



**Side-by-side – NSF provisions in the 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) compared to the Endless Frontier Act (Division B of the US Innovation and Competition Act, as passed by the Senate 6.8.21)**

*Last Updated: 10 February 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)
Authorization of Appropriations (NSF)*	<p><b>Includes \$78B FY22-26 for NSF total (\$B) as follows:</b>  <b>FY22 - \$12.5; FY23 - \$14.6; FY24 - \$15.9; FY25 - \$17.0; FY26 - \$17.9</b></p> <ul style="list-style-type: none"> <li>Annual authorization levels provided for R&amp;RA, EHR, Noyce, NRT, GRFP, Cyber Sfs, AOAM, Mid-scale, MREFC, Directorate for SES, NSB, and OIG</li> </ul> <p><b>Directorate for Science and Engineering Solutions (\$B):</b>  <b>FY22 - \$1.4; FY23 - \$2.3; FY24 - \$2.9; FY25 - \$3.3; FY26 - \$3.4 = \$13B</b></p>	<p><b>Includes \$81B FY22-26 for NSF total; (\$B) as follows:</b>  <b>FY22 - \$10.8B; FY23 - \$12.8; FY24 - \$16.6; FY25 - \$19.5; FY26 - \$21.3</b></p> <ul style="list-style-type: none"> <li>not less than \$33m/year for OIG</li> <li>\$8.4B FY22-26 for STEM workforce programs, at least 20% of funds go to EPSCOR jurisdictions)</li> <li>20% of total authorization to EPSCOR program</li> </ul> <p><b>Directorate for Technology and Innovation (after 10% transfer to other NSF programs) (\$B):</b>  <b>FY22 - \$1.6; FY23 - \$2.9; FY24 - \$5.7B; FY25 - \$7.6B; FY26 - \$8.4B = \$26B</b></p>
<b>Establishing New Directorate</b>		
Governance	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	New “Directorate for Technology and Innovation” led by an Assistant Director (AD)  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.
<b>Purposes/Activities</b>	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	Establishes a new Directorate for Technology and Innovation (T&I) within NSF to advance innovation in key technology areas
<b>Distribution of funds</b>	Entrepreneurial Fellowships (authorizes \$100m FY22-26)  Low-Income Scholarships (\$100m authorized)	Of money authorized to the T&I directorate, provides total authorizations of appropriations FY22-26 for: <ul style="list-style-type: none"> <li>• innovation centers (\$9.57B) – of which \$750m dedicated to capacity building for MSIs</li> <li>• 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);</li> <li>• research and development (\$4.35B);</li> <li>• test beds (\$2.9B);</li> <li>• academic technology transfer (\$4.06B);</li> </ul> <p>Specific percentages set-aside for:</p> <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&amp;I directorate funding goes to EPSCoR program</p>
<b>Limitations on funding Directorate</b>	No funds shall be available for transfer to the SES Directorate from other offices, directorates, or divisions within the Foundation.  Funds may be transferred from Directorate to other areas of NSF to purposes consistent with authorization	Amounts authorized shall supplement, not supplant, any other amounts already appropriated to the Foundation or OIG  Prohibits making new awards by the new directorate in any year where funding for rest of NSF does not receive inflationary increase  No funds provided to the Directorate shall be used for construction
<b>Movement of funds from Directorate</b>	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.	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.
<b>Assistant Director</b>	Establishes an Assistant Director and includes: <ul style="list-style-type: none"> <li>• Term limit no longer than 4 years</li> <li>• Qualifications are specified</li> </ul>	Assistant Director is appointed in the same manner as other Assistant Directors of the Foundation are appointed. Qualifications specified.

	<ul style="list-style-type: none"> <li>Responsibilities are described in detail</li> </ul>	
Personnel Authorities	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>T&amp;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>Authorizes NSF to create a program to recruit eminent experts in science and engineering outside of current civil service hiring authorities and salary limitations</p>
Advisory Body	Establishes an Advisory Committee under FACA rules like many of the other NSF Directorates	No similar measure
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.	<p>May use peer review or other authorities</p> <p>Report required on impacts of using non-traditional selection</p>
Focus Areas	<p>The Director shall identify no more than 5 focus areas. The Director should consider the following societal challenges in establishing the focus areas:</p> <ol style="list-style-type: none"> <li>(1) Climate change and environmental sustainability</li> <li>(2) Global competitiveness in and domestic job creation in critical technologies</li> <li>(3) Cybersecurity</li> <li>(4) National security</li> <li>(5) STEM education and workforce</li> <li>(6) Social and economic inequality</li> </ol>	<p>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:</p> <ol style="list-style-type: none"> <li>(1) artificial intelligence, machine learning, autonomy and related advances</li> <li>(2) high performance computing, semiconductors, and advanced computer hardware and software</li> <li>(3) quantum information science and technology</li> <li>(4) robotics, automation, and advanced manufacturing</li> <li>(5) natural and anthropogenic disaster prevention or mitigation</li> <li>(6) advanced communications technology and immersive technology</li> <li>(7) biotechnology, medical technology, genomics, and synthetic biology</li> <li>(8) data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics</li> </ol>

		<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>
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"> <li>• Review process shall consider industry input and may consider other inputs</li> <li>• May add or delete key technology focus areas in light of national needs or competitive threats</li> <li>• Never more than 10 total areas</li> <li>• Annual report to Congress on key areas and rationale</li> <li>• As part of annual budget request, NSF and DOE provide details on activities to be funded and avoids duplication.</li> <li>• Within 5 years requires Director to contract with NASEM to review key technology focus areas</li> </ul>
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>Authorizes private sector entities as eligible potential recipients for awards distributed from the new directorate</p>	<p>The Directorate:</p> <ul style="list-style-type: none"> <li>• Shall support basic and applied research, and technology development through awards to individual researchers, entities, or consortia and through diverse funding mechanisms and models</li> <li>• Shall identify opportunities to coordinate and collaborate with other directorates of NSF, other agencies, and external stakeholders on projects or research, development and commercialization</li> <li>• Shall fund projects designed to achieve specific technology metrics or objectives;</li> <li>• May support research and technology infrastructure</li> <li>• Shall identify ways to reduce barriers to tech transfer</li> <li>• Shall build capacity for research at IHEs across the nation</li> <li>• 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;</li> <li>• May make SBIR/STTR awards</li> </ul>
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)
<b>New Programs within the Directorate</b>	<p>Within the new Science for Engineering Solutions Directorate, the bill authorizes 5-year awards for Technology Research Institutes in key technology areas, “as determined by the Director.”</p> <ul style="list-style-type: none"> <li>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.</li> </ul> <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>	<p>Authorizes Directorate to establish:</p> <ul style="list-style-type: none"> <li>University Technology Centers and Innovation Institutes</li> <li>Research and technology development awards in the key technology focus areas</li> <li>Program to develop and operate testbeds and fabrication facilities related to technology focus areas</li> <li>Academic Technology Transfer to advance commercialization of technologies in key areas</li> <li>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&amp;D awards (eligible institutions must not receive more than \$50m in annual federal R&amp;D funding) (sec. 2110)</li> </ul> <p>Also requires T&amp;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>
<b>Current Programs</b>	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.
<b>Other NSF Provisions (Not specific to the creation of a new Directorate)</b>		
<b>Emerging Research Institutions</b>	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
<b>Capacity Building</b>	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	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

	<p>awards; at least 25% of awards &gt;\$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&amp;D awards (eligible institutions must not receive more than \$50m in annual federal R&amp;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>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><b>Equity/Broadening Participation</b></p>	<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>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>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>	
<b>Geographic Diversity</b>	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
<b>Education/Workforce provisions</b>	<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>	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
<b>Miscellaneous provisions</b>	NSF must conduct assessment of broader impacts (BI) application and support research to improve BI implementation	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>Includes multiple provisions directing NSF to support research in certain topics (diversity in technology sectors, measuring federal R&amp;D impacts on society, biological field stations, risk and resilience, UAV technologies, Critical Minerals, AI research capacity, IoT Precision Agriculture, climate change, violence, clean 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>Standalone bills (with NSF provisions) incorporated into the legislation:</p>	<ul style="list-style-type: none"> <li>• H.R. 4521, the Bioeconomy Research and Development Act of 2021</li> <li>• H.R. 204, the STEM Opportunities Act</li> <li>• H.R. 210, the Rural STEM Education Research Act</li> <li>• H.R. 2027, the MSI STEM Achievement Act</li> <li>• H.R. 2695, the Combating Sexual Harassment in Science Act</li> <li>• H.R. 144, the Supporting Early-Career Researchers Act</li> </ul>	<ul style="list-style-type: none"> <li>• Advance Technological Manufacturing Act (\$150m authorized)</li> <li>• AI Scholarship-for-Service Act</li> <li>• Rural STEM Education Act</li> <li>• Quantum Network Infrastructure and Workforce Development Act</li> <li>• Supporting Early-Career Researchers Act</li> <li>• Advancing Precision Agriculture Capabilities Act</li> <li>• Critical minerals mining research</li> <li>• Bioeconomy R&amp;D Act</li> <li>• Research Investment to Spark the Economy (RISE) Act</li> </ul>



	<ul style="list-style-type: none"> <li>• H.R. 3858, the National Science and Technology Strategy Act of 2021</li> <li>• H.R. 4606, the Energizing Technology Transfer Act</li> <li>• H.R. 4588, the Regional Innovation Act of 2021</li> <li>• H.R. 6291, the Microelectronics Research for Energy Innovation Act</li> </ul>	
<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-ISAO) 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 directly or indirectly funded by the Government of the People’s Republic of China. Also requires NSF to collect a detailed description of any financial contributions from the Government of the People’s Republic of China or its affiliates to the institution, a foundation of the institution, or related entities.</p>

		Prohibits any IP funded by NSF from being transferred to a foreign entity of concerns or to any entity that includes a partnership with a foreign entity of concern
Research Infrastructure	<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>	No similar measures
<p>*American Jobs Plan included \$50B for a new directorate at NSF; SALSTA 2021 (H.R. 2153, House Science GOP bill) included \$9.3B for NSF in FY22; FY22 PBR requests \$10.2B for NSF and \$850m for a new Technology, Innovation and Partnerships directorate</p>		