

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.

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## 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

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## 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:

8 (1) Over the past seven decades, the National  
9 Science Foundation has played a critical role in ad-

1 vancing the United States academic research enter-  
2 prise by supporting fundamental research and edu-  
3 cation across science and engineering disciplines.

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

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

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

19 (5) To address major societal challenges and  
20 sustain United States leadership in innovation, the  
21 Federal Government must increase investments in  
22 research, broaden participation in the STEM work-  
23 force, and bolster collaborations among universities,  
24 National Laboratories, companies, non-profit  
25 funders of research, local policymakers, civil societies

1 and stakeholder communities, and international  
2 partners.

3 **SEC. 3. DEFINITIONS.**

4 In this Act:

5 (1) **ACADEMIES.**—The term “Academies”  
6 means the National Academies of Sciences, Engi-  
7 neering, and Medicine.

8 (2) **AWARDEE.**—The term “awardee” means  
9 the legal entity to which Federal assistance is  
10 awarded and that is accountable to the Federal Gov-  
11 ernment for the use of the funds provided.

12 (3) **BOARD.**—The term “Board” means the Na-  
13 tional Science Board.

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

16 (5) **EMERGING RESEARCH INSTITUTION.**—The  
17 term “emerging research institution” means an in-  
18 stitution of higher education with an established un-  
19 dergraduate student program that has, on average  
20 for 3 years prior to the time of application for an  
21 award, received less than \$35,000,000 in Federal re-  
22 search funding.

23 (6) **FEDERAL SCIENCE AGENCY.**—The term  
24 “Federal science agency” means any Federal agency

1 with an annual extramural research expenditure of  
2 over \$100,000,000.

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

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

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

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

17 (11) PREK–12.—The term “preK–12” means  
18 pre-kindergarten through grade 12.

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

24 (13) STEM.—The term “STEM” has the  
25 meaning given the term in section 2 of the America

1       COMPETES Reauthorization Act of 2010 (42  
2       U.S.C. 6621 note).

3   **SEC. 4. AUTHORIZATION OF APPROPRIATIONS.**

4       (a) FISCAL YEAR 2022.—

5           (1) IN GENERAL.—There are authorized to be  
6       appropriated to the Foundation \$11,469,200,000 for  
7       fiscal year 2022.

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

10           (A) \$9,444,100,000 shall be made avail-  
11       able to carry out research and related activities,  
12       of which—

13           (i) \$208,150,000 shall be for the  
14       Graduate Research Fellowship Program;

15           (ii) \$55,000,000 shall be for the Mid-  
16       Scale Research Infrastructure Program;  
17       and

18           (iii) \$1,000,000,000 shall be for the  
19       Directorate for Science and Engineering  
20       Solutions;

21           (B) \$1,333,860,000 shall be made avail-  
22       able for education and human resources, of  
23       which—

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

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

3 (iii) \$208,150,000 shall be for the  
4 Graduate Research Fellowship Program;  
5 and

6 (iv) \$66,000,000 shall be for the  
7 Cybercorps Scholarship for Service Pro-  
8 gram;

9 (C) \$190,000,000 shall be made available  
10 for major research equipment and facilities con-  
11 struction, of which \$65,000,000 shall be for the  
12 Mid-Scale Research Infrastructure Program;

13 (D) \$473,500,000 shall be made available  
14 for agency operations and award management;

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

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

19 (b) FISCAL YEAR 2023.—

20 (1) IN GENERAL.—There are authorized to be  
21 appropriated to the Foundation \$12,668,000,000 for  
22 fiscal year 2023.

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

1 (A) \$10,367,460,000 shall be made avail-  
2 able to carry out research and related activities,  
3 of which—

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

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

9 (iii) \$1,500,000,000 shall be for the  
10 Directorate for Science and Engineering  
11 Solutions;

12 (B) \$1,391,320,000 shall be made avail-  
13 able for education and human resources, of  
14 which—

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

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

19 (iii) \$227,070,000 shall be for the  
20 Graduate Research Fellowship Program;  
21 and

22 (iv) \$72,000,000 shall be for the  
23 Cybercorps Scholarship for Service Pro-  
24 gram;

1 (C) \$355,000,000 shall be made available  
2 for major research equipment and facilities con-  
3 struction, of which \$75,000,000 shall be for the  
4 Mid-Scale Research Infrastructure Program;

5 (D) \$522,940,000 shall be made available  
6 for agency operations and award management;

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

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

11 (c) FISCAL YEAR 2024.—

12 (1) IN GENERAL.—There are authorized to be  
13 appropriated to the Foundation \$14,148,200,000 for  
14 fiscal year 2024.

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

17 (A) \$11,702,420,000 shall be made avail-  
18 able to carry out research and related activities,  
19 of which—

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

22 (ii) \$70,000,000 shall be for the Mid-  
23 Scale Research Infrastructure Program;  
24 and



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

4 (B) \$1,457,590,000 shall be made avail-  
5 able for education and human resources, of  
6 which—

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

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

11 (iii) \$245,990,000 shall be for the  
12 Graduate Research Fellowship Program;  
13 and

14 (iv) \$78,000,000 shall be for the  
15 Cybercorps Scholarship for Service Pro-  
16 gram;

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

21 (D) \$582,380,000 shall be made available  
22 for agency operations and award management;

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

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

3 (d) FISCAL YEAR 2025.—

4 (1) IN GENERAL.—There are authorized to be  
5 appropriated to the Foundation \$16,036,900,000 for  
6 fiscal year 2025.

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

9 (A) \$13,440,840,000 shall be made avail-  
10 able to carry out research and related activities,  
11 of which—

12 (i) \$264,920,000 shall be for the  
13 Graduate Research Fellowship Program;

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

17 (iii) \$3,375,000,000 shall be for the  
18 Directorate for Science and Engineering  
19 Solutions;

20 (B) \$1,522,890,000 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) \$264,920,000 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) \$661,830,000 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 \$18,325,020,000 for  
22 fiscal year 2026.

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

1 (A) \$15,549,390,000 shall be made avail-  
2 able to carry out research and related activities,  
3 of which—

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

6 (ii) \$80,000,000 shall be for the Mid-  
7 Scale Research Infrastructure Program;  
8 and

9 (iii) \$5,062,500,000 shall be for the  
10 Directorate for Science and Engineering  
11 Solutions;

12 (B) \$1,601,470,000 shall be made avail-  
13 able for education and human resources, of  
14 which—

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

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

19 (iii) \$283,840,000 shall be for the  
20 Graduate Research Fellowship Program;  
21 and

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

1 (C) \$375,000,000 shall be made available  
2 for major research equipment and facilities con-  
3 struction, of which \$100,000,000 shall be for  
4 the Mid-Scale Research Infrastructure Pro-  
5 gram;

6 (D) \$756,270,000 shall be made available  
7 for agency operations and award management;

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

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

12 **SEC. 5. STEM EDUCATION.**

13 (a) PREK–12 STEM EDUCATION.—

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

21 (2) SCALING INNOVATIONS IN PREK–12 STEM  
22 EDUCATION.—

23 (A) IN GENERAL.—The Director shall es-  
24 tablish a program to award grants, on a com-  
25 petitive basis, to institutions of higher edu-

1 cation or non-profit organizations (or consortia  
2 of such institutions or organizations) to estab-  
3 lish no fewer than 3 multidisciplinary Centers  
4 for Transformative Education Research and  
5 Translation (in this section referred to as “Cen-  
6 ters”) to support research and development on  
7 widespread and sustained implementation of  
8 STEM education innovations.

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

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

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

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

13                  (iv) include a focus on the learning  
14 needs of under resourced schools and  
15 learners in low-resource or underachieving  
16 local education agencies in urban and rural  
17 communities; and

18                  (v) support research and development  
19 on scaling practices and models to support  
20 and sustain highly-qualified STEM edu-  
21 cators in urban and rural communities.

22                  (C) ADDITIONAL CONSIDERATIONS.—In  
23 awarding a grant under this paragraph, the Di-  
24 rector may also consider the extent to which the  
25 proposed Center will—

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

5 (ii) support research on and the devel-  
6 opment and scaling of innovative ap-  
7 proaches to distance learning and edu-  
8 cation for various student populations;

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

13 (iv) include a commitment from local  
14 or State education administrators to mak-  
15 ing the proposed reforms and activities a  
16 priority.

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

22 (E) ANNUAL MEETING.—The Director  
23 shall encourage and facilitate an annual meet-  
24 ing of the Centers to foster collaboration among



1 the Centers and to further disseminate the re-  
2 sults of the Centers' activities.

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

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

10 (ii) an assessment of the program's  
11 success in helping to promote scalable solu-  
12 tions in PreK–12 STEM education.

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

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

23 (B) present a compendium of promising,  
24 evidence-based PreK–12 STEM education prac-  
25 tices, models, programs, and technologies;

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

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

11 (b) UNDERGRADUATE STEM EDUCATION.—

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

18 (A) encourage greater collaboration and  
19 coordination between institutions of higher edu-  
20 cation and industry to enhance education and  
21 improve alignment with workforce needs;

22 (B) understand the current composition of  
23 the STEM workforce and the factors that influ-  
24 ence growth, retention, and development of that  
25 workforce; and

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

3 (2) ADVANCED TECHNOLOGICAL EDUCATION  
4 PROGRAM UPDATE.—Section 3(b) of the Scientific  
5 and Advanced Technology Act of 1992 (42 U.S.C.  
6 1862i(b)) is amended to read as follows:

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

14 “(1) coordinate research, training, and edu-  
15 cation activities funded by awards under subsection  
16 (a) and share information and best practices across  
17 the network of awardees;

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

24 “(3) develop national and regional partnerships  
25 between PreK–12 schools, two-year colleges, institu-

tions of higher education, workforce development programs, and industry to meet workforce needs.”.

(c) GRADUATE STEM EDUCATION.—

(1) MENTORING AND PROFESSIONAL DEVELOPMENT.—

(A) MENTORING PLANS.—

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

(I) inserting “and graduate student” after “postdoctoral”; and

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

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

1 for improving mentoring for Foundation-  
2 supported postdoctoral researchers.

3 (B) CAREER EXPLORATION.—

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

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

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

1 (II) the likelihood that the insti-  
2 tution or organization will sustain or  
3 expand the proposed activity effort be-  
4 yond the period of the grant.

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

17 (D) PROFESSIONAL DEVELOPMENT SUP-  
18 PLEMENT.—The Director shall carry out a five-  
19 year pilot initiative to award up to 2,500 ad-  
20 ministrative supplements of up to \$2,000 to ex-  
21 isting research grants annually, on a competi-  
22 tive basis, to support graduate student profes-  
23 sional development experiences for graduate  
24 students who receive a substantial portion of

1           their support under such grants, as determined  
2           by the Director.

3           (E) GRADUATE EDUCATION RESEARCH.—

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

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

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

20               (iii) the development and assessment  
21               of new or adapted interventions, including  
22               approaches that improve mentoring rela-  
23               tionships, develop conflict management  
24               skills, and promote healthy research teams.

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

3           (A) SENSE OF CONGRESS.—It is the sense  
4       of Congress that the Foundation should in-  
5       crease the number of new graduate research fel-  
6       lows supported annually over the next 5 years  
7       to no fewer than 3,000 fellows.

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

11           (i) in subsection (a), by inserting  
12       “and as will address national workforce de-  
13       mand in critical STEM fields” after  
14       “throughout the United States”;

15           (ii) in subsection (b), by striking “of  
16       \$12,000” and inserting “up to \$16,000”;  
17       and

18           (iii) by adding at the end the fol-  
19       lowing:

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



1           (3) STUDY ON GRADUATE STUDENT FUND-  
2       ING.—

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

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

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

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

24      (d) STEM WORKFORCE DATA.—

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

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

10          (B) REPORT.—Not later than 180 days  
11 after the date of the review under subparagraph  
12 (A) is complete, the Director shall submit to  
13 Congress and make widely available to the pub-  
14 lic a summary report of the portfolio review.

15          (2) SURVEY DATA.—

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

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

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

20 (C) LONGITUDINAL DESIGN.—The Direc-  
21 tor shall continue and accelerate efforts to en-  
22 hance the usefulness of National Center for  
23 Science and Engineering Statistics survey data  
24 for longitudinal research and analysis.

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

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

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

**SEC. 6. BROADENING PARTICIPATION.**

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

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

(A) in subparagraph (B)—

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

(ii) by striking clause (iv);

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

1 (iv) by redesignating clauses (i), (ii),  
 2 (iii), and (v) as subclauses (I), (II), (III),  
 3 and (IV), respectively, and moving the  
 4 margins of such subclauses (as so redesign-  
 5 nated) two ems to the right; and

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

9 “(C) In selecting teachers for an award au-  
 10 thorized by this subsection, the President shall  
 11 select—

12 “(i) at least two teachers—”; and

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

16 “(ii) at least one teacher—

17 “(I) from the Commonwealth of  
 18 the Northern Mariana Islands;

19 “(II) from American Samoa;

20 “(III) from the Virgin Islands of  
 21 the United States; and

22 “(IV) from Guam.”.

23 (2) EFFECTIVE DATE.—The amendments made  
 24 by paragraph (1) shall apply with respect to awards

1       made on or after the date of the enactment of this  
2       Act.

3       (b) ROBERT NOYCE TEACHER SCHOLARSHIP PRO-  
4       GRAM UPDATE.—

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

12          (2) OUTREACH.—To increase the diversity of  
13      participants, the Director shall support symposia, fo-  
14      rums, conferences, and other activities to expand  
15      and enhance outreach to—

16           (A) historically Black colleges and univer-  
17      sities that are part B institutions, as defined in  
18      section 322(2) of the Higher Education Act of  
19      1965 (20 U.S.C. 1061(2));

20           (B) minority institutions, as defined in sec-  
21      tion 365(3) of the Higher Education Act of  
22      1965 (20 U.S.C. 1067k(3));

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

25           (D) emerging research institutions; and

1 (E) higher education programs that serve  
2 or support veterans.

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

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

21 (e) PARTNERSHIPS WITH EMERGING RESEARCH IN-  
22 STITUTIONS.—The Director shall establish a five-year  
23 pilot program to enhance partnerships between emerging  
24 research institutions and institutions classified as very  
25 high research activity by the Carnegie Classification of In-

stitutions of Higher Education at the time of application.

In carrying out this program, the Director shall—

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

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

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

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



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

3 (A) an assessment, drawing on feedback  
 4 from the research community and other sources  
 5 of information, of the effectiveness of the pilot  
 6 program for improving the quality of partner-  
 7 ships with emerging research institutions; and

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

10 (f) TRIBAL COLLEGES AND UNIVERSITIES PROGRAM  
 11 UPDATE.—

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

15 (A) in subsection (a) by—

16 (i) striking “Native American” and  
 17 inserting “American Indian, Alaska Na-  
 18 tive, and Native Hawaiian”;

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

21 (iii) striking “or baccalaureate de-  
 22 grees” and inserting “, baccalaureate, and  
 23 graduate degrees”;

24 (B) in subsection (b) by striking “under-  
 25 graduate”; and

1 (C) in subsection (c) by inserting “and  
2 STEM” after “laboratory”.

3 (2) AUTHORIZATION OF APPROPRIATIONS.—

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

7 (g) DIVERSITY IN TECH RESEARCH.—The Director  
8 shall award grants, on a competitive basis, to institutions  
9 of higher education or non-profit organizations (or con-  
10 sortia of such institutions or organizations) to support  
11 basic and applied research that yields a scientific evidence  
12 base for improving the design and emergence, development  
13 and deployment, and management and ultimate effective-  
14 ness of organizations of all kinds, including research re-  
15 lated to diversity, equity, and inclusion in the technology  
16 sector.

17 **SEC. 7. FUNDAMENTAL RESEARCH.**

18 (a) BROADER IMPACTS.—

19 (1) ASSESSMENT.—Not later than 45 days  
20 after the date of enactment of this Act, the Director  
21 shall enter into an agreement with a qualified inde-  
22 pendent organization to assess how the Broader Im-  
23 pacts review criterion is applied across the Founda-  
24 tion and make recommendations for improving the  
25 effectiveness for meeting the goals established in sec-

tion 526 of the America Creating Opportunities to  
Meaningfully Promote Excellence in Technology,  
Education, and Science Reauthorization Act of 2010  
(42 U.S.C. 1862p–14).

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

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

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

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

(b) SENSE OF CONGRESS.—It is the sense of Con-  
gress that the Director should continue to identify oppor-

1 tunities to reduce the administrative burden on research-  
2 ers.

3 (c) RESEARCH INTEGRITY AND SECURITY.—

4 (1) OFFICE OF RESEARCH SECURITY AND POL-  
5 ICY.—The Director shall maintain a Research Secu-  
6 rity and Policy office within the Office of the Direc-  
7 tor with no fewer than 4 full time equivalent posi-  
8 tions. The functions of the Research Security and  
9 Policy office shall be to coordinate all research secu-  
10 rity policy issues across the Foundation, including  
11 by—

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

24 (B) serving as the Foundation’s primary  
25 resource for all issues related to the security

1 and integrity of the conduct of Foundation-sup-  
2 ported research;

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

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

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

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

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

1 Senate on the resources and the number of full time  
2 employees needed to carry out the functions of the  
3 Office established in paragraph (1).

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

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

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

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

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

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

1           (5) RISK ASSESSMENT CENTER.—The Director  
2       shall enter into an agreement with a qualified inde-  
3       pendent organization to create a new risk assess-  
4       ment center to—

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

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

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

22          (7) RESPONSIBLE CONDUCT IN RESEARCH  
23      TRAINING.—Section 7009 of the America Creating  
24      Opportunities to Meaningfully Promote Excellence in

1 Technology, Education, and Science Act (42 U.S.C.  
2 1862o–1) is amended by—

3 (A) striking “and postdoctoral research-  
4 ers” and inserting “postdoctoral researchers,  
5 faculty, and other senior personnel”; and

6 (B) inserting the following at the end: “,  
7 including mentor training, and training to raise  
8 awareness of potential security threats and  
9 Federal export control, disclosure, and report-  
10 ing requirements”.

11 (8) NATIONAL ACADEMIES GUIDE TO RESPON-  
12 SIBLE CONDUCT IN RESEARCH.—

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

20 (i) updated professional standards of  
21 conduct in research;

22 (ii) promising practices for preventing,  
23 addressing, and mitigating the negative  
24 impact of harassment, including sexual  
25 harassment and gender harassment as de-



1           fined in the 2018 Academies report enti-  
2           tled “Sexual Harassment of Women: Cli-  
3           mate, Culture, and Consequences in Aca-  
4           demic Sciences, Engineering, and Medi-  
5           cine”; and

6           (iii) promising practices for mitigating  
7           potential security risks that threaten re-  
8           search integrity.

9           (B) REPORT.—Not later than 18 months  
10          after the effective date of the agreement under  
11          subparagraph (A), the Academies, as part of  
12          such agreement, shall submit to the Director  
13          and the Committee on Science, Space, and  
14          Technology of the House of Representatives  
15          and the Committee on Commerce, Science, and  
16          Transportation of the Senate the report re-  
17          ferred to in such subparagraph, as updated pur-  
18          suant to such subparagraph.

19       (d) RESEARCH ETHICS.—

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

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

1 (B) the incorporation of ethical, social,  
2 safety, and security considerations into the re-  
3 search design and review process for Federal  
4 awards, may help mitigate potential harms be-  
5 fore they happen;

6 (C) the Foundation's agreement with the  
7 Academies to conduct a study and make rec-  
8 ommendations with respect to governance of re-  
9 search in emerging technologies is a positive  
10 step toward accomplishing this goal; and

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

16 (2) ETHICS STATEMENTS.—Drawing on stake-  
17 holder input, not later than 18 months after the  
18 date of enactment of this Act, the Director shall  
19 amend award proposal instructions to include a re-  
20 quirement for an ethics statement to be included as  
21 part of any proposal for funding prior to making the  
22 award. Such statement shall be considered by the  
23 Director in the review of proposals, taking into con-  
24 sideration any relevant input from the peer-reviewers  
25 for the proposal, and shall factor into award deci-

1        sions as deemed necessary by the Director. Such  
2        statements may include, as appropriate—

3                (A) any foreseeable or quantifiable risks to  
4                society, including how the research could enable  
5                products, technologies, or other outcomes that  
6                could intentionally or unintentionally cause sig-  
7                nificant societal harm;

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

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

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

20        (4) RESEARCH.—The Director shall award  
21        grants, on a competitive basis, to institutions of  
22        higher education or non-profit organizations (or con-  
23        sortia of such institutions or organizations) to sup-  
24        port—

1 (A) research to assess the potential ethical  
2 and societal implications of Foundation-sup-  
3 ported research and products or technologies  
4 enabled by such research, including the benefits  
5 and risks identified pursuant to paragraph  
6 (2)(A); and

7 (B) the development and verification of ap-  
8 proaches to proactively mitigate foreseeable  
9 risks to society, including the technical and so-  
10 cial solutions identified pursuant to paragraph  
11 (2)(B).

12 (5) ANNUAL REPORT.—The Director shall en-  
13 courage awardees to update their ethics statements  
14 as appropriate as part of the annual reports re-  
15 quired by all awardees under the award terms and  
16 conditions.

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

23 (1) DATA MANAGEMENT PLANS.—

24 (A) The Director shall require that every  
25 proposal for funding for research include a ma-

chine-readable data management plan that includes a description of how the awardee will archive and preserve public access to data, software, and code developed as part of the proposed project.

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

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

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

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

(2) OPEN REPOSITORIES.—The Director shall—

(A) coordinate with the heads of other Federal science agencies, and solicit input from the scientific community, to develop and widely

1 disseminate a set of criteria for trusted open re-  
2 positories, accounting for discipline-specific  
3 needs and necessary protections for sensitive in-  
4 formation, to be used by Federally funded re-  
5 searchers for the sharing of data, software, and  
6 code;

7 (B) work with stakeholders to identify sig-  
8 nificant gaps in available repositories meeting  
9 the criteria developed under subparagraph (A)  
10 and options for supporting the development of  
11 additional or enhanced repositories;

12 (C) award grants on a competitive basis to  
13 institutions of higher education or non-profit  
14 organizations (or consortia of such institutions  
15 or organizations) for the development, up-  
16 grades, and maintenance of open data reposi-  
17 tories that meet the criteria developed under  
18 subparagraph (A);

19 (D) work with stakeholders and build on  
20 existing models, where appropriate, to establish  
21 a single, public, web-based point of access to  
22 help users locate repositories storing data, soft-  
23 ware, and code resulting from or used in Foun-  
24 dation-supported projects;

1           (E) work with stakeholders to establish the  
2           necessary policies and procedures and allocate  
3           the necessary resources to ensure, as prac-  
4           ticable, data underlying published findings re-  
5           sulting from Foundation-supported projects are  
6           deposited in repositories meeting the criteria  
7           developed under subparagraph (A) at the time  
8           of publication;

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

12          (G) coordinate with the scientific pub-  
13          lishing community to develop uniform consensus  
14          standards around data archiving and sharing.

15          (3) RESEARCH, DEVELOPMENT, AND EDU-  
16          CATION.—The Director shall award grants, on a  
17          competitive basis to institutions of higher education  
18          or non-profit organizations (or consortia of such in-  
19          stitutions or organizations) to—

20               (A) support research and development of  
21               open source, sustainable, usable tools and infra-  
22               structure that support reproducibility for a  
23               broad range of studies across different dis-  
24               ciplines;

1 (B) support research on computational re-  
2 producibility, including the limits of reproduc-  
3 ibility and the consistency of computational re-  
4 sults in the development of new computation  
5 hardware, tools, and methods; and

6 (C) support the education and training of  
7 students, faculty, and researchers on computa-  
8 tional methods, tools, and techniques to improve  
9 the quality and sharing of data, code, and sup-  
10 porting metadata to produce reproducible re-  
11 search.

12 (f) CLIMATE CHANGE RESEARCH.—

13 (1) IN GENERAL.—The Director shall award  
14 grants, on a competitive basis, to institutions of  
15 higher education or non-profit organizations (or con-  
16 sortia of such institutions or organizations) to sup-  
17 port research to improve our understanding of the  
18 climate system and related human and environ-  
19 mental systems.

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

22 (A) fundamental research on climate  
23 forcings, feedbacks, responses, and thresholds  
24 in the earth system;



1 (B) research on climate-related human be-  
2 haviors and institutions;

3 (C) research on climate-related risk, vul-  
4 nerability, resilience, and adaptive capacity of  
5 coupled human-environment systems, including  
6 risks to ecosystem stability and risks to vulner-  
7 able populations;

8 (D) research to support the development  
9 and implementation of effective social strategies  
10 and tools for mitigating and adapting to climate  
11 change, including at the local level;

12 (E) improved modeling, projections, anal-  
13 yses, and assessments of climate and other  
14 Earth system changes;

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

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

25 (g) VIOLENCE RESEARCH.—

1           (1) IN GENERAL.—The Director shall award  
2       grants, on a competitive basis, to institutions of  
3       higher education or non-profit organizations (or con-  
4       sortia of such institutions or organizations) to sup-  
5       port research to improve our understanding of the  
6       nature, scope, causes, consequences, prevention, and  
7       response to all forms of violence.

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

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

12           (B) research on risk and protective factors;

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

16           (D) research on scaling up effective inter-  
17       ventions; and

18           (E) one or more interdisciplinary research  
19       centers to conduct violence research, foster new  
20       and expanded collaborations, and support ca-  
21       pacity building activities to increase the number  
22       and diversity of new researchers trained in  
23       cross-disciplinary violence research.

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

1           (1) actively communicate opportunities and so-  
2       licit proposals for social, behavioral, and economic  
3       science researchers to participate in cross-cutting  
4       and interdisciplinary programs, including the Con-  
5       vergence Accelerator and Big Ideas activities, and  
6       the Mid-Scale Research Infrastructure program; and

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

10       (i) FOOD-ENERGY-WATER RESEARCH.—The Direc-  
11     tor shall award grants on a competitive basis to institu-  
12     tions of higher education or non-profit organizations (or  
13     consortia of such institutions or organizations) to—

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

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

22           (3) support research that will lead to innovative  
23       solutions to critical food-energy-water system prob-  
24       lems; and

1           (4) grow the scientific workforce capable of  
2       studying and managing the food-energy-water sys-  
3       tem, through education and other professional devel-  
4       opment.

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

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

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

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

21           (C) integrating sustainable chemistry prin-  
22       ciples into elementary, secondary, under-  
23       graduate, and graduate chemistry and chemical  
24       engineering curriculum and research training,

1 as appropriate to that level of education and  
2 training; and

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

6 (k) RISK AND RESILIENCE RESEARCH.—The Direc-  
7 tor shall award grants on a competitive basis to institu-  
8 tions of higher education or non-profit organizations (or  
9 consortia of such institutions or organizations) to advance  
10 knowledge of risk assessment and predictability and to  
11 support the creation of tools and technologies for in-  
12 creased resilience through—

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

16 (2) the creation of novel engineered systems so-  
17 lutions for resilient infrastructures, particularly  
18 those that leverage the growing infusion of cyber-  
19 physical-social components into the infrastructures;  
20 and

21 (3) research on the behaviors individuals and  
22 communities engage in to detect, predict, assess,  
23 mitigate, and prevent risks and to improve and in-  
24 crease resilience.

1        (l) LEVERAGING INTERNATIONAL EXPERTISE IN RE-  
2 SEARCH.—The Director shall explore and advance oppor-  
3 tunities for leveraging international capabilities and re-  
4 sources that align with the Foundation and United States  
5 research community priorities and have the potential to  
6 benefit United States prosperity, security, health, and  
7 well-being, including by sending teams of Foundation sci-  
8 entific staff for site visits of scientific facilities and agen-  
9 cies in other countries.

10        (m) BIOLOGICAL RESEARCH COLLECTIONS.—

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

21            (2) SPECIMEN MANAGEMENT PLAN.—The Di-  
22 rector shall require that every proposal for funding  
23 for research that involves collecting or generating  
24 specimens include a specimen management plan that  
25 includes a description of how the specimens and as-

1       sociated data will be accessioned into and perma-  
 2       nently maintained in an established biological collec-  
 3       tion.

4               (3) ACTION CENTER FOR BIOLOGICAL COLLEC-  
 5       TIONS.—The Director shall award grants on a com-  
 6       petitive basis to institutions of higher education or  
 7       non-profit organizations (or consortia of such insti-  
 8       tutions or organizations) to establish an Action Cen-  
 9       ter for Biological Collections to facilitate coordina-  
 10      tion and data sharing among communities of prac-  
 11      tice for research, education, workforce training, eval-  
 12      uation, and business model development.

13 **SEC. 8. RESEARCH INFRASTRUCTURE.**

14       (a) FACILITY OPERATION AND MAINTENANCE.—

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

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

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

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

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

6 (A) an assessment, that includes feedback  
7 from the research community, of the effective-  
8 ness of the pilot program for—

9 (i) supporting research directorates  
10 and divisions in balancing investments in  
11 research grants and funding for the initial  
12 operation and maintenance of major facili-  
13 ties;

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

16 (iii) facilitating interagency and inter-  
17 national partnerships;

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

20 (v) supporting facility divestment  
21 costs; and

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

24 (b) REVIEWS.—The Director shall periodically carry  
25 out reviews within each of the directorates and divisions



1 to assess the cost and benefits of extending the operations  
2 of research facilities that have exceeded their planned  
3 operational lifespan.

4 (c) HELIUM CONSERVATION.—

5 (1) MAJOR RESEARCH INSTRUMENTATION SUP-  
6 PORT.—

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

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

22 (2) ANNUAL REPORT.—No later than 1 year  
23 after the date of enactment of this Act and annually  
24 for the subsequent two years, the Director shall sub-  
25 mit an annual report to Congress on the use of

1 funding awarded by the Foundation for the purchase  
2 and conservation of helium. The report should in-  
3 clude—

4 (A) the volume and price of helium pur-  
5 chased;

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

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

10 (d) ADVANCED COMPUTING.—

11 (1) COMPUTING NEEDS.—To gather informa-  
12 tion about the computational needs of grant pro-  
13 posals submitted to the Foundation, the Director  
14 shall encourage and provide access to tools to facili-  
15 tate the inclusion of relevant measures of computa-  
16 tional performance needs in proposals for projects  
17 that require advanced computing, including the  
18 measures identified in the 2016 Academies report  
19 entitled “Future Directions for NSF Advanced Com-  
20 puting Infrastructure to Support U.S. Science and  
21 Engineering in 2017–2020”.

22 (2) REPORTS.—The Director shall document  
23 and publish on a regular basis a summary of the  
24 amount and types of advanced computing capabili-  
25 ties that are needed to respond to Foundation re-

1 search opportunities as identified under paragraph  
2 (1).

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

8 (A) draws on community input, informa-  
9 tion contained in research proposals, allocation  
10 requests, and Foundation-wide information  
11 gathering regarding community needs;

12 (B) reflects anticipated technology trends;

13 (C) informs users and potential partners  
14 about future facilities and services; and

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

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

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

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

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

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

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

18 (2) translate research into science and engineer-  
19 ing innovations, including through developing inno-  
20 vative approaches to connect research with societal  
21 outcomes, education and training for students and  
22 researchers on engaging with end users and the pub-  
23 lic, partnerships that facilitate research uptake, ap-  
24 plication, and scaling, prototype development, entre-  
25 preneurial education, developing tech-to-market

1 strategies, and partnerships that connect research  
2 products to businesses, accelerators, and incubators;

3 (3) develop and expand sustainable and mutu-  
4 ally-beneficial use-inspired and translational research  
5 and development partnerships and collaborations  
6 among institutions of higher education, including  
7 minority serving institutions and emerging research  
8 institutions, non-profit organizations, businesses and  
9 other for-profit entities, Federal or State agencies,  
10 community organizations, other Foundation direc-  
11 torates, national labs, international entities as ap-  
12 propriate, and other organizations;

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

16 (5) expand opportunities for researchers to con-  
17 tribute to use-inspired and translational research in-  
18 cluding through support for workshops and con-  
19 ferences, targeted incentives and training, and multi-  
20 disciplinary research centers;

21 (6) support the education, mentoring, and  
22 training of undergraduate students, graduate stu-  
23 dents, and postdoctoral researchers in use-inspired  
24 and translational approaches to research in key

1 focus areas identified under subsection (g) through  
2 scholarships, fellowships, and traineeships;

3 (7) support translational research infrastruc-  
4 ture, including platforms and testbeds, data manage-  
5 ment and software tools, and networks and commu-  
6 nication platforms for interactive and collective  
7 learning and information sharing; and

8 (8) identify social, behavioral, and economic  
9 drivers and consequences of technological innova-  
10 tions.

11 (d) ASSISTANT DIRECTOR.—

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

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

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

23 (A) advise the Director on all matters per-  
24 taining to use-inspired and translational re-  
25 search, development, and commercialization at

1 the Foundation, including partnership with the  
2 private sector and other users of Foundation  
3 funded research; and

4 (B) develop and implement the necessary  
5 policies and procedures to promote a culture of  
6 use-inspired and translational research within  
7 the Directorate and across the Foundation and  
8 carry out the responsibilities under paragraph  
9 (4).

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

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

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

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

24 (ii) between the Foundation and  
25 stakeholders in academia, the private sec-

1           tor, including non-profit entities, labor or-  
2           ganizations, Federal or State agencies, and  
3           international entities, as appropriate;

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

8           (D) approving all new programs within the  
9           Directorate;

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

16          (F) assessing the success of programs;

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

19          (H) performing other such duties per-  
20          taining to the purposes in subsection (b) as are  
21          required by the Director.

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



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

4       (e) ADVISORY COMMITTEE.—

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

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

12                (A) be individuals with relevant experience  
13       or expertise, including individuals from industry  
14       and national labs, educators, academic subject  
15       matter experts, technology transfer experts, and  
16       representatives of civil society and other non-  
17       governmental organizations; and

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

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

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

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

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

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

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

19 (2) Global competitiveness in critical tech-  
20 nologies.

21 (3) Cybersecurity.

22 (4) National security.

23 (5) STEM education and workforce.

24 (6) Social and economic inequality.

25 (h) TRANSFER OF FUNDS.—

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

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

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

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

19           (2) APPOINTMENTS.—The Director shall have  
20      the authority to—

21           (A) make appointments of scientific, engi-  
22      neering, and professional personnel without re-  
23      gard to the civil service laws as the Director de-  
24      termines necessary for carrying out research  
25      and development functions which require the

1 services of specially qualified personnel relating  
2 to the focus areas identified under subsection  
3 (g) and such other areas of national research  
4 priorities as the Director may determine; and

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

10 (j) ETHICAL, LEGAL, AND SOCIETAL CONSIDER-  
11 ATIONS.—The Director shall establish policies and set up  
12 formal avenues for public input, as appropriate, to ensure  
13 that ethical, legal, and societal considerations are explicitly  
14 integrated into the priorities for the Directorate, including  
15 the selection of focus areas under subsection (g), the  
16 award-making process, and throughout all stages of sup-  
17 ported projects.

18 (k) REPORTS AND ROADMAPS.—

19 (1) ANNUAL REPORT.—The Director shall pro-  
20 vide to the relevant authorizing and appropriations  
21 committees of Congress an annual report describing  
22 projects supported by the Directorate during the  
23 previous year.

24 (2) ROADMAP.—Not later than 1 year after the  
25 date of enactment of this Act, the Director shall pro-

vide to the relevant authorizing and appropriations committees of Congress a roadmap describing the strategic vision that the Directorate will use to guide investment decisions over the following 3 years.

(l) EVALUATION.—

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

(2) INCLUSIONS.—The evaluation shall include—

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

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

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

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

1           (1) a specific appropriation is made for the Di-  
2     rectorate; and

3           (2) the amount appropriated for the activities  
4     of the Foundation, other than the activities author-  
5     ized under this section, for each such fiscal year ex-  
6     ceeds the amount appropriated for the Foundation  
7     for fiscal year 2021, as adjusted for inflation in ac-  
8     cordance with the Consumer Price Index published  
9     by the Bureau of Labor Statistics of the Depart-  
10    ment of Labor.

11 **SEC. 10. ADMINISTRATIVE AMENDMENTS.**

12       (a) SUPPORTING VETERANS IN STEM CAREERS.—  
13     Section 3(c) of the Supporting Veterans in STEM Careers  
14     Act is amended by striking “annual” and inserting “bien-  
15     nial”.

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

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

20           “(3) COMPLIANCE REVIEW.—The Inspector  
21     General of the Foundation shall conduct a review of  
22     the compliance by the Board with the requirements  
23     described in paragraph (2) as necessary based on a  
24     triennial risk assessment. Any review deemed nec-  
25     essary shall examine the proposed and actual con-

1       tent of closed meetings and determine whether the  
2       closure of the meetings was consistent with section  
3       552b of title 5, United States Code.”; and

4               (2) by striking paragraphs (4) and (5) and in-  
5       serting the following:

6               “(4) MATERIALS RELATING TO CLOSED POR-  
7       TIONS OF MEETING.—To facilitate the risk assess-  
8       ment required under paragraph (3) of this sub-  
9       section, and any subsequent review conducted by the  
10      Inspector General, the Office of the National Science  
11      Board shall maintain the General Counsel’s certifi-  
12      cate, the presiding officer’s statement, and a tran-  
13      script or recording of any closed meeting, for at  
14      least 3 years after such meeting.”.

15      (c) SCIENCE AND ENGINEERING INDICATORS RE-  
16      PORT SUBMISSION.—Section 4(j)(1) of the National  
17      Science Foundation Act of 1950 (42 U.S.C. 1863(j)(1))  
18      is amended by striking “January 15” and inserting  
19      “March 15”.

○