



Side-by-side – NSF provisions comparison between: NSF for the Future Act (as passed by the House 6.28.21) and the America COMPETES Act of 2022 (as passed by the House 2.4.22); the Endless Frontier Act (Division B of the US Innovation and Competition Act, as passed by the Senate 6.8.21) and Division B of CHIPS and Science Act of 2022 (as passed by the Senate 7.27.22)

Last Updated: 27 July 2022

	America COMPETES Act of 2022 (H.R. 4521) and NSF for the Future Act (H.R. 2225)	US Innovation and Competition Act (S. 1260) (Division B of USICA is the Endless Frontier Act)	Division B of CHIPS and Science Act of 2022
Authorization of Appropriations (NSF)*	<p>Includes \$78B FY22-26 for NSF total (\$B) as follows: FY22 - \$12.5; FY23 - \$14.6; FY24 - \$15.9; FY25 - \$17.0; FY26 - \$17.9</p> <ul style="list-style-type: none"> Annual authorization levels provided for R&RA, EHR, Noyce, NRT, GRFP, Cyber SfS, AOAM, Mid-scale, MREFC, Directorate for SES, NSB, and OIG <p>Directorate for Science and Engineering Solutions (\$B): FY22 - \$1.4; FY23 - \$2.3; FY24 - \$2.9; FY25 - \$3.3; FY26 - \$3.4 = \$13B</p>	<p>Includes \$81B FY22-26 for NSF total; (\$B) as follows: FY22 - \$10.8B; FY23 - \$12.8; FY24 - \$16.6; FY25 - \$19.5; FY26 - \$21.3</p> <ul style="list-style-type: none"> not less than \$33m/year for OIG \$8.4B FY22-26 for STEM workforce programs, at least 20% of funds go to EPSCOR jurisdictions) 20% of total authorization to EPSCOR program <p>Directorate for Technology and Innovation (after 10% transfer to other NSF programs) (\$B): FY22 - \$1.6; FY23 - \$2.9; FY24 - \$5.7B; FY25 - \$7.6B; FY26 - \$8.4B = \$26B</p>	<p>Sec. 10303 -</p> <p>Includes \$81B FY23-27 for NSF total; (\$B) as follows: FY23 - \$11.9B; FY24 - \$15.7; FY25 - \$16.7; FY26 - \$17.8; FY27 - \$18.9</p> <p>Directorate for Technology, Innovation and Partnerships (\$B) FY23 - \$1.5; FY24 - \$3.4; FY25 - \$3.6B; FY26 - \$3.8B; FY27 - \$4.1B = \$16.2B</p> <p>TIP Scholarships and Fellowships FY23 - \$350m; FY24 - \$800m; FY25 - \$900m; FY26 - \$950m; FY27 - \$1B = \$4B (under the authorization for STEM Education)</p>
Establishing New Directorate			

<p>Governance</p>	<p>New “Directorate for Science and Engineering Solutions (SES)” led by an Assistant Director (AD) and guided by an advisory committee similar to other NSF directorates</p>	<p>New “Directorate for Technology and Innovation” led by an Assistant Director (AD)</p> <p>Creates an OSTP-led interagency working group, to coordinate activities and review key technology focus areas (across all agencies); requires NSF (and DOE) to annually review and update key technology focus areas in coordination with the working group.</p>	<p>Sec. 10381 -</p> <p>New “Directorate for Technology, Innovation and Partnerships” led by an AD and guided by an advisory committee of at least 10 members, 3 or more which must be from the private sector, and at least 1 with national security expertise.</p> <p>Creates an OSTP-led interagency working group, to coordinate activities and review key technology focus areas (across all agencies); requires NSF (and DOE) to annually review and update key technology focus areas in coordination with the working group.</p>
<p>Purposes/ Activities</p>	<p>Greater bill authorizes NSF programs and activities; includes establishment of a new Directorate for Science and Engineering Solutions (SES) to address societal and national challenges</p>	<p>Establishes a new Directorate for Technology and Innovation (T&I) within NSF to advance innovation in key technology areas</p>	<p>Sec. 10382 - Establishes the TIP Directorate to support use-inspired and translational research and accelerate development and use; strengthen US competitiveness by accelerated development of key technologies; growing the domestic workforce in key tech areas and improving participation in STEM at all levels.</p>
<p>Distribution of funds</p>	<p>Entrepreneurial Fellowships (authorizes \$100m FY22-26)</p> <p>Low-Income Scholarships (\$100m authorized)</p>	<p>Of money authorized to the T&I directorate, provides total authorizations of appropriations FY22-26 for:</p> <ul style="list-style-type: none"> • innovation centers (\$9.57B) – of which \$750m dedicated to capacity building for MSIs • scholarships and fellowships (\$5.22B – not less than 10% to community colleges and not less than 20% to ESPCOR jurisdictions; \$125m for hands-on learning programs); • research and development (\$4.35B); • test beds (\$2.9B); • academic technology transfer (\$4.06B); <p>Specific percentages set-aside for:</p>	<p>Sec. 10381 -</p> <p>Of money authorized to the TIP Directorate, provides total authorizations of appropriations FY23-27 for:</p> <ul style="list-style-type: none"> • (Sec. 10388) Regional Innovation Engines and (Sec. 10389) Translation Accelerators — “balance encouraged” between the number of Engines and Accelerators (\$6.5B FY23-27) • (Sec. 10309) test beds (no specific authorization); • (Sec. 10391) Planning and Capacity Building Awards to advance the development, adoption, or commercialization of technologies (\$3.1B FY23-27)

		<p>Each year, 10% of total funding to Directorate is transferred to other parts of NSF for collaboration activities</p> <p>20% of total T&I directorate funding goes to EPSCoR program</p>	<p>The Director must ensure that directorate activities avoid undue geographic concentration of R&D and education funding across the United States, and encourages broader participation in the key technology focus area workforce by populations historically underrepresented in STEM</p>
<p>Limitations on funding Directorate</p>	<p>No funds shall be available for transfer to the SES Directorate from other offices, directorates, or divisions within the Foundation.</p> <p>Funds may be transferred from Directorate to other areas of NSF to purposes consistent with authorization</p>	<p>Amounts authorized shall supplement, not supplant, any other amounts already appropriated to the Foundation or OIG</p> <p>Prohibits making new awards by the new directorate in any year where funding for rest of NSF does not receive inflationary increase</p> <p>No funds provided to the Directorate shall be used for construction</p>	<p>No limitation language parallel to previous bills</p> <p>Sec. 10387 - As part of its budget request, NSF shall provide a description of how TIP funds will be used, and how the requested funding is complementary and not redundant of activities supported by other federal agencies.</p>
<p>Movement of funds from Directorate</p>	<p>Funds made available to carry out the SES Directorate shall be available for transfer to other offices, directorates, or divisions within the Foundation for such use as is consistent with the purposes for which such funds are provided.</p>	<p>Directorate for T&I may partner with other NSF directorates, and other federal agencies for projects that advance research and workforce training related to the key technology focus areas.</p>	<p>Sec. 10383 - Under activities, TIP is directed to Partner with other directorates and offices of the NSF</p>
<p>Assistant Director</p>	<p>Establishes an Assistant Director and includes:</p> <ul style="list-style-type: none"> • Term limit no longer than 4 years • Qualifications are specified • Responsibilities are described in detail 	<p>Assistant Director is appointed in the same manner as other Assistant Directors of the Foundation are appointed. Qualifications specified.</p>	<p>Sec. 10385 - Assistant Director is appointed in the same manner as other Assistant Directors of the Foundation are appointed. Qualifications and responsibilities specified.</p>
<p>Personnel Authorities</p>	<p>Provides additional authorities to Director to appoint staff which require specially qualified personnel related to the 5 focus areas determined by the Director and other areas of national research priority (authority applies across all of NSF, including new directorate)</p>	<p>T&I program directors should have special expertise in key technology focus areas, limited terms (renewable by Director).</p> <p>Provides direct hiring authority (outside of competitive civil service) to NSF Director (authority applies across all of NSF, including new directorate) which may apply to Federally funded fellows or rotators who have completed service within 2 years or exercising the hiring authority.</p>	<p>Sec. 10396 -</p> <p>Provides additional authorities to Director to appoint up to 70 staff who require specially qualified science and engineering personnel (authority applies across all of NSF, including new directorate). There is also new authority provided for hiring of up to 70 highly qualified experts in areas such as business creativity, venture capital, etc.</p>

		Authorizes NSF to create a program to recruit eminent experts in science and engineering outside of current civil service hiring authorities and salary limitations	TIP program directors should have special expertise in key technology focus areas or challenges and come from a variety of backgrounds, limited terms (renewable by Director). R&D awards made through TIP may use diverse merit review models for selection of award recipients including internal review and different models that use peer review.
Advisory Body	Establishes an Advisory Committee under FACA rules like many of the other NSF Directorates	No similar measure	Sec. 10386 - Establishes an Advisory Committee under FACA rules like many of the other NSF Directorates
Selection of Recipients	New SES Assistant director has authority to develop and test diverse merit review models and mechanisms for selecting and providing awards for use-inspired and translational research and development at different scales, from individual investigator awards to large multi-institution collaborations.	May use peer review or other authorities Report required on impacts of using non-traditional selection	Sec. 10385 - Among other things, TIP Assistant Director is responsible for developing and testing diverse merit review models and mechanisms for selecting and providing awards for use-inspired and translational research and development at different scales, from individual investigator awards to large multi-institution collaborations.
Focus Areas	The Director shall identify no more than 5 focus areas. The Director should consider the following societal challenges in establishing the focus areas: (1) Climate change and environmental sustainability (2) Global competitiveness in and domestic job creation in critical technologies (3) Cybersecurity (4) National security (5) STEM education and workforce (6) Social and economic inequality	The bill identifies 10 initial key technology focus areas, to be reviewed every year by NSF Director and others and limits the areas to not exceed 10: (1) artificial intelligence, machine learning, autonomy and related advances (2) high performance computing, semiconductors, and advanced computer hardware and software (3) quantum information science and technology (4) robotics, automation, and advanced manufacturing (5) natural and anthropogenic disaster prevention or mitigation (6) advanced communications technology and immersive technology (7) biotechnology, medical technology, genomics, and synthetic biology (8) data storage,	Sec. 10387 – The Director, in consultation with the AD, NSB, and interagency working group, shall identify: <ul style="list-style-type: none"> • Not more than 5 societal, national, and geostrategic challenges that may be addressed by technology; and • Not more than 10 key technology focus areas; Initial lists of challenges and key technology focus areas are identified in the legislation, as follows: <i>Initial Challenges:</i>

		<p>data management, distributed ledger technologies, and cybersecurity, including biometrics</p> <p>(9) advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation</p> <p>(10) advanced materials science, including composites and 2D materials</p>	<p>(1) United States national security.</p> <p>(2) United States manufacturing and industrial5 productivity.</p> <p>(3) United States workforce development and skills gaps.</p> <p>(4) Climate change and environmental sustainability.</p> <p>(5) Inequitable access to education, opportunity, or other services.</p> <p><i>Initial Key Tech Focus Areas:</i></p> <p>(1) Artificial intelligence, machine learning, autonomy, and related advances.</p> <p>(2) High performance computing, semiconductors, and advanced computer hardware and software.</p> <p>(3) Quantum information science and technology.</p> <p>(4) Robotics, automation, and advanced manufacturing.</p> <p>(5) Natural and anthropogenic disaster prevention or mitigation.</p> <p>(6) Advanced communications technology and immersive technology.</p> <p>(7) Biotechnology, medical technology, genomics, and synthetic biology.</p> <p>(8) Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics.</p> <p>(9) Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 (42 U.S.C. 1874).</p> <p>(10) Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies.</p> <p>The Director is also permitted to make limited investments in technologies or areas not</p>
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			identified as a challenge or key technology focus area.
Focus Area Regular Review	Director, NSB, and other Federal agencies shall “regularly update” up to 5 focus areas	<p>Director, in coordination with DOE shall annually review and update key technology focus areas:</p> <ul style="list-style-type: none"> • Review process shall consider industry input and may consider other inputs • May add or delete key technology focus areas in light of national needs or competitive threats • Never more than 10 total areas • Annual report to Congress on key areas and rationale • As part of annual budget request, NSF and DOE provide details on activities to be funded and avoids duplication. • Within 5 years requires Director to contract with NASEM to review key technology focus areas 	<p>Section 10387 -</p> <p>Director will review and update annually the key tech list, with coordination from interagency working group and consultation with DNI and FBI. Technologies can be added or deleted as long as the number does not exceed 10.</p> <p>Challenges will also be annually reviewed and updated as appropriate.</p> <p>Following the review and update of challenges and key tech areas, NSF will provide a report to Congress explaining the selections, rationale, and impact.</p> <p>Within 5 years of enactment, the National Academies shall review the challenge and focus areas and assessing progress in domestic and global competitiveness</p>
Activities of Directorate	<p>May provide awards in the form of grants, contracts, cooperative agreements, cash prizes, and other transactions</p> <p>Support use-inspired and translational research and development through a variety of activities (diverse research funding models, innovative approaches to tech transfer, partnerships, capacity building, conferences and workshops, translational research infrastructure, and education, training, and mentorship).</p> <p>Requires development of policies to ensure ethical, legal, and societal considerations are integrated into SES activities</p>	<p>The Directorate:</p> <ul style="list-style-type: none"> • Shall support basic and applied research, and technology development through awards to individual researchers, entities, or consortia and through diverse funding mechanisms and models • Shall identify opportunities to coordinate and collaborate with other directorates of NSF, other agencies, and external stakeholders on projects or research, development and commercialization • Shall fund projects designed to achieve specific technology metrics or objectives; 	<p>Section 10383 -</p> <p>Director shall achieve purposes by making awards that:</p> <ul style="list-style-type: none"> • Support transformational advances in use-inspired and translational R&D, though diverse funding mechanisms and models at different scales, • Encourage translation of research into innovations, processes and products; • Develop mutually beneficial partnerships and collaborations; • Partner with other directorates and offices of the NSF; • Build capacity and infrastructure for use-inspired and translational research at IHEs;

	Authorizes private sector entities as eligible potential recipients for awards distributed from the new directorate	<ul style="list-style-type: none"> • May support research and technology infrastructure • Shall identify ways to reduce barriers to tech transfer • Shall build capacity for research at IHEs across the nation • Shall partner with other directorates and offices of the Foundation for projects or research (including social and ethical considerations) to advance key technology areas and affiliated workforce; • May make SBIR/STTR awards 	<ul style="list-style-type: none"> • Support education, mentoring, and training of undergrad-grad students, including through scholarships, fellowships, and traineeships; • Identify social, behavioral and economic drivers and consequences of technological innovations; • Identify social, behavioral and economic drivers and consequences of technological innovations
Reporting Requirements	No similar measure	Requires NSF to submit to Congress a vision and spend plan for the next 5 years of the Directorate, as well as a plan to seek additional investment from other countries and non IHEs, and how the SES will secure federally funded S&T (per provisions of SASTA FY20 NDAA and FY21 NDAA)	<p>Sec.10399 -</p> <p>Director must report annual to Congress on projects supported by TIP;</p> <p>Roadmap providing strategic visions used to guide the next 3 year investment decisions required within a year of enactment;</p> <p>Report with other agencies every three years on how TIP will secure federally funded S&T (per provisions of SASTA FY20 NDAA and FY21 NDAA) and how NSF will increase funding for research and education for underserved populations;</p> <p>Within two years, NSF shall report to Congress on using alternatives to traditional peer review process for selection of awards.</p> <p>After 6 years of Directorate operation, the National Academies must evaluate how well the Directorate is achieving its purposes as well as recommended funding levels for the Directorate.</p>
New Programs within the Directorate	Within the new Science for Engineering Solutions Directorate, the bill authorizes 5-year awards for Technology Research Institutes in	Authorizes Directorate to establish: <ul style="list-style-type: none"> • University Technology Centers and Innovation Institutes 	Sec. 10392 – Entrepreneurial Fellowships – through the TIP Directorate, the Director shall award fellowships to PhD-trained scientists and

	<p>key technology areas, “as determined by the Director.”</p> <ul style="list-style-type: none"> The institutes may advance transdisciplinary research, development, and commercialization in key technology areas, including through support for multi-user testbeds and instrumentation, accessible repositories for research data and computational models, workshops, and graduate student traineeships. <p>Entrepreneurial Fellowships – through the SES Directorate, the Director shall award fellowships to PhD-trained scientists and engineers who have completed degrees within 5 years of application (authorizes \$100m FY22-26)</p> <p>Low-Income Scholarships – directs NSF to award scholarships, renewable up to 5 years, to students at associates, undergrad, and graduate levels (from SES Directorate, \$100m authorized)</p>	<ul style="list-style-type: none"> Research and technology development awards in the key technology focus areas Program to develop and operate testbeds and fabrication facilities related to technology focus areas Academic Technology Transfer to advance commercialization of technologies in key areas Capacity Building Program for Developing Universities –authorizes \$150m/year for a new capacity building program to increase the capacity of MSIs to compete for and manage NSF R&D awards (eligible institutions must not receive more than \$50m in annual federal R&D funding) (sec. 2110) <p>Also requires T&I to make scholarships and fellowships in key technology areas – can be directly to students or to institutions and consortia; and to other federal agencies.</p>	<p>engineers who have completed degrees within 5 years of application (authorizes \$125m FY23-27)</p> <p>May leverage existing programs to carry out scholarship and fellowship programs authorized by section 10393:</p> <ul style="list-style-type: none"> Requires T&I to make scholarships and fellowships in key technology areas – can be directly to students or to institutions and consortia, and to other federal agencies. Low-Income Scholarships – directs NSF to award scholarships, renewable up to 5 years, to students at associates, undergrad, and graduate levels (from TIP Directorate, \$100m authorized). <p>Sec. 10394 - Research and technology development awards in the key technology focus areas and challenges (from TIP Directorate, \$1B FY23-27)</p> <p>Sec. 10395 - Scaling Innovations in PreK-12 STEM Education – authorizes new Centers to support implementation of STEM Education Innovations</p>
Current Programs	The Convergence Accelerator, the Growing Convergence Research Big Idea, and any other program, at the discretion of the Director, may be managed by the Directorate.	The Convergence Accelerator, IUCRC, National AI Research Institutes, I-Corps, and any other program, at the discretion of the Director, may be managed by the Directorate.	Sec. 10383 - Includes convergence accelerators in activities of new directorate
Other NSF Provisions (Not specific to the creation of a new Directorate)			
Emerging Research Institutions	The bill defines “Emerging Research Institution” as a university with an established undergraduate student program that receives < \$35M in federal research funding.	Identical definition included	Sec. 10002 - The term “emerging research institution” means an institution of higher education with an established undergraduate or graduate program that has less than \$50,000,000 in Federal research expenditures.

<p>Capacity Building</p>	<p>Establishes a 5-year pilot program on research and education partnerships with “emerging research institution” (ERI) and R1 (as defined by Carnegie Classification) on multi-institutional awards; at least 25% of awards >\$1m must be directed to capacity building at ERI</p> <p>Updates TCUP and authorizes \$107m FY22-26 Fostering STEM Research Diversity and Capacity Program –authorizes \$150m/year for a new program for research capacity building (including students) at research institutions not in the top 100 of federal research funding, (caps total funding per institution/yr at \$10m)</p> <p>Capacity Building Program for Developing Universities –authorizes \$200m for FY22 and \$250/yr FY23-26 for a new capacity building program to increase the capacity of MSIs to compete for and manage NSF R&D awards (eligible institutions must not receive more than \$50m in annual federal R&D funding and must only compete against like-institutions)</p> <p>Planning and Capacity Building Grants (sec. 11) Amends the Partnerships for Innovation (PFI program) statute to authorize \$40 million/yr in grants for technology transfer capacity building for smaller research institutions, including support for technology transfer expert staff, private sector partnerships, and education and training of students and researchers. Eligible institutions must not be in the top 100 institutions. Grant floor is \$500k and 3 years</p>	<p>Establishes a 5-year pilot program on research and education partnerships led by at least one “emerging research institution” (ERI) and at least one R1 (that has received more than \$100m in federal research funding) to “enable such institutions to contribute to programs run by the Directorate.”</p> <p>Bill requires multiple pilot programs to aid eligible grantees in successfully competing for Foundation grants (sec. 2206).</p> <p>Capacity Building Program for Developing Universities is authorized within the Directorate in S. 1260.</p>	<p>Sec. 10325 (c) - Establish a five-year pilot program for awards to research partnerships that involve emerging research institutions and may involve institutions classified as very high research activity by the Carnegie Classification of Institutions of Higher Education. On multi-institutional awards >\$1 million at least 35% of the total award must go to one or more emerging research institution. Funds awarded to emerging research institutions may be used to build research capacity, including through support for faculty salaries and training, field and laboratory research experiences for undergraduate and graduate students, and maintenance and repair of research equipment and instrumentation.</p> <p>Sec. 10325 (b) - Authorizes \$150,000,000 over 5 years (FY23-27) a new “Fostering STEM Research Diversity and Capacity Program” for institution of higher education that, according to the data published by the National Center for Science and Engineering Statistics, is not, on average, among the top 100 institutions in Federal research and development expenditures during the 3-year period prior to the year of the award - to implement and study innovative approaches for building research capacity in order to engage and retain students from a range of institutions.</p> <p>Sec. 10524 - Capacity Building Program for Developing Universities –authorizes \$200m for FY23 and \$250/yr FY2-27 for a new capacity building program to increase the capacity of MSIs to compete for and manage NSF R&D awards (eligible institutions must not receive more than \$50m in annual federal R&D funding and not be an institution classified as having very high research activity by the Carnegie Classification on Institutions of Higher Education. NSF is encouraged to hold separate</p>
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			competitions for each type of eligible to ensure fair competition for different types of MSIs
Equity/ Broadening Participation	<p>Expands Presidential Awards for Excellence in Math and Science Teaching to include awardees from US territories.</p> <p>Supports expanding outreach for NSF scholarship and fellowship programs</p> <p>Creates a Chief Diversity Officer and authorizes related activities at NSF \$25m FY22-26</p> <p>Authorizes the INCLUDES program</p> <p>At least 3 multidisciplinary Centers for Transformative Education Research and Translation authorized to implement preK-12 STEM education innovations</p> <p>Supports research on prek-8 STEM student engagement (including underrepresented and rural students in STEM) with the goal to prepare students to pursue degrees or careers in STEM.</p> <p>Authorizes \$15m for a new grant program to support women and minorities in STEM</p>	<p>Consortia awards for innovation institutes require diverse partnerships must include (as lead or partner) at least one HBCU, MSI, institution participating in EPSCOR, ERI, or Community College.</p> <p>Creates a Chief Diversity Officer and authorizes related activities at NSF \$25m FY22-26</p> <p>Requires OSTP to establish federal agency guidance for caregiver policies applicable to all federal research grants and PIs</p>	<p>Sec. 10321 - Presidential awards for excellence in mathematics and science expanded to include awardees from U.S. territories.</p> <p>Sec. 10322 - Robert Noyce Teacher Scholarship program update to expand outreach activities.</p> <p>Sec. 10323 - Authorizes the INCLUDES program and renames it the “Eddie Bernice Johnson Inclusion across the Nation of Communities of Learners of Underrepresented Discoverers in Engineering and Science Initiative”</p> <p>Sec. 10324 - Broadening participation on major facilities awards - organizations seeking a cooperative agreement for the management of the operations and maintenance of a Foundation project to demonstrate prior experience and current capabilities in or to have a plan for employing best practices in broadening participation in science and engineering and ensure implementation of such practices is considered in oversight of the award.</p> <p>Sec. 10326 - Authorizes a new program to fund research focused on diversity and inclusion in the technology sector.</p> <p>Sec. 10327 - Creates a Chief Diversity Officer and authorizes related activities at NSF \$5m FY23-27.</p> <p>Sec. 10328 - Authorizes (\$5 million per year 2023- 2027) a new program to research and disseminate best practices for increasing the participation of women and underrepresented minorities in STEM fields.</p> <p>Sec. 10329 - Authorizes (\$8 m/year FY23-27) a new program to increase the recruitment,</p>

			<p>retention, and advancement of individuals from underrepresented minority groups in academic STEM careers. Additionally, this section also authorizes a new program (\$15 m/yr FY23-27) to expand research-based reforms in undergraduate STEM education for the purpose of recruiting and retaining students from minority groups who are underrepresented in STEM fields.</p> <p>Sec. 10330 - Give the NSF Director the authority to conduct multiple pilot programs, within the Foundation to expand the number of institutions of higher education (including such institutions that are community colleges), and other eligible entities to successfully compete for Foundation awards.</p>
Geographic Diversity	Includes a Sense of Congress that EPSCoR should maintain its experimental component to improve research capacity and competitiveness	Requires 20% of all funds received by NSF and T&I Directorate go to EPSCoR program; 20% of scholarships and fellowships funded by NSF and T&I Directorate awarded within EPSCoR jurisdictions	<p>Sec. 10325 -</p> <p>To the maximum extent practicable NSF is instructed to fund research and related activities, and science, mathematics, and engineering education and human resources programs and activities, excluding those amounts made available for polar research and operations support (and operations and maintenance of research facilities) to EPSCoR institutions at the following funding levels:</p> <ul style="list-style-type: none"> • 15.5 percent in FY23 • 16 percent in FY24 • 16.5 percent in FY25 • 17 percent in FY26 • 18 percent in FY27 • 19 percent in FY28 • 20 percent in FY29 <p>Additionally, NSF instructed to the maximum extent practicable to award scholarships (including at community colleges), graduate fellowships and traineeships, and postdoctoral</p>

			<p>awards to support EPSCoR institutions at the following levels:</p> <ul style="list-style-type: none"> • 16 percent in FY23 • 18 percent in FY24 • 20 percent in each of FY25-FY29
<p>Education/ Workforce provisions</p>	<p>Supports research on workforce needs at four-year institutions</p> <p>Supports mentoring and professional development and research for graduate education</p> <p>Increases authorization and stipends for Graduate Research Fellowship Program and National Research Traineeship</p> <p>Requires AI graduate students to be supported by both fellowships and traineeships at NSF</p> <p>NSF must support a study to assess AI research capacity at US IHEs</p> <p>Director must conduct a portfolio analysis of NSF's skilled technical workforce investments</p> <p>Requires research and data initiative on cyber workforce</p> <p>Incorporates elements of art and design into Math and Science education Partnerships grants and teacher institutes</p> <p>Requires a 4-year pilot program to establish at least 5 Centers to develop and scale up successful models to provide undergraduate students hands-on, discover-based research courses.</p>	<p>Requires the Director to issue scholarships, fellowships and traineeships through a variety of mechanisms; includes focus on increasing the participation of those underrepresented in STEM; innovations in graduate education. May leverage existing programs</p>	<p>Sec. 10311 (c) - Authorizes \$60m/yr for years FY23-32 for a National STEM Teacher Corps Pilot</p> <p>Sec. 10313 - Graduate STEM Education</p> <ul style="list-style-type: none"> • Supports mentoring and professional development and research for graduate education and post docs through grant supplements. • Increases authorization and stipends for Graduate Research Fellowship Program and National Research Traineeship • Authorizes a new AI-for-Service program to recruit and train artificial intelligence professionals to lead and support the application of artificial intelligence to the missions of Federal, State, local, and Tribal governments. <p>Sec. 10314 - Requires NSF to conduct a full portfolio analysis of the Foundation's skilled technical workforce investments across all Directorates in the areas of education, research, infrastructure, data collection, and analysis.</p> <p>Sec. 10315 - Authorizes a new program focused on cyber workforce and development.</p> <p>Sec. 10316 - Expands the Federal Cyber Scholarship-for-Service program to include any "cybersecurity-related aspects of other related fields as appropriate, including artificial</p>

			<p>intelligence, quantum computing and aerospace;”</p> <p>Sec. 10317 - Creates a new cybersecurity workforce data initiative in collaboration with NIST.</p> <p>Sec. 10318 - Authorizes a new program to support microelectronic workforce development. Including the creation of a traineeship programs for graduate students who pursue microelectronics research.</p> <p>Sec. 10319 - Incorporates elements of art and design into Math and Science education Partnerships grants and teacher institutes</p> <p>Sec. 10321 - Encouraged the NSF to issue undergraduate scholarships, including at community colleges, graduate fellowships and traineeships, postdoctoral awards, and other awards, to address STEM workforce gaps, including for programs that recruit, retain, and advance students to a bachelor’s degree in a STEM discipline concurrent with a secondary school diploma, through existing and new partnerships with State educational agencies.</p> <p>Sec. 10601 - Authorizes a new 2-year early career research fellowship program.</p>
Miscellaneous provisions	<p>NSF must conduct assessment of broader impacts (BI) application and support research to improve BI implementation</p> <p>Includes multiple provisions directing NSF to support research in certain topics (diversity in technology sectors, measuring federal R&D impacts on society, biological field stations, risk and resilience, UAV technologies, Critical Minerals, AI research capacity, IoT Precision Agriculture, climate change, violence, clean</p>	Requires NAPA study starting 30 days after enactment to make recommendations on implementing the Directorate for T&I and recommend coordination with rest of agency	<p>Sec. 10312 - Reauthorizes and updates the Advanced Technological Education program (\$150m authorized annually FY23-27)</p> <p>Sec. 10341 - NSF must conduct assessment of broader impacts (BI) application and support research to improve BI implementation</p>

	<p>water, technology and social science, satellite constellations)</p> <p>Reauthorizes and updates the Advanced Technological Education program (\$150m authorized)</p> <p>All NSF proposals will require data management plans including plans to archive and ensure public access to all data, software and code; Director must support open data repositories.</p> <p>Authorizes NSF to facilitate access to the microgravity environment for awardees of funding from the Foundation</p> <p>Recognizes the contributions made by the 305-meter radio telescope at the Arecibo Observatory in Puerto Rico and encourages NSF and NASA to explore future opportunities for education and research at the site.</p> <p>Includes language requiring NSF to make grants to support career and technical education (CTE) in STEM and computer science, and to prioritize those awards to institutions committed to providing CTE to veterans and Members of the Armed Forces transitioning to the private sector workforce.</p>		<p>Sec. 10342 - The NSF Director should continue to identify opportunities to reduce the administrative burden on researchers.</p> <p>Sec. 10343 - Within 2 years of enactment NSF should revise funding proposal instructions to require that ethical and societal considerations are to be included as part of a proposal for funding prior to making an award.</p> <p>Sec. 10344 - All NSF proposals will require data management plans including plans to archive and ensure public access to all data, software and code; Director must support open data repositories.</p> <p>Sec. 10345 - Authorizes NSF to make research awards focused on research to improve our understanding of the climate system and related human and environ4 mental systems</p> <p>Sec. 10346 - The NSF director shall actively communicate opportunities and solicit proposals for social, behavioral, and economic science researchers to participate in cross-cutting and interdisciplinary programs, including the Convergence Accelerator and agency priority activities, and the Mid-Scale Research Infrastructure program.</p> <p>Sec. 10347 - NSF is authorized to support research and development of data, models, indicators, and associated analytical tools to improve our understanding of the impacts of Federally funded research on society, the economy, and the workforce, including domestic job creation.</p>
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			<p>Sec. 10348 - NSF is authorized to support research to advance our understanding of the food-energy-water systems.</p> <p>Sec. 10349 - NSF shall continue to support enhancing, repairing and maintaining research instrumentation, laboratories, telecommunications and housing at biological field stations and marine laboratories.</p> <p>Sec. 10350 - NSF is authorized to support individual investigators and others to support the integration of sustainable chemistry principles into elementary, secondary, undergraduate, and graduate chemistry and chemical engineering curriculum and research training.</p> <p>Sec. 10351 - NSF is authorized to support research focused on the advancement of risk assessment and predictability and to support the creation of tools and technologies to support risk and resilience research.</p> <p>Sec. 10352 - NSF is authorized to support unmanned aircraft systems technologies research in coordination with the FAA and NAS, including support for undergraduate and graduate curriculum development.</p> <p>Sec. 10353 - NSF in consultation with the Under Secretary of Commerce for Oceans and Atmosphere and the Commandant of the Coast Guard, shall support research that will accelerate innovation to advance unmanned maritime systems.</p> <p>Sec. 10354 - NSF shall leverage international capabilities and resources that align with the Foundation and United States research community priorities and have the potential to</p>
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			<p>benefit United States prosperity, security, health, and well-being.</p> <p>Sec. 10355 - NSF shall continue to support databases, tools, methods, and other activities that secure and improve existing physical and digital biological research collections, improve the accessibility of collections and collection-related data for research and educational purposes, develop capacity for curation and collection management.</p> <p>Sec. 10356 - NSF shall support transdisciplinary research to significantly advance our understanding of water availability, quality, and dynamics and the impact of human activity and a changing climate on urban and rural water and wastewater systems, including in low-income, underserved, and disadvantaged communities.</p> <p>Sec. 10357 - NSF shall support research to increase understanding of social media and consumer technology access and use patterns and related mental health, behavioral, and substance use disorder issues, particularly for children and adolescents; and explore the role of social media and consumer technology in rising rates of mental health and substance use disorder issues, including within communities experiencing long-term economic distress.</p> <p>Sec. 10358 - Expands existing NSF manufacturing research to include additive manufacturing, including new material designs, complex materials, rapid printing techniques, and real-time process controls.</p>
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			<p>and NASA to explore future opportunities for education and research at the site.</p> <p>Sec. 10396 - Requires NAPA study starting 30 days after enactment to make recommendations on implementing the Directorate for T&I and recommend coordination with rest of agency</p>
<p>Standalone bills (with NSF provisions) incorporated into the legislation:</p>	<ul style="list-style-type: none"> • H.R. 4521, the Bioeconomy Research and Development Act of 2021 • H.R. 204, the STEM Opportunities Act • H.R. 210, the Rural STEM Education Research Act • H.R. 2027, the MSI STEM Achievement Act • H.R. 2695, the Combating Sexual Harassment in Science Act • H.R. 144, the Supporting Early-Career Researchers Act • H.R. 3858, the National Science and Technology Strategy Act of 2021 • H.R. 4606, the Energizing Technology Transfer Act • H.R. 4588, the Regional Innovation Act of 2021 • H.R. 6291, the Microelectronics Research for Energy Innovation Act 	<ul style="list-style-type: none"> • Advance Technological Manufacturing Act (\$150m authorized) • AI Scholarship-for-Service Act • Rural STEM Education Act • Quantum Network Infrastructure and Workforce Development Act • Supporting Early-Career Researchers Act • Advancing Precision Agriculture Capabilities Act • Critical minerals mining research • Bioeconomy R&D Act • Research Investment to Spark the Economy (RISE) Act 	<ul style="list-style-type: none"> • S.1418, the Bioeconomy Research and Development Act of 2021 • H.R. 204, the STEM Opportunities Act • H.R. 210/S. 1374, the Rural STEM Education Research Act • H.R. 2027, the MSI STEM Achievement Act • H.R. 2695, the Combating Sexual Harassment in Science Act • H.R. 144/S. 637, the Supporting Early-Career Researchers Act • H.R. 3858, the National Science and Technology Strategy Act of 2021 • H.R. 4606, the Energizing Technology Transfer Act • H.R. 4588, the Regional Innovation Act of 2021 • H.R. 6291, Micro Act • S. 1161, the Quantum Network Infrastructure and Workforce Development Act • H.R. 3784/S. 1395, Advancing IoT for Precision Agriculture Act of 2021 • H.R. 2637, American Critical Mineral Independence Act of 2021 • S. 1418, Bioeconomy Research and Development Act of 2021

<p>Research Security at NSF</p>	<p>Requires NSF to establish and Chief of Research Security and maintain a research security and policy office with at least 4 full time staff positions</p> <p>NSF must develop an online resource with NSF security policies and guidance materials for institutions and individual researchers</p> <p>NSF shall enter into an agreement for an independent organization to establish a risk assessment center to help NSF develop resources and awardees in risk assessment support</p> <p>NSF may request additional documents when disclosure reveals items requiring additional information, and may take actions to change grant terms or personnel; NSF required to justify requests and decisions and provide opportunity to comment and appeal.</p> <p>Bill defines “malign foreign talent recruitment program” and requires NSF to establish a policy to prohibit covered individuals on grants from participation in such programs with foreign countries of concern. Institutions must certify awardees are informed of requirement. International collaborations are not to be prohibited by this language.</p> <p>Requires NSF to support the development of security training modules for federal awardees</p> <p>Updates responsible conduct of research training to include mentoring, anti-sexual harassment, and security awareness.</p> <p>Requires ethics statements to be a part of all proposals to NSF, identifying potential societal risks of the research and mitigation plans, as appropriate.</p>	<p>Establishes an NSF Office for Research Security and Chief of Research Security position and staff (authorizes \$5m)</p> <p>OSTP shall support an independent entity to establish a Research Security and Integrity Information Sharing Analysis Organization (RSI-ISA) to assist the broad research community in risk assessments and research security improvements. Allows initial funding from NSF with a goal of moving to fee-based model.</p> <p>OSTP shall establish policies for federal science agencies prohibiting all research personnel (agency staff, PIs, and others) from participating in a foreign talent recruitment programs (FTRP) with China, N. Korea, Russia or Iran. FTRP is linked to the meaning provided in the NSPM-33. Any applicant for federal funding must disclose participation in FTRP from any other countries (not listed above) by submitting contracts to agency.</p> <p>Director shall establish an initiative to work with IHEs to ensure protection of IP, limit undue influence, and support the workforce.</p> <p>NIST shall disseminate resources to IHEs to assist with preventing cybertheft</p> <p>NSF Director must develop a plan to identify research areas that may include sensitive of controlled information, and provide background screenings for individuals who work in those research areas for NSF or receive funding from NSF.</p> <p>Mandates NSF collect final copies of any contracts, agreements, or documentation of financial transactions between universities, their foundations, and related organizations and any educational, cultural, or language entity that is</p>	<p>Sec. 10332 - Requires NSF to establish and appoint a Chief of Research Security within the Office of the Director to maintain a research security and policy office with at least 4 full-time staff positions (No authorized \$)</p> <p>Sec. 10333- NSF must provide an annual report to Congress on office activities, including administrative actions taken, recommendations for legislative and additional administrative actions, gaps in legal authorities needed, and IG cases relating to undue influence and potential IP theft/loss.</p> <p>Sec. 10334 - NSF must develop an online resource with NSF security policies and guidance materials for institutions and individual researchers.</p> <p>Sec. 10337 - Updates responsible conduct of research training to include mentoring, anti-sexual harassment, and security awareness.</p> <p>Sec. 10338 - OSTP shall support an independent entity to establish a Research Security and Integrity Information Sharing Analysis Organization (RSI-ISA) to assist the broad research community in risk assessments and research security improvements. Allows initial funding from NSF with a goal of moving to fee-based model.</p> <p>Sec. 10339 - NSF Director must develop a plan to identify research areas that may include sensitive of controlled information and provide background screenings for individuals who work in those research areas for NSF or receive funding from NSF.</p>
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<p>Research Security (OSTP/cross-government)</p>			<p>Sec. 10631 - Requires disclosure of participation in foreign talent recruitment programs (to be defined by OSTP) by all recipients of federal funding and prohibits participation in malign foreign talent recruitment programs (defined in sec. 10638)</p> <p>Sec. 10632 - Requires certification by grant recipients that they do not participate in a malign foreign talent recruitment program; IHEs must certify that employees are aware of this policy</p> <p>Sec. 10633 - Provides each agency the authority to require submission of copies of contracts and agreements reported by covered individuals as current and pending support in an application for funding</p> <p>Sec. 10634 - Requires all covered individuals on a research application to complete research security training</p>

<p style="text-align: center;">Research Infrastructure</p>	<p>Continues facility operation transition pilot program for a total of 5 years and cost-sharing for operations and maintenance</p> <p>MRI program shall support helium conservation research proposals</p> <p>NSF proposals shall include estimates of computational resource needs (as appropriate) and Director shall develop a roadmap on advanced computing needs</p> <p>NSF shall establish a Computing Enclave Pilot Program (\$38m authorized FY22-24)</p> <p>Establishes a National Secure Data Service demonstration project for government-wide statistical activities managed by the NCSES (\$9m authorized FY22-26)</p> <p>Waives cost-sharing requirements for MRI and Noyce teaching fellowships for 5 years</p> <p>Adds Davis-Bacon prevailing wage requirements to any construction activities funded through this title</p>	<p>No similar measures</p>	<p>Sec. 10371 - Continues facility operation transition pilot program of 10 – 50% for a total of 5 years and cost-sharing for operations and maintenance.</p> <p>Sec. 10373 - MRI program shall support helium conservation research proposals.</p> <p>Sec. 10374 - NSF proposals shall include estimates of computational resource needs (as appropriate) and Director shall develop a roadmap on advanced computing needs.</p> <p>NSF shall establish a Computing Enclave Pilot Program (\$38m authorized FY23-25)</p> <p>Sec. 10375 - Establishes a National Secure Data Service demonstration project for government-wide statistical activities managed by the NCSES (\$9m authorized FY23-27)</p> <p>Sec. 10320 - Waives mandatory cost-sharing for the Major Research Instrumentation Program and the Robert Noyce Teacher Scholarship Program for 5 years. Waives mandatory cost-sharing for the Major Research Instrumentation (MRI) Program and the Robert Noyce Teacher Scholarship Program for 5 years.</p>
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