



July 2, 2021

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Competing Visions: The NSF for the Future Act and the U.S. Innovation and Competition Act

Summary

In June 2021, the House and Senate advanced separate versions of legislation to enhance U.S. innovation and global competitiveness. The approaches taken by the two bills, however, differ dramatically. The Senate bill focuses squarely on ways to harness and in some cases alter the nation's scientific assets to better compete with China. The House bill, on the other hand, doubles down on the nation's existing, proven scientific leadership and proposes additional investments to push the U.S. research enterprise—particularly the National Science Foundation—in new directions.

Despite the many differences between them, some parallels can be found; for example, both propose establishing a new directorate at the National Science Foundation focused on technology development and translational research, and both measures include substantive provisions related to research security and STEM education. Beyond that, though, many unresolved differences remain.

The following pages include COSSA's in-depth analysis and comparison of provisions in the *National Science Foundation for the Future Act* (H.R. 2225) and the *U.S. Innovation and Competition Act* (S. 1260) that are of most relevance to the social and behavioral science community.

Background

The *National Science Foundation for the Future Act* ([H.R. 2225](#)) is authorization legislation crafted by leaders of the House Science, Space, and Technology Committee and introduced in April 2021. "Authorization" or "reauthorization" bills are used to establish new or modify existing federal programs or activities and to authorize funding levels that inform the annual appropriation of funds. The overarching purpose of the House bill is to authorize annual budget targets for fiscal years (FY) 2022-2026 and set research policy for the agency. It authorizes several new activities, including the establishment of a new research directorate.

On the other side of the Capitol is the *U.S. Innovation and Competition Act* ([S. 1260](#)), a 2,300-page package

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comprised of several individual authorization bills covering a wide range of topics dealing with the U.S. scientific enterprise and global technological competition. Within it is the *Endless Frontier Act*, legislation introduced in March 2021 by Senate Majority Leader Chuck Schumer (D-NY) and Senator Todd Young (R-IN) aimed at shoring up U.S. leadership in specific technology areas—specifically with respect to China—and to enhance “tech transfer” for scientific research funded by the federal government. While it too contains provisions for the National Science Foundation, it is not a traditional NSF reauthorization bill. It takes a more targeted approach to identify specific NSF activities that should be enhanced to address the bill’s primary purpose—competing with China.

National Science Foundation for the Future Act (House)

On June 28, the House of Representatives passed the *NSF for the Future Act* (H.R. 2225). For more than a year, the House Science, Space and Technology Committee—the leaders of which produced the bill—has been engaging with stakeholders on ways to craft an NSF reauthorization bill that will continue to support the agency while pushing it into innovative new directions. The resulting legislation introduced in March offers a detailed blueprint for moving the agency forward while maintaining and strengthening its central mission to support fundamental research.

As a wholesale, more traditional reauthorization bill, the *NSF for the Future Act* includes a comprehensive suite of policy and program directives. It would set ambitious funding targets for the next five fiscal years, seeking to grow the agency’s overall budget from its current level of \$8.5 billion to \$17.9 billion by FY 2026. However, as an authorization bill, the legislation can only identify desired funding targets; Congressional appropriators would still need to act each year to enact funding increases for the agency guided—but not bound—by the levels approved in the bill.

In addition to establishing a new directorate (discussed in detail below), the House bill includes several other provisions that would affect the social and behavioral science community, including specific language directing that the social, behavioral, and economic sciences (SBE) be actively included in cross-cutting and

interdisciplinary NSF activities like the [Convergence Accelerators](#), [Big Ideas](#), and [Mid-Scale Research Infrastructure](#).

It also includes sections on securing the U.S. research enterprise from foreign and malign influence, STEM education, and broadening participation, each discussed in more detail below.

COSSA issued a [statement](#) in support of the *NSF for the Future Act* on May 7, applauding the bill for its comprehensive approach to strengthening NSF, enhancing its budget, and preserving its role as the premier U.S. basic science agency.

Broader Impacts

The House bill includes several provisions to enhance NSF’s broader impacts criterion. The National Science Board and directorate advisory committees have raised questions in recent years about broader impacts, specifically, whether the criterion is being applied evenly across the agency and whether there is adequate training and/or expertise on review panels for assessing broader impacts of research proposals.

To this end, the House bill would ask NSF to contract with an outside organization to assess how the broader impacts review criterion is applied across NSF and make recommendations for improving effectiveness. In addition, it would authorize grants to support activities to increase the efficiency, effectiveness, and availability of resources for implementing the broader impacts review criterion (e.g., training and workshops; repositories and clearinghouses for sharing best practices and facilitating collaboration; and tools for evaluating and documenting societal impacts of research).

National Secure Data Service

The bill authorizes \$9 million a year over five years for a National Secure Data Service (NSDS) demonstration project overseen by NSF’s National Center for Science and Engineering Statistics (NCSES). The demonstration project would test and refine approaches to inform the implementation of a government-wide data linkage and access infrastructure, with the goal of scaling up the project in the future. The Data Service was recommended by the Commission on Evidence-Based Policymaking (see [previous coverage](#)) as a way to facilitate access to data for qualified researchers and approved purposes, while also ensuring privacy and

transparency for the data service’s activities. The language was added to the bill through an amendment offered by Rep. Don Beyer (D-VA) during its subcommittee markup.

Other Research Priorities

The House bill includes several additional sections identifying areas of research priority of particular interest to policymakers, including:

- **Violence Research** – Authorizes grants for research to improve understanding of the nature, scope, causes, consequences, prevention, and response to all forms of violence.
- **Impacts of Federally Funded R&D** – Authorizes grants for research and development of data, models, indicators, and associated analytical tools to improve understanding of the impacts of Federally funded research on society, the economy, and the workforce/job creation.
- **Technology and Behavioral Science Research** – Authorizes grants to “increase understanding of social media and consumer technology access and use patterns and related psychological and behavioral issues, particularly for adolescents; and explore the role of social media and consumer technology in rising rates of depressive symptoms, suicidal ideation, drug use, and deaths of despair...”
- **Climate Change Research** – Among the research priorities listed in the bill related to climate change are “research on climate-related human behaviors and institutions,” and “research on climate-related risk, vulnerability, resilience, and adaptive capacity of coupled human-environment systems, including

risks to ecosystem stability and risks to vulnerable populations.”

Authorization of Appropriations

The House bill outlines stable funding growth for the agency through FY 2026 (see Table 1). It proposes growing the agency to \$17.9 billion by FY 2026 (for reference, the current NSF budget is \$8.5 billion). It is important to note, however, that of the total, \$3.4 billion would be earmarked for the new Science and Engineering Solutions Directorate (discussed in more detail below) by FY 2026, leaving \$14.5 billion for the rest of NSF and \$11.4 billion specifically for NSF’s research account.

Still, while the numbers indicate a quick ramp up of investment in the new directorate, specifically as a proportion of the total NSF budget, the budget for the directorate would begin to level off by FY 2025 under the House proposal. This is an important detail given concerns by many in the scientific community that the new directorate would divert funds away from other NSF activities (see the *Endless Frontier Act* section for comparison). Under the House proposal, while major new investments are sought for the directorate, the plan is not for the directorate to be given an exorbitantly outsized share of the NSF budget. Instead, ambitious annual increases are sought for all parts of the agency in the House bill.

	NSF Total	SES Auth	%
2021	0	-	0.0%
2022	12,504,890,000	1,400,000,000	11.2% ⬆
2023	14,620,800,000	2,300,000,000	15.7% ⬆
2024	15,945,020,000	2,900,000,000	18.2% ⬆
2025	17,004,820,000	3,250,000,000	19.1% ⬇
2026	17,939,490,000	3,400,000,000	19.0% ⬇

Table 1: NSF Authorization of Appropriations, NSF for the Future Act, FY 2022-2026

...	FY 2021 Enacted	FY 2022	%	FY 2023	%	FY 2024	%	FY 2025	%	FY 2026	%	5-Year Total
NSF Total	8,486,759,000	12,504,890,000	47.3% ⬆	14,620,800,000	16.9% ⬆	15,945,020,000	9.1% ⬆	17,004,820,000	6.6% ⬆	17,939,490,000	5.5% ⬇	78,015,020,000
R&RA	6,909,800,000	10,025,000,000	45.1% ⬆	11,870,000,000	18.4% ⬆	13,050,000,000	9.9% ⬆	14,000,000,000	7.3% ⬆	14,800,000,000	5.7% ⬇	63,745,000,000
SES (NEW)	0	1,400,000,000	⬆	2,300,000,000	64.3% ⬆	2,900,000,000	26.1% ⬆	3,250,000,000	12.1% ⬇	3,400,000,000	4.6% ⬇	13,250,000,000
Mid-scale	0	55,000,000		60,000,000	9.1%	70,000,000	16.7%	75,000,000	7.1%	80,000,000	6.7%	340,000,000
EHR	968,000,000	1,583,160,000	63.5% ⬆	1,654,520,000	4.5% ⬆	1,739,210,000	5.1% ⬆	1,823,470,000	4.8% ⬆	1,921,600,000	5.4% ⬆	8,721,960,000
MREFC	241,000,000	249,000,000	3.3% ⬆	355,000,000	42.6%	370,000,000	4.2%	372,000,000	0.5%	375,000,000	0.8%	1,721,000,000
Mid-scale		76,250,000		80,000,000	4.9% ⬆	85,000,000	6.3%	90,000,000	5.9%	100,000,000	11.1%	431,250,000
AOAM	345,640,000	620,000,000	79.4% ⬆	710,000,000	14.5% ⬆	750,000,000	5.6% ⬆	770,000,000	2.7% ⬆	800,000,000	3.9% ⬆	3,650,000,000
NSB	4,500,000	4,620,000	2.7%	4,660,000	0.9%	4,700,000	0.9%	4,740,000	0.9%	4,780,000	0.8%	23,500,000
OIG	17,850,000	23,120,000	29.5%	26,610,000	15.1%	31,110,000	16.9%	34,610,000	11.3%	38,110,000	10.1%	153,560,000

⬆ Indicates increase from bill as originally introduced in March 2021.
⬇ Indicates decrease from bill as originally introduced in March 2021.

Endless Frontier Act/U.S. Innovation and Competition Act (Senate)

On June 8, the Senate passed the *U.S. Innovation and Competition Act* (USICA) (S. 1260), known colloquially as “the China package.” The bill was originally introduced as the *Endless Frontier Act* in 2020, which called for major investments (\$100 billion) specifically for a new technology- and commercialization-focused directorate within NSF (see [previous coverage](#)).

However, one year and hundreds of amendments later, the USICA, which now includes the *Endless Frontier Act* as one piece, consists of more than 2,300 pages covering everything from NSF policy to space exploration, the origins of COVID-19, international trade, and, of course, China policy.

The emphasis on advancing U.S. leadership in key technology areas has expanded since the original bill to now include several agencies beyond NSF, particularly the Department of Energy, Department of Commerce, and the Defense Advanced Research Projects Agency within the Department of Defense.

The NSF-specific provisions of the USICA attempt to bridge some of the divide between the Senate proposal and the *NSF for the Future Act* in the House. For example, the amended Senate bill includes similar language related to enhancing research capacity building for “emerging research universities,” including minority-serving institutions, promoting STEM education in rural areas, and supporting early-career researchers, among other provisions. However, the two bills remain far apart in their general handling of NSF funding and policy, including their approaches to establishing a new directorate (more in the next section).

Authorization of Appropriations

As noted, the original version of the bill authorized \$100 billion over five years specifically for a new Technology and Innovation Directorate at NSF. Not

surprisingly, such a proposal raised many questions throughout the NSF stakeholder community. How would this major infusion of funding be managed and affect other parts of the agency and/or NSF’s basic science mission? On the one hand, an investment of this magnitude would be a welcome departure from years of stagnant funding for NSF; however, would all of NSF see the benefits? The proposal left the research community divided in many respects.

The version of the bill that passed the Senate in June now includes a total of \$81 billion over five years for all of NSF, with \$29 billion (as opposed to \$100 billion) tagged for the new directorate (see Table 2). This is a welcome change since the original bill only authorized funding for the new directorate, not for other NSF activities. The bill also calls for a total of \$8.4 billion over five years for STEM education-related activities; however, the bill does not go into detail of how that funding should be administered. In the end, the Senate measure would authorize \$43.5 billion over five years for all NSF activities that are *not* associated with the new directorate.

On its surface, the Senate proposal would significantly boost NSF’s budget while also creating the new directorate. However, there are reasons for caution. Unlike the House bill which proposes major investments in its new directorate in the first few years, then leveling off, the goal of the Senate bill would be for the share of the directorate’s budget to grow to 43.7 percent by FY

	NSF Total	T&I Auth	%
2021	8,486,759,000	-	0.0%
2022	10,800,000,000	1,800,000,000	16.7%
2023	12,800,000,000	3,200,000,000	25.0%
2024	16,600,000,000	6,300,000,000	38.0%
2025	19,500,000,000	8,400,000,000	43.1%
2026	21,300,000,000	9,300,000,000	43.7%

2026. In other words, if these funding levels were to become reality, in the aggregate, the share of funding for activities not directly related to the new directorate would decline over time. It also raises questions about what such an investment in technology development would mean for NSF’s mission as a basic science agency.

Table 2: NSF Authorization of Appropriations, Endless Frontier Act, FY 2022-2026

...	FY 2021 Enacted	FY 2022	%	FY 2023	%	FY 2024	%	FY 2025	%	FY 2026	%	5-Year Total
NSF Total	8,486,759,000	10,800,000,000	27.3%	12,800,000,000	18.5%	16,600,000,000	29.7%	19,500,000,000	17.5%	21,300,000,000	9.2%	81,000,000,000
<i>T&I Directorate (NEW)</i>	n/a	1,800,000,000	🔴	3,200,000,000	77.8%🔴	6,300,000,000	96.9%🔴	8,400,000,000	33.3%🔴	9,300,000,000	10.7%🔴	29,000,000,000
NSF, non-T&I	n/a	9,000,000,000		9,600,000,000	6.7%	10,300,000,000	7.3%	11,100,000,000	7.8%	12,000,000,000	8.1%	52,000,000,000
<i>STEM Ed</i>	n/a	1,000,000,000		1,190,000,000	19.0%	1,600,000,000	34.5%	2,100,000,000	31.3%	2,540,000,000	21.0%	8,430,000,000
NSF, non-T&I/ non-STEM Ed	n/a	8,000,000,000		8,410,000,000	5.1%	8,700,000,000	3.4%	9,000,000,000	3.4%	9,460,000,000	5.1%	43,570,000,000

🔵 Indicates increase from bill as originally introduced in April 2021.

🔴 Indicates decrease from bill as originally introduced in April 2021.

New NSF Directorate Proposals

While both bills seek to establish new NSF directorates that would emphasize investment in key technology areas, their approaches differ significantly.

Complicating things further, the White House released its own detailed blueprint in the spring for a new research directorate. This section compares the three proposals for standing up a new directorate at the National Science Foundation. See the table in the Appendix for direct comparison.

Science and Engineering Solutions Directorate (House Proposal)

The *NSF for the Future Act* proposes creation of a Directorate for Science and Engineering Solutions (SES). Its purpose would be to “accelerate the translation of fundamental research and to advance technologies, support use-inspired research, facilitate commercialization and use of federally funded research, and expand the pipeline of students and researchers in areas of societal and national importance.”

Structurally, it would be organized like NSF’s other research directorates and led by an Assistant Director, putting it on even footing with its fellow directorates. In addition to new activities, it would become home to some of NSF’s existing programs, such as [Convergence Accelerators](#), the [Growing Convergence Big Idea](#), and others to be determined by the NSF Director.

Unlike the Senate bill, the *NSF for the Future Act* would organize the directorate’s activities around no more than five focus areas that would address major societal challenges; the Senate bill’s list of activities (noted below) is more closely tied to development of key technologies. Further, while the Senate bill would mandate the focus areas to be addressed by its version of the new directorate, the House bill leaves the determination to the NSF Director. It does however identify focus areas that NSF should consider, including:

- Climate change/environmental sustainability
- Global competitiveness and domestic job creation in critical technologies
- Cybersecurity
- National security

- STEM education and workforce
- Social and economic inequality

Importantly, the House bill would provide a safeguard to ensure funding for SES does not come at the expense of other NSF activities. Specifically, under the proposal no funding may be appropriated to SES unless the total provided to NSF in FY 2022—excluding SES—exceeds the FY 2021 level, as adjusted for inflation.

Technology and Innovation Directorate (Senate Proposal)

The *Endless Frontier Act* in the Senate takes a much different approach to creating a new directorate in NSF. To understand the proposed activities of the directorate, one must first understand the overarching design of the bill. Unlike the House bill, which is focused entirely on NSF, the *Endless Frontier Act* in its current form is focused on U.S. innovation, competition, and technological advancement more generally. As such NSF is only one piece of the Senate’s proposal.

Within the NSF provisions in the bill, the *Endless Frontier Act* proposes creation of a new **Technology and Innovation (T&I) Directorate** that would be charged with strengthening U.S. leadership in critical technologies through basic research and commercialization; addressing and mitigating technology challenges integral to the geostrategic position of the U.S.; enhancing U.S. competitiveness by improving education in the key technology areas; and accelerating the translation of scientific advances in the key technology areas. An earlier version of the bill also included fostering economic and societal impacts of federal R&D to achieve national goals among the directorate’s list of goals; however, that provision has since been dropped.

Similar to the *NSF for the Future Act*, existing NSF programs would be relocated to T&I under the Senate measure, specifically the [Convergence Accelerators](#), [Industry-University Cooperative Research Centers](#), [National AI Research Institutes](#), and the [Innovation Corps \(I-Corps\) program](#).

The Senate bill includes a list of focus areas just like the House bill; however, its list is specifically tied to key technology areas and not societal challenges. Further, its list of key technology focus areas would also be

applied to provisions governing the Department of Energy (DOE) and any other department or agency with research and development activities related to the focus areas. To help organize such efforts, the Senate bill would create a new **interagency working group**, coordinated by the Director of the White House Office of Science and Technology Policy (OSTP), charged with “ensur[ing] that the activities of different federal agencies enhance and complement, but, as appropriate, do not duplicate, efforts being carried out by another federal agency” as they relate to the key technology focus areas at NSF, DOE, the Department of Commerce (DOC), and other agencies.

The list of key technology focus areas include:

- Artificial intelligence, machine learning, autonomy, and related advances
- High performance computing, semiconductors, and advanced computer hardware and software
- Quantum information science and technology
- Robotics, automation, and advanced manufacturing
- Natural and anthropogenic disaster prevention or mitigation
- Advanced communication technology and immersive technology
- Biotechnology, medical technology, genomics, and synthetic biology
- Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics
- Advanced energy and industrial efficiency technologies
- Advanced materials science

Unlike the House bill that lists *suggested* focus areas tied to national challenges, the Senate bill would *mandate* the above initial list of ten technology areas for the new directorate. Under the measure, the list would be reviewed annually by the NSF Director and the Secretary of Energy, in coordination with the new interagency working group, and amended as needed.

Another major difference between the directorate proposals is how they would be structured and how funding decisions would be made. As noted above, the SES directorate under the House proposal would organizationally resemble the agency’s existing directorates (i.e., SBE, BIO, ENG, GEO, etc.). In the

Senate bill, it is unclear where the T&I directorate would reside (i.e., as a separately funded entity like the Education and Human Resources Directorate or alongside the existing research directorates). Further, while it too would be led by an Assistant Director, additional program director positions would be modeled after those within DARPA at the Department of Defense. Breaking with longstanding NSF practice and consistent with the DARPA model, program directors within T&I would not be bound by NSF’s merit review criteria when making award decisions. The bill states that the “directorate *may* [emphasis added] use a peer review process in informing the selection of award recipients.” An earlier version of the bill stated the directorate “shall” use the merit review process, a small but significant distinction.

Finally, in addition to supporting research in the 10 key technology focus areas, the bill would create additional new programs and activities for the directorate, including, among others:

- **University Technology Centers** – Multidisciplinary centers conducting basic and applied research on at least one of the key technology focus areas.
- **Innovation Institutes** – Partnerships among universities, for-profit companies, nonprofit organizations, and/or federal agencies working to “further the research, development, and commercialization of innovation in the key technology focus areas.”
- **Test Beds** – Working with DOE and the National Institute of Standards and Technology (NIST), establish test beds to “advance the development, operation, integration, deployment, and, as appropriate, demonstration of new, innovative technologies in the key technology focus areas.”

Technology, Innovation, and Partnerships Directorate (White House Proposal)

In addition to the two proposals put forward by Congress, the Biden Administration too has provided its own blueprint for a new directorate as part of its FY 2022 budget request to Congress. However, given that the President’s budget request was not released until late May—too late for the provisions to be considered as part of either the House or Senate bills—it is unclear what bearing, if any, the proposal will have on the final outcome.

The Biden Administration’s proposal includes the creation of a Technology, Innovation and Partnerships Directorate (TIP). Similar to the House bill, the structure of the TIP directorate would follow that of existing directorates at NSF; it would be aligned with the other six directorates under the Research and Related Activities (R&RA) account. In addition, it would absorb several existing programs (e.g., [Convergence Accelerator](#), [I-Corps](#), and [SBIR/STTR](#)) from elsewhere in the agency. The budget request includes a total of \$865 million for the first year of the new directorate, which consists of about \$365 million in transfers from existing programs in other directorates and \$500 million in new funding.

The stated goals of the new directorate under the President’s proposal share several similarities with both legislative measures. They include:

- “Advance science and engineering research and innovation leading to breakthrough technologies as well as solutions to national and societal challenges, sustaining and enhancing U.S. competitiveness on a global stage;
- Accelerate the translation of fundamental discoveries from lab to market, advancing the U.S. economy; and
- Create education pathways for every American to pursue new, high-wage, good-quality jobs, supporting a diverse workforce of researchers, practitioners, and entrepreneurs.”

Functionally, the directorate would serve as a “cross-cutting platform that leverages, energizes, and rapidly brings to the market and to society the innovations that result from all of NSF’s investments.” As such, it would serve as a resource to all parts of NSF.

The President’s proposal goes into greater detail about new areas for investment it would pursue, including:

- **Accelerating Public and Private Partnerships** (\$50 million in new funding) – This initiative would provide seed funding “to incentivize the scale-up of public and private partnerships.”
- **NSF Entrepreneurial Fellows** (\$20 million in new funding) – This program would support PhD-trained scientists and engineers “to forge connections between academic research and government, industry, and finance.” Through the

fellowship, they would receive training to equip them to bring promising ideas from the lab to the market.

- **Regional Innovation Accelerators** (\$200 million in new funding) – This program would seek to support use-inspired research in several technology areas (e.g., artificial intelligence) and national challenge areas (e.g., climate change) at the individual community and/or regional level.

Additional details about the President’s proposed directorate can be found in [COSSA’s analysis](#) of the FY 2022 budget request.

Research Security

The House and Senate bills include significant provisions that aim to safeguard the U.S. research enterprise, affecting research supported by NSF and by other federal agencies. The Senate’s USICA package in particular contains several provisions on securing the research enterprise, especially with respect to China, that extend far beyond the provisions in the House version of the bill.

Safeguarding American Innovation Act

The *Safeguarding American Innovation Act* was introduced in 2020 by Senators Rob Portman (R-OH) and Tom Carper (D-DE), although its origins began with a [2019 report](#) from the Senate Permanent Subcommittee on Investigations (PSI), a body then chaired by Portman. The legislation, which pushes forward many of the recommendations in the 2019 report, aims to tighten research security through restrictions on foreign scientists. The legislation received some backlash from the research community upon its introduction (see [COSSA’s previous coverage](#)), and although some of the original bill’s controversial language has been altered, other language remains untouched in its current iteration as part of the USICA.

Among the more controversial provisions in the bill is the establishment of a new **Federal Research Security Council** within the White House Office of Management and Budget (OMB) charged with coordinating research security efforts across federal research agencies (Sec. 4493). The Council would be tasked with outlining requirements for a uniform application process to be used by federal research agencies and internal risk-assessment strategies. There are concerns within the

extramural research community that OMB is not the appropriate entity to coordinate research security activities. The new committee may also absorb the current responsibilities the Joint Committee on the Research Environment (JCOPE), which was created during the last Administration within OSTP (see [previous coverage](#)).

Another section of the bill (Sec. 4494) would make it **unlawful for researchers to knowingly prepare grant applications without disclosing all sources of outside compensation including foreign compensation**. It would also prohibit forgery or assisting another individual with forgery of a grant application. The penalty for these crimes could include a fine or up to five years of jail time, and a prohibition on receiving federal grants for five years.

Finally, Sec. 4495 of the bill would give the **Secretary of State authority to reject entry into the United States** to anyone determined to be seeking to acquire sensitive or emerging technologies to either undermine U.S. national security or benefit a hostile foreign government. It also requires the Department of State to submit a report to Congress listing all individuals deemed inadmissible to the U.S. on this basis.

NSF Office of Research Security

Both bills include provisions that would establish entities at NSF dedicated to overseeing the agency's research security efforts and would create a Chief of Research Security position. The Senate bill (Sec. 2301) would authorize \$5 million a year for FY 2022 through FY 2026 for a new **Office of Research Security and Policy** within NSF led by a new appointee, a Chief of Research Security. This new office would be responsible for serving as the main NSF resource and coordinating body on research security policy. It would have the authority to conduct risk assessments of award applications and disclosures and would be responsible for creating an online resource to help inform researchers and institutions on how to best engage in international collaboration without jeopardizing research integrity. The office would also be able to award grants for research related to enhancing research security. Notably, the section includes language that would affirm this new office's commitment to [National Security Presidential Memorandum \(NSPM\)-33](#), a Trump-era list of

recommendations on research security policy (see [previous COSSA coverage](#) for more details).

The House bill authorizes an **Office of Research Security and Policy** with the same roles and responsibilities but would further authorize the office to request that universities submit documentation related to foreign appointments, employment, and foreign talent programs and would have the authority to substitute or remove an individual from an award, reduce an award amount, or terminate an award if the NSF Director determines involvement from a foreign entity or contract interferes with the award or creates duplication.

Research Security and Integrity Information Sharing Analysis Organization

The Senate bill (Sec. 2302) directs the White House Office of Science and Technology Policy (OSTP) to **partner with an independent organization** to establish a Research Security and Integrity Information Sharing Analysis Organization (RSI-ISAO), a **clearinghouse for information on research security and integrity** available to dues-paying members that would also be responsible for setting risk-assessment standards. The RSI-ISAO would have members from institutions of higher education, non-profit research institutions, and the private sector. The House bill authorizes a similar agreement with an independent organization to establish a Risk Assessment Center but omits any mention of a membership structure.

Foreign Talent Recruitment Programs

Both bills would prohibit all federal employees and contractors from participating in foreign government talent recruitment programs with an exception for international conferences and other similar activities with prior approval. However, Sec. 2303 of the Senate bill sets stricter guidelines by prohibiting science agencies from awarding research grants to participants in these programs and directing OSTP to create consistent guidelines for federal science agencies to follow regarding talent recruitment programs.

Research Security for New NSF T&I Directorate Activities

The Senate bill (Sec. 2304) includes language pertaining specifically to the activities of its new Technology & Innovation Directorate at NSF. Notably, it would create an initiative to award research grants

on the protection of intellectual property and foreign influence within the Directorate. This research would analyze best practices of training programs, partnerships, and regulations that would result in stronger research security within the new Directorate and NSF broadly. There is also language in this section directing NSF to consider efforts taken by the Department of Defense in securing defense research. No such language exists in the House bill.

Funding to Foreign Entities

The Senate bill contains several provisions governing research funding to foreign entities. While the House bill includes some similar provisions referring to foreign talent recruitment programs, the Senate’s approach goes further to prevent research funding to foreign entities, especially “Foreign Entities of Concern.”

Sec. 2523 of the Senate bill directs NSF to prepare a biennial report on research funding that has been awarded from NSF to foreign entities. The report would be required to include a complete list of projects funded as well as background information about the persons who received project funding and a justification for their award.

Another provision (Sec. 2307) would direct the Government Accountability Office (GAO) to analyze federal research funding to **identify the scope of funds inadvertently awarded to potential security threats** labeled as “Foreign Entities of Concern” by the Department of State. This label applies to members of designated terrorist organizations, the Specially Designated Nationals and Blocked Persons List, hostile governmental bodies, and other designated national security threats.

Further, Sec. 2502 **would prohibit individuals from “Foreign Entities of Concern” from participating in any research, partnerships, or other activities** within the proposed new Technology & Innovation Directorate. There is less expansive language in the House bill excluding “Foreign Entities of Concern” and participants of “malign foreign government talent recruitment programs” from participation in activities of the new Science & Engineering Solutions Directorate.

Finally, Sec. 3138 of the bill would expand the authority of the **Committee on Foreign Investment in**

the United States (CFIUS), “an interagency committee authorized to review certain transactions involving foreign investment in the United States,” to have **oversight over foreign awards, research grants, and gifts at academic institutions**. This could give CFIUS the power to suspend or cancel foreign-granted activities at academic institutions if they are deemed harmful to national security concerns (see [COSSA’s previous coverage](#) for more details).

HHS Research Requirements

As a condition to receive research funding from the Department of Health and Human Services (HHS), including the National Institutes of Health (NIH), provisions in the Senate bill (Sections 6101 through 6107) would set strict disclosure requirements for recipients of funding from foreign governments, restrictions on partnerships with “Confucius Institutes” (see below for more), and requirements to ensure better coordination between the health research and intelligence communities on matters related to national security. It would also direct HHS to consult the intelligence and national security communities on securing highly sensitive research such as mass personal data or human genomic information and would direct GAO to report on HHS funding of such sensitive research. Sec. 6107 of USICA also explicitly prohibits HHS funding to be given to conduct gain-of-function research in China, which is research to artificially mutate microorganisms to better predict and prevent future outbreaks of infectious diseases.

R&D Supporting National Security Strategy

The Senate bill includes language (Sec. 2501) directing OSTP, in collaboration with the heads of other federal science agencies, to make recommendations to promote research and development efforts that support the **U.S. National Security Strategy**, a recurring policy document prepared by the Executive branch listing prevailing national security concerns and governmental strategies to address these concerns. Specifically, the report should detail the global state of research and development, identify weaknesses that need to be addressed that would ensure U.S. leadership in science, and recommend best practices to strengthen the scientific enterprise as a means of strengthening national security. OSTP would also be empowered to recommend research and development funding levels as expressed in this report to the Office

of Management and Budget, to be included in annual budget requests for federal research agencies.

Confucius Institutes & Foreign Gifts

The Senate bill (Sec. 2525) **prohibits the awarding of NSF funds to institutions hosting or supporting the Confucius Institutes**, the cultural centers at institutions of higher education sponsored by the Chinese government. Exceptions are allowed to institutions that acquire the appropriate waiver from the Department of Defense. A section further in the bill specific to higher education policy (Sec. 6122) would prohibit universities hosting Confucius Institutes from receiving federal funding provided under the Higher Education Act. Confucius Institutes are not directly addressed in the House bill.

In addition, the bill (Sec. 6124) would require institutions to **disclose all foreign sourced gifts or contracts** with a value of \$50,000 or more to the Department of Education each calendar year or else risk federally imposed fines or sanctions.

STEM Education & Broadening Participation in Science

Both bills include provisions dedicated to broadening participation in STEM and enhancing the STEM education pipeline generally. Below is a sampling, not a complete list, of the sections covering STEM education and broadening participation.

NSF Chief Diversity Officer

Both bills include similar language establishing the position of Chief Diversity Officer at NSF. This individual would direct the Office of Diversity and Inclusion and be responsible for “providing advice on policy, oversight, guidance, and coordination with respect to matters of the Foundation related to diversity and inclusion, including ensuring the geographic diversity of the Foundation programs,” among other duties. Both bills authorize \$5 million a year for this function.

Partnership with Emerging Research Institutions

Both bills include provisions calling for a five-year pilot program to enhance the research capacity of “emerging research institutions.” The House bill specifically calls for new partnerships between emerging institutions (defined as receiving on average

less than \$35 million a year in federal research funding) and institutes classified as “very high research activity.”

The Senate language defines the partnership as including at least one emerging research institution and one institution that receives on average more than \$100 million in federal research funding. Funding could be used for increasing research, education and innovation capacity through faculty training and resources, research experiences for undergraduate and graduate students, and maintenance or repair of research equipment.

In addition, the Senate bill would authorize an **Intramural Emerging Institutions Pilot Program** “to expand the number of institutions of higher education...that are able to successfully compete for Foundation grants.” The pilot would provide support for mentorship programs, grant writing technical assistance, targeted outreach, including to minority serving institutions, grant management support, and/or to increase the term and funding for first-time awardees.

Supporting Early Career Researchers Act

The Senate package contains the [*Supporting Early Career Researchers Act*](#) (S. 637/H.R. 144), bipartisan legislation that originated in the House and passed the chamber as a standalone bill in May. It would authorize a new two-year pilot program that would award grants to “highly qualified early-career investigators to carry out an independent research program.” Priority would be given to investigators from groups and institutions traditionally underrepresented in STEM.

Graduate Research Fellowship Program

The House proposal includes provisions to enhance NSF’s signature Graduate Research Fellowship Program, including by increasing the number of fellowships to at least 3,000 annually over the next five years and increasing the cost-of-education allowance to institutions from \$12,000 to at least \$16,000. In addition, the bill would direct NSF to ensure outreach is made to applicants from fields of study that are in areas of critical national need, from all regions of the country, and from historically underrepresented populations. The Senate bill includes no such language.

National Academies Studies

The House bill calls for two separate reports from the National Academies of Sciences, Engineering, and Medicine (NAEM). First, it would call on the NAEM to develop a Decadal Survey of STEM Education Research that would review and assess PreK-12 STEM education research and make recommendations for research priorities over next 10 years. In addition, the bill asks NAEM to review the research literature and identify research gaps on the interconnected factors that foster and hinder implementation of PreK-12 STEM innovations, and present a compendium of promising practices, models, programs and technologies.

Skilled Technical Workforce/Scientific Workforce

Over the last few years, the National Science Board and NSF have been trying to better understand the “[skilled technical workforce](#),” the sector of working individuals in science and engineering fields who do not hold bachelor’s degrees. In response, the House bill calls on NSF to conduct a portfolio analysis of NSF’s skilled technical workforce investments. In addition, to gain even greater understanding of life within the scientific workforce, it asks the agency to assess the feasibility and benefits of adding new questions or topics to NCSSES surveys on the skilled technical workforce, working conditions and work-life balance, harassment and discrimination, sexual orientation and general identity, and immigration and emigration.

Other STEM education and research related provisions in the House bill include:

- A new grant program to fund at least three multidisciplinary **Centers for Transformative Education Research and Translation**.
- A **National Coordination Network for Science and Technical Education** charged with coordinating research, training and best practices, serving as a clearinghouse for resources, and developing partnerships between PreK-12 schools, 2- and 4-year institutions, and industry.
- Support for research on the nature of **learning and teaching at community colleges** and to improve outcomes for students who enter the workforce upon completion of their STEM degree or credential or transfer to a 4-year institution.
- Support for **research on the graduate education system**, including the effects of traineeships, fellowships, and other factors.

- Independent evaluation of NSF’s role in supporting graduate student education and training.

Other Notable Provisions

It is common for several pieces of legislation—often not directly related—to be combined into a single legislative package as a way to ensure passage. That is what happened with the USICA/Endless Frontier Act in the Senate.

The version that passed the Senate in June now contains several previously standalone bills, many impacting the U.S. scientific enterprise. We summarize the most notable provisions below.

RISE Act

Section 2507 of USICA incorporates the *Research Investment to Spark the Economy (RISE) Act*, a bipartisan bill originally introduced in 2020 and reintroduced earlier this year by Representatives Diana DeGette (D-CO) and Fred Upton (R-MI) and Senators Ed Markey (D-MA) and Thom Tillis (R-NC). The bill would provide flexibilities to federal research agencies to restart or otherwise accommodate research that has been adversely affected by the COVID-19 pandemic (see [COSSA’s previous coverage](#) for more details). However, unlike the stand-alone bill (H.R. 869/S. 289) that included \$25 billion in new relief funding for federal science agencies, the language incorporated into the USICA does not include authorization of funding. Instead, it would allow agencies to provide supplemental funding (presumably with existing resources) to extend the duration of an award, extend training opportunities, or replace laboratory equipment and facilities.

Combatting Sexual Harassment in Science Act

Also included in the Senate package is the *Combatting Sexual Harassment in Science Act*, legislation championed in the House (H.R. 2695) by Representatives Eddie Bernice Johnson (D-TX) and Frank Lucas (R-OK) and in the Senate (S. 1379) by Senator Richard Blumenthal (D-CT) (see [COSSA’s previous coverage](#)). The bill, which passed as a standalone bill in the House in May, would authorize the heads of federal research agencies to award research grants on the causes and consequences of sexual harassment in the STEM workforce and use data

to influence policy to reduce negative impacts of sexual harassment in science. It would also authorize the White House Office of Science and Technology Policy (OSTP) to develop harmonized policy guidelines for federal agencies and directs the National Academies of Sciences, Engineering, and Medicine and the Government Accountability Office (GAO) to develop reports analyzing federal agencies' progress.

National SEAL Act

Section 2503 of the Senate bill includes the *National Strategy to Ensure American Leadership (SEAL) Act* (S. 1213), legislation that was first introduced by Senators Chris Van Hollen (D-MD) and Roy Blunt (R-MO). The National SEAL Act directs the Department of Commerce and the National Academies of Sciences, Engineering, and Medicine to conduct a study on 10 critical emerging science and technology challenges facing the U.S. The report should include recommendations for legislative or executive action that could be taken to secure U.S. leadership in these challenge areas.

International Education Reauthorization

The Senate bill includes a reauthorization of international education programs administered by the Department of State and Department of Education. The **Fulbright-Hayes Program** (Sec. 3134), which is a hallmark educational exchange program to promote international and foreign language education, would be authorized at \$105.5 million for FY 2022 through FY 2026 under the Senate's bill.

In addition, the bill includes portions of the *Advancing International and Foreign Language Education Act*, which is legislation designed to reauthorize and enhance the international education programs under **Title VI of the Higher Education Act** (Sec. 6121), placing special emphasis on career-building programs to reinforce U.S. competitiveness in the fields of international business and national security. The bill authorizes \$208.1 million for the programs in FY 2022 and "such sums as may be necessary" for the five succeeding fiscal years. The authorization levels for Fulbright-Hayes and Title VI programs would represent significant increases to these programs' budgets if appropriated.

Anti-Asian Discrimination

Acknowledging the sharp rise in Anti-Asian discrimination and violence in the U.S. since the onset of the COVID-19 pandemic, the Senate bill includes language (Sec. 3135) denouncing all forms of racism and xenophobia and emphasizing the value of the Asian American and Pacific Islander (AAPI) population to the United States. It also recommends the usage of official, scientific terms for the COVID-19 pandemic (e.g., COVID-19, SARS-CoV-2) as recommended by the World Health Organization (WHO) and the Centers for Disease Control and Prevention (CDC).

Advancing American AI Act

The Senate's USICA package includes the *Advancing American AI Act* (S. 1353), a bill introduced by Sen. Gary Peters (D-MI) to streamline and coordinate the adoption of artificial intelligence (AI) technologies in government and to ensure that the government's use of AI is documented in a transparent manner. Among other provisions, the bill would establish a program under the direction of the Office of Management and Budget (OMB) to identify and pilot four applications of "artificial intelligence-enabled systems to support inter-agency or intra-agency modernization initiatives that require linking multiple siloed internal and external data sources." The use cases in the pilot would fall under two broad categories: (1) Using AI to "drive agency productivity efficiencies in predictive supply chain and logistics" in areas such as disaster recovery and medical or food supply chains; and (2) using AI to "accelerate agency investment return and address mission-oriented challenges," including workforce retraining, determining compliance with regulations, and evaluating outcomes that incorporate both economic and social benefits.

Next Steps

Lawmakers in both chambers will be heading home for their annual month-long recess in August. We do not expect to see much, if any, major new actions on either bill until the fall. The prospects for a conference committee to hammer out an agreement that both bodies can support remain murky at best.

COSSA is closely watching the action and engaging with Congressional offices to gauge possible next steps. We will share additional details in the [COSSA Washington Update](#) as they develop.

Previous COSSA Coverage

June 22, 2021: [Senate Passes Sweeping U.S. Competitiveness Legislation, Includes Endless Frontier Act](#)

June 22, 2021: [House Science Committee Advances NSF Legislation](#)

May 11, 2021: [House Science Committee Discusses NSF's Future](#)

April 27, 2021: [Competing NSF Bills Introduced in House and Senate](#)

March 30, 2021: [Science Committee Releases NSF Reauthorization Proposal](#)

May 26, 2020: [New Proposal Would Rename NSF, Create New Technology Directorate](#)

RISE Act

March 2, 2021: [House Science Committee Holds Hearing on COVID-19 Impacts and the Recovery of the U.S. Research Enterprise](#)

February 16, 2021: [Lawmakers Reintroduce RISE Act](#)

September 15, 2020: [House Science Committee Holds Hearing on the Impact of COVID-19 on University Research](#)

July 7, 2020: [RISE Act Would Provide Relief Funding for Federally Funded Scientists](#)

Sexual Harassment

April 27, 2021: [House Science Committee Reintroduces Legislation to Combat Sexual Harassment in Science](#)

October 16, 2018: [COSSA Endorses Bill to Combat Sexual Harassment in Science](#)

Research Security

April 27, 2021: [Senate Focuses on Research Security, Introduces New Anti-China Provisions](#)

February 2, 2021: [Biden Executive Actions: Immigration and Research Security](#)

October 30, 2020: [HOT TOPIC: Research Security Revisited: COVID-19 & Immigration](#)

Find even more at www.cossa.org.

APPENDIX – Comparison of NSF Directorate proposals

	HOUSE: Science and Engineering Solutions (SES) Directorate	SENATE: Technology and Innovation (T&I) Directorate	WHITE HOUSE: Technology, Innovation, and Partnerships (TIP) Directorate
Organizational Structure	Structured like other NSF research directorates, led by an Assistant Director	Let by an Assistant Director, program directors would have more discretion in funding decisions	Structured like other NSF research directorates, led by an Assistant Director
Year 1 Funding	\$1.455 billion (\$1.4b new funding + \$55m existing)	\$1.8 billion (new funding)	\$865 million (\$500m new funding + \$365m existing)
Peer review required for awards?	✓	✗	✓
Existing Programs	Convergence Accelerators, Growing Convergence Big Idea	Convergence Accelerators, Industry-University Cooperate Research Centers, National AI Research Institutes, I-Corps	Convergence Accelerator, I-Corps, and SBIR/STTR
Focus Areas	<p>Max. 5 focus areas centered on societal challenges, identified by NSF leadership.</p> <p>Potential topics:</p> <ul style="list-style-type: none"> • Climate change/environmental sustainability • Global competitiveness and domestic job creation in critical technologies • Cybersecurity • National security • STEM education and workforce • Social and economic inequality 	<p>10 focus areas centered on technology; shared by Depts. of Energy, Commerce, and other agencies in the bill. Identified by Congress, reviewed by leadership of NSF, Dept. of Energy, interagency working group</p> <p>Mandated topics:</p> <ul style="list-style-type: none"> • Artificial intelligence, machine learning, autonomy, and related advances • High performance computing, semiconductors, and advanced computer hardware and software • Quantum information science and technology • Robotics, automation, and advanced manufacturing • Natural and anthropogenic disaster prevention or mitigation • Advanced communication technology and immersive technology • Biotechnology, medical technology, genomics, and synthetic biology 	Not identified

APPENDIX – Comparison of NSF Directorate proposals

		<ul style="list-style-type: none"> • Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics • Advanced energy and industrial efficiency technologies • Advanced materials science 	
New Programs	Not identified	<ul style="list-style-type: none"> • University Technology Centers • Innovation Institutes • Test Beds • Others 	<ul style="list-style-type: none"> • Accelerating Public and Private Partnerships • NSF Entrepreneurial Fellows • Regional Innovation Accelerators • Others