, \$100,000,000 shall be authorized for this
10 program.

11 (l) TRANSFER OF FUNDS.—

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

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

22 (m) AUTHORITIES.—In addition to existing authori-
23 ties available to the Foundation, the Director may exercise
24 the following authorities in carrying out the activities
25 under this section:

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

5 (2) APPOINTMENTS.—The Director shall have
6 the authority to make appointments of scientific, en-
7 gineering, and professional personnel for carrying
8 out research and development functions which re-
9 quire the services of specially qualified personnel re-
10 lating to the focus areas identified under subsection
11 (g) and such other areas of national research prior-
12 ities as the Director may determine.

13 (n) ETHICAL, LEGAL, AND SOCIETAL CONSIDER-
14 ATIONS.—The Director shall establish policies regarding
15 engagement with experts in the social dimensions of
16 science and technology and set up formal avenues for pub-
17 lic input, as appropriate, to ensure that ethical, legal, and
18 societal considerations are explicitly integrated into the
19 priorities for the Directorate, including the selection of
20 focus areas under subsection (g), the award-making proc-
21 ess, and throughout all stages of supported projects.

22 (o) REPORTS AND ROADMAPS.—

23 (1) ANNUAL REPORT.—The Director shall pro-
24 vide to the relevant authorizing and appropriations
25 committees of Congress an annual report describing

1 projects supported by the Directorate during the
2 previous year.

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

9 (p) EVALUATION.—

10 (1) IN GENERAL.—After the Directorate has
11 been in operation for 6 years, the National Science
12 Board shall evaluate how well the Directorate is
13 achieving the purposes identified in subsection (b),
14 including an assessment of the impact of Directorate
15 activities on the Foundation's primary science mis-
16 sion.

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

19 (A) a recommendation on whether the Di-
20 rectorate should be continued or terminated;
21 and

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

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

4 **SEC. 10. ADMINISTRATIVE AMENDMENTS.**

5 (a) SUPPORTING VETERANS IN STEM CAREERS.—
6 Section 3(c) of the Supporting Veterans in STEM Careers
7 Act is amended by striking “annual” and inserting “bien-
8 nial”.

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

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

13 “(3) COMPLIANCE REVIEW.—The Inspector
14 General of the Foundation shall conduct a review of
15 the compliance by the Board with the requirements
16 described in paragraph (2) as necessary based on a
17 triennial risk assessment. Any review deemed nec-
18 essary shall examine the proposed and actual con-
19 tent of closed meetings and determine whether the
20 closure of the meetings was consistent with section
21 552b of title 5, United States Code.”; and

22 (2) by striking paragraphs (4) and (5) and in-
23 serting the following:

24 “(4) MATERIALS RELATING TO CLOSED POR-
25 TIONS OF MEETING.—To facilitate the risk assess-

1 ment required under paragraph (3) of this sub-
2 section, and any subsequent review conducted by the
3 Inspector General, the Office of the National Science
4 Board shall maintain the General Counsel’s certifi-
5 cate, the presiding officer’s statement, and a tran-
6 script or recording of any closed meeting, for at
7 least 3 years after such meeting.”.

8 (c) SCIENCE AND ENGINEERING INDICATORS RE-
9 PORT SUBMISSION.—Section 4(j)(1) of the National
10 Science Foundation Act of 1950 (42 U.S.C. 1863(j)(1))
11 is amended by striking “January 15” and inserting
12 “March 15”.