DIRECTORATE FOR SOCIAL, BEHAVIORAL, AND
   ECONOMIC SCIENCES (SBE)

$319,660,000
+$37,600,000 / 13.3%

SBE Funding

(Dollars in Millions)

	FY 2020 Actual[1]	FY 2020 CARES Act Actual	FY 2021 Estimate[1]	FY 2022 Request	Change over FY 2021 Estimate Amount	Percent
Division of Behavioral and Cognitive Sciences (BCS)	$98.64	$4.00	$99.41	$113.16	$13.75	13.8%
Division of Social and Economic Sciences (SES)	99.87	5.50	102.83	117.08	14.25	13.9%
National Ctr. for Science and Engineering Statistics (NCSES)	55.20	-	55.48	61.48	6.00	10.8%
SBE Office of Multidisciplinary Activities (SMA)	26.64	-	24.34	27.94	3.60	14.8%
Total	**$280.35**	**$9.50**	**$282.06**	**$319.66**	**$37.60**	**13.3%**

[1] Funding for FY 2020 and FY 2021 is adjusted for comparability to reflect the movement of I-Corps™ to TIP in FY 2022. See the R&RA Overview for more details.

About SBE

SBE researchers examine fundamental questions about the dynamic abilities of humans, the strength and resilience of essential institutions, the creation of jobs and industries, national security, and relations between nations, and on finding new ways to improve quality of life for all Americans. SBE provides approximately 65 percent of the federal funding for basic research at academic institutions in the social, behavioral, and economic sciences. SBE supported research empowers America's private and public sectors to grow the economy, secure the homeland, improve the health and safety of American families, and increase the competitiveness of farms, offices, and factories across the Nation.

SBE aggressively seeks opportunities to build a better future. One way it does this is by investing in a new and increasingly diverse, dynamic, and skilled generation of young SBE researchers. SBE support for early career investigators, undergraduates, graduate students, and post-doctoral research fellowships trains and prepares young scholars to develop rigorous and effective new ways to capitalize on the increasing availability of massive amounts of data to advance knowledge about human behavior. SBE researchers, for example, will have increasing opportunity to use and combine data from surveys, administrative records, brain imaging, and biospecimen analysis, as well as output from behavioral, environmental, and geographic sensors to help others learn about how to create opportunity and improve life outcomes. America's young SBE researchers have limitless potential to produce transformative, socially beneficial science of this kind.

SBE is also home to the National Center for Science and Engineering Statistics (NCSES). NCSES is one of only 13 principal statistical agencies in the federal government and is the Nation's source for science and engineering information in a global context. NCSES collects, analyzes, and disseminates information on representation across the scientific enterprise; research and development; innovation; the Science and Engineering (S&E) workforce; the condition and progress of STEM education; and U.S. competitiveness in science, engineering, technology, and research and development.

SBE's FY 2022 Request is shaped by three guiding principles:
1. Support fundamental research that advances key national priorities. The research emphases include enhancing national security and preparedness; understanding, mitigating, and adapting to climate change; strengthening American infrastructure; broadening participation (BP) in STEM and studying the causes of, impacts on, and practices for addressing inequity throughout society; creating new economic opportunities for populations adversely affected by change; and empowering American innovation through research in artificial intelligence (AI) with a focus on worker productivity and well-being in a growing range of work environments, including in emerging industries; reliability of information networks; and improving quality of life for communities across the country.

2. Support NCSES, the Nation's premier source for information on the science and engineering enterprise. The Evidence Act, and other initiatives to improve the performance of federal agencies and the productivity of America's S&E enterprise as a whole, require our Nation to make more effective use of the types of data that NCSES collects, analyzes, and disseminates. Increased support for NCSES allows the Nation to be more informed, more effective, and more agile in converting America's incredible talent and ability into better educational outcomes, more opportunity, greater productivity, and higher rates of innovation in all areas of American life.
3. Support and advance cross-directorate activities that address urgent national challenges. Whether the topic is creating the new jobs and industries that will yield an economic recovery that helps everyone, increasing national security through tools that better identify new and emerging threats, improving community resilience by improving response to natural disasters and pandemics, protecting consumers and institutions against misinformation and other attacks on vital infrastructure, or broadening opportunity, understanding the people involved is critical. SBE works with all of NSF and other agencies to support research that solves big problems by putting people first.

The FY 2022 Request of $319.66 million represents an increase of $37.60 million, or 13.3 percent over the FY 2021 Estimate. SBE will prioritize and maximize support in its disciplinary and interdisciplinary programs that support Administration and NSF-wide priorities including activities that contribute to advanced manufacturing research; AI with an emphasis on supporting minority-serving institutions (MSIs); United States Global Research Change Program (USGCRP); and understanding the causes and effects of Online Influence.

The FY 2022 Request includes continued support for investments that integrate the social, behavioral, and economic sciences into multi-directorate and multi-disciplinary activities that address issues of major scientific, national, and societal importance. These activities include BRAIN; National AI Research Institutes; Predictive Intelligence for Pandemic Prevention (PIPP); SaTC; Smart and Connected Communities (S&CC); and Dynamics of Integrated Socio-Environmental Systems (DISES). Understanding the human element is essential to safety, security, growth, and well-being. SBE is committed to supporting the science that will help America's innovators improve quality of life for all its citizens.

SBE will also support racial equity efforts by continuing foundational research activities and targeted BP investments that seek to increase participation of underrepresented groups as well as to advance understanding of institutional, organizational and group factors; affective, behavioral, cultural, and social factors; and economic and policy-related factors that affect BP and equity. Specific SBE investments include SPRF-BP, B2, SBP, and increased AI funding for MSIs.

In FY 2022, SBE will continue to support foundational research in the Big Ideas including FW-HTF, URoL, HDR, NNA and NSF INCLUDES.

The FW-HTF Big Idea will engage research communities to explain how constantly evolving technologies are changing the world of work and the lives of workers, and how people can in turn shape those technologies to human benefit. SBE's existing disciplinary and interdisciplinary programs support basic research that comprises the intellectual underpinnings for FW-HTF, including the opportunities and constraints of human capability, AI, machine learning, information processing, decision-making, human adaptation to technology, responsible and ethical use of data, the effect of technological change on the workforce, and the development of emerging industries. SBE research in this domain supports efforts to improve lifelong learning and to integrate human values and social dynamics into the algorithms and technologies that are transforming modern life. SBE is partnering with CISE, ENG, OIA, and EHR on this Big Idea.

The URoL Big Idea, which all NSF directorates and offices participate in, includes foundational SBE

research on topics such as human genetic variation; the emergence of phenotype from gene-environment interactions; the human microbiome and its co-evolution with its human hosts; epigenetics of cognition and behavior; human networks in evolving environments, and the ethical and social implications and societal acceptance of new scientific technologies, such as tools for genetic engineering and synthetic biology.

Support for the HDR Big Idea includes SBE foundational research on machine learning, data analytics, computational simulations, technologies, human networks, and statistical methodologies. Understanding human dynamics is also critical in the area of cybersecurity and cyberinfrastructure. HDR encompasses a wide range of data-centered activities and SBE actively collaborates with CISE on many projects in this domain, such as the Partnership for Artificial Intelligence. More generally, SBE partners with CISE, EHR, MPS, ENG, and other directorates to build the knowledge required to convert unprecedented changes in computing power into transformative practices and usable technologies that can improve quality of life for all.

The NNA Big Idea seeks to advance understanding and explanation of the rapid and complex environmental and social changes in the Arctic region, and the repercussions of those changes, and to provide the tools and knowledge that will enable resilience in this important part of the world. Changes in the Arctic provide new opportunities for commerce and new challenges for people and communities in the region and beyond. SBE's partnership with other NSF directorates can help Americans more effectively understand and adapt to this new world. Specifically, SBE sciences are critical in understanding the opportunities, challenges, and adaptive capacities of individuals who, and communities that, will be affected by ongoing Arctic change.

In FY 2022, SBE will continue to support the next generation of scholars poised to produce transformative and societally beneficial science. SBE will continue its support for early career investigators—Faculty Early Career Development (CAREER); undergraduates—Research Experiences for Undergraduates (REU); graduate students—Doctoral Dissertation Research Improvement Grants (DDRIG); and post-doctoral research fellows through its SBE Postdoctoral Research Fellowships (SPRF) program.

Finally, SBE's FY 2022 Request includes continued support for NCSES. The Center is established in law with a mandate to serve as the central federal resource for collecting, analyzing, and distributing objective data on science, engineering, technology, and research and development. Consistent with recent Executive Orders that highlight the importance of objective and trustworthy data, SBE support will help NCSES modernize systems and data tools, develop a new website, and address requirements of the Foundations for Evidence-Based Policy Act (Evidence Act). SBE is also committed to supporting NSF's transition to meeting other requirements associated with the Evidence Act, including having NCSES's Director serve as the Foundation's Statistical Official and Chair the Advisory Committee on Data for Evidence Building until the Chief Statistician of the United States is appointed.

Major Investments

SBE Major Investments
(Dollars in Millions)

Area of Investment[1,2]	FY 2020 Actual	FY 2021 Estimate	FY 2022 Request	Change over FY 2021 Estimate Amount	Percent
Advanced Manufacturing	$0.75	$0.50	$3.50	$3.00	600.0%
Artificial Intelligence	16.04	14.59	19.59	5.00	34.3%
Build and Broaden	1.37	8.00	8.00	-	-
Climate: USGCRP	19.61	17.18	25.14	7.96	46.3%
NCSES	55.20	55.48	61.48	6.00	10.8%
SaTC	4.00	4.00	4.00	-	-
Strengthening American Infrastructure	1.15	6.00	8.00	2.00	33.3%

[1] Major investments may have funding overlap and thus should not be summed.

[2] This table reflects this directorate's support for selected areas of investment. In other directorate narratives, areas of investment displayed in this table may differ and thus should not be summed across narratives.

Advanced Manufacturing ($3.50 million): SBE will invest in advanced manufacturing-related activities through support for fundamental research in the social and economic sciences that contribute to the development of new methods, processes, analyses of new or existing manufacturing systems or processes. In addition, SBE is a partner in the Future Manufacturing program.

AI ($19.59 million): SBE will continue support for AI research. Key areas of investment include such activities as advancing machine learning (ML); developing natural language processing models; integrating ML advances using big data with learning mechanisms developed in cognitive science; developing new statistical inferences and algorithms for the analysis of large data sets; and understanding the ethical, legal, and societal implications (ELSI) of AI. SBE's AI investment includes support for National AI Research and Development Institutes as well as NITRD-related AI. SBE's FY 2022 funding estimate includes increased support for MSI-based research in AI.

Build and Broaden (B2) ($8.0 million): SBE will maintain investments in B2, an innovative new program that supports research collaborations and partnerships between scholars at MSIs and scholars in other institutions or organizations. B2 supports research projects that:1) build capacity and enhance research productivity in the SBE sciences at MSIs; 2) provide researchers with new ways to diversify and sustain collaborations; 3) foster partnerships that strengthen career and research trajectories for faculty at MSIs; and 4) contribute to stronger, more innovative science by diversifying research and widening the STEM pathways.

Climate: USGCRP ($25.14 million): In FY 2022, SBE will increase funding activities that are encompassed by the USGCRP. Foundational research in the SBE sciences include advancing the fundamental understanding of humans as a component of the Earth system to improve knowledge of the causes and consequences of global change; improving and developing advanced models that integrate across all components of the Earth system, the human with the physical, chemical, and biological; increase understanding of human and community resilience to global change; improving risk communications; and improving the deployment and accessibility of the SBE sciences to inform mitigation and adaptation decisions. In addition to supporting core programs that support research in this portfolio (including DISES), a portion of SBE's FY 2022 increase will be directed to Coastlines and People (CoPe), which seeks convergent science at the nexus between coastal sustainability, human dimensions, and coastal processes,

to transform understanding of interactions among natural, human-built, and social systems in coastal, populated environments.

SaTC ($4.0 million): SBE will sustain its investment in SaTC to support the foundational research on human beings that can improve and strengthen efforts to increase cybersecurity. SBE research can contribute to society's attempts to build infrastructure that facilitates innovation at the same time that it protects individuals, families, communities, and a full array of private and public sector institutions.

Strengthening American Infrastructure ($8.0 million): In FY 2022, SBE will increase by $2.0 million its commitment to this investment that links experts on physical, computational, and material aspects of infrastructure design with scientists whose fundamental research explains how humans will—and will not—use infrastructure that we build. This human-centered approach to infrastructure is a critical component to building better, smarter, and more cost-effective roads, electric grids, hospitals, and more. Improving infrastructure in these ways spurs private-sector innovation, grows the economy, and is essential to national competitiveness.

SBE Funding for Centers Programs

SBE Funding for Centers Programs
(Dollars in Millions)

	FY 2020 Actual	FY 2021 Estimate	FY 2022 Request	Change over FY 2021 Estimate	
				Amount	Percent
Artificial Intelligence Research Institutes	0.64	0.77	0.77	-	-

For detailed information on individual centers programs, please see the NSF-Wide Investments chapter.

Funding Profile

SBE Funding Profile			
	FY 2020 Actual Estimate	FY 2021 Estimate	FY 2022 Estimate
Statistics for Competitive Awards:			
Number of Proposals	4,252	4,300	4,300
Number of New Awards	1,081	1,020	1,150
Regular Appropriation	1,007	1,020	1,150
CARES Act	74		
Funding Rate	25%	24%	27%
Statistics for Research Grants:			
Number of Research Grant Proposals	3,171	3,200	3,200
Number of Research Grants	767	700	790
Regular Appropriation	693	700	790
CARES Act	74		
Funding Rate	24%	22%	25%
Median Annualized Award Size	$144,236	$144,200	$144,200
Average Annualized Award Size	$154,442	$154,400	$154,400
Average Award Duration, in years	2.4	2.4	2.4

SBE supports investment in core research and education activities as well as research infrastructure. In FY 2022, SBE will continue to fund research in areas such as the NSF Big Ideas, AI, BRAIN, and cybersecurity research while continuing to prioritize its disciplinary and interdisciplinary investigator-led research areas. In FY 2022, SBE expects to award approximately 1,150 competitive grants, including nearly 800 research grants.

Program Monitoring and Evaluation

The Performance and Management chapter provides details regarding the periodic reviews of programs and portfolios by external Committees of Visitors and directorate Advisory Committees. Please see this chapter for additional information.

People Involved in SBE Activities

Number of People Involved in SBE Activities				
	FY 2020 Actual Estimate	FY 2020 CARES Act Actual Estimate	FY 2021 Estimate	FY 2022 Estimate
Senior Researchers	2,004	110	2,000	2,300
Other Professionals	379	40	380	430
Postdoctoral Associates	185	3	190	220
Graduate Students	1,473	71	1,500	1,700
Undergraduate Students	1,155	31	1,200	1,300
Total Number of People	**5,196**	**255**	**5,270**	**5,950**

DIVISION OF BEHAVIORAL AND COGNITIVE SCIENCES (BCS) $113,160,000
                                                            +$13,750,000 / 13.8%

BCS

(Dollars in Millions)

	FY 2020 Actual	FY 2021 Estimate	FY 2022 Request	Change over FY 2021 Estimate Amount	Percent
Total	**$98.64**	**$99.41**	**$113.16**	**$13.75**	**13.8%**
Research	**89.79**	**94.47**	**108.22**	**13.75**	**14.6%**
CAREER	6.68	5.00	5.00	-	-
Education	**0.76**	**0.44**	**0.44**	**-**	**-**
Infrastructure	**8.08**	**4.50**	**4.50**	**-**	**-**
Research Resources	8.08	4.50	4.50	-	-

About BCS

BCS supports fundamental research that examines the sources of the human condition and the character of thinking and behavior. Its programs examine these issues at multiple levels of analysis, ranging from genetics and brain activity to social, cultural, and environmental contexts. Core analyses of human language, perception, and cognition are critical to understanding human behavior and to the development of new approaches to learning, decision making, and problem solving for individuals and groups.

BCS-supported research informs a range of pressing national issues. Exploring how thought and behavior respond to changing situations, environmental characteristics, and cultural differences, provides critical bases for improving disaster response and supporting improved security and preparedness. Research on sources of bias in human interaction and strategies for their mitigation are critical to expanding diversity and inclusion across the STEM disciplines. Understanding human thinking is essential for the design and improvement of advanced technologies. Through its Science of Learning and Augmented Intelligence program, BCS research explores how new technologies, especially artificial intelligence, can enhance human cognition and productivity.

BCS also manages infrastructure-related activities in Human Networks and Data Science, which seek to advance relevant analytical techniques and develop user-friendly, large-scale, next-generation data resources to improve quality of life for all Americans. These activities are complemented by active involvement in funding competitions and development of partnerships that support collaborative and cross-disciplinary projects that increase understanding of the human brain, mind, and behavior.

In general, about 87 percent of the BCS portfolio is available to support new research grants. The remaining 13 percent supports research grants made in prior years and the research infrastructure needed by this community.

DIVISION OF SOCIAL AND ECONOMIC SCIENCES (SES)   **$117,080,000**
                                                                   +$14,250,000 / 13.9%

SES Funding

(Dollars in Millions)

	FY 2020 Actual	FY 2021 Estimate	FY 2022 Request	Change over FY 2021 Estimate Amount	Percent
Total	**$99.87**	**$102.83**	**$117.08**	**$14.25**	**13.9%**
Research	**94.45**	**96.84**	**111.09**	**14.25**	**14.7%**
CAREER	6.49	5.00	5.00	-	-
Education	**0.10**	**0.50**	**0.50**	**-**	**-**
Infrastructure	**5.32**	**5.49**	**5.49**	**-**	**-**
NNIN	0.40	0.40	0.40	-	-
Research Resources	4.92	5.09	5.09	-	-

About SES

SES is concerned with the growth and flourishing of our Nation through the provision of goods, services, opportunities, and wellbeing. The Division therefore supports research on how people live, work, and prosper together in productive businesses or other organizations. Priority topics include: management tools, risk assessment, and strategic planning; workforce measurement, training, and development; fundamental questions about markets, competition, and the economy; social trends, attitudes, and demographics; security and preparedness; accountable institutions and behaviors; the legal aspects of innovation, technology, and science; the safety and trustworthiness of new technologies; as well as the statistics, modeling, and other methodologies that enable such vital research. These techniques are used to study the scientific enterprise itself with the goal of enhancing the rate, value, and communication of basic discoveries. This work thus helps grow the economy, secure the homeland, improve the health and safety of American families, and increase the competitiveness of America's farms, offices, and factories.

SES supports widely used data infrastructure such as the Panel Study of Income Dynamics, the American National Election Studies, and the General Social Survey. These surveys are national resources for research and teaching and have become models for data collections in other fields.

In general, about 75 percent of the SES portfolio is available to support new research grants. The remaining 25 percent supports research grants made in prior years and the research infrastructure needed by this community.

NATIONAL CENTER FOR SCIENCE AND ENGINEERING $61,480,000
   STATISTICS (NCSES)   +$6,000,000 / 10.8%

NCSES Funding
(Dollars in Millions)

	FY 2020 Actual	FY 2021 Estimate	FY 2022 Request	Change over FY 2021 Estimate Amount	Percent
Total	**$55.20**	**$55.48**	**$61.48**	**$6.00**	**10.8%**
Research	**0.29**	**-**	**-**	**-**	**N/A**
CAREER	0.25	-	-	-	N/A
Infrastructure	**54.91**	**55.48**	**61.48**	**6.00**	**10.8%**

About NCSES

NCSES is one of the federal government's thirteen principal statistical agencies with a mission to provide information regarding the S&E enterprise in a global context. NCSES provides policymakers, researchers, and the public high-quality data and analysis on R&D, innovation, the education of scientists and engineers, and the S&E workforce. NCSES also supports research; the education and training of researchers; statistical methodology and data quality improvement efforts; and information compilation and dissemination to meet the statistical and analytical needs of a diverse user community.

NCSES was originally created within NSF as the Division of Science Resources Statistics. In 2010, the agency's mandate was expanded and it was renamed as NCSES by Section 505 of the America COMPETES Reauthorization Act of 2010 (P.L. 111-358). The Act mandates that NCSES collect data on R&D trends, the science and engineering workforce, U.S. competitiveness, and the condition and progress of the Nation's STEM education. This includes the preparation of two congressionally mandated biennial reports—*Science and Engineering Indicators (SEI); and Women, Minorities, and Persons with Disabilities in Science and Engineering (WMPD)*. WMPD is a unique source of data and analysis on participation across the science and engineering enterprise.

The FY 2022 Request supports NCSES's core data collection and analytic activities, including nationally representative surveys of U.S. investment in R&D across all sectors of the economy, innovation, the education of scientists and engineers, and the science and engineering workforce. This also includes preparation of the aforementioned *SEI and WMPD* reports. In FY 2022, NCSES will continue initiatives related to:
- Standing up America's DataHub—an NCSES research center of excellence that will move NCSES toward a future in which it can securely share and link existing data to solve complex problems, such as those related to economic recovery, racial equity, or the impacts of COVID-19. The DataHub will facilitate broad and secure access to linked data and revolutionize privacy protections and data security.
- Improving the data and informational infrastructure around understanding racial equity and participation by reimagining the WMPD report and supporting efforts to gather data necessary to inform government-wide equity efforts.
- Furthering the Nation's understanding of the impact of R&D funding on the U.S. and global scientific enterprises.
- Informing U.S. policy on the foreign-trained S&E workforce by filling important gaps in knowledge of foreign-born and foreign-degreed scientists and engineers.
- Studying the Skilled Technical Workforce (STW)—with emphasis on the STW's current and potential future relevance to economic recovery and emerging industries such as, but not limited to AI, the

bioeconomy, and future manufacturing.
- Improving the government's classification systems for defining cybersecurity, bioeconomy, and data science occupations.
- Using of administrative and organic data to inform efforts to increase government effectiveness and efficiency through increased data integration.
- Maintaining systems and data collection efforts for modern federal statistics.
- Modernizing systems and data tools to ease data access.
- Developing and building a new website for data and product dissemination to enhance the experience of users of NCSES information.

SBE OFFICE OF MULTIDISCIPLINARY ACTIVITIES (SMA) **$27,940,000**
+$3,600,000 / 14.8%

SMA Funding

(Dollars in Millions)

	FY 2020 Actual	FY 2021 Estimate	FY 2022 Request	Change over FY 2021 Estimate Amount	Percent
Total	**$26.64**	**$24.34**	**$27.94**	**$3.60**	**14.8%**
Research	**20.14**	**13.28**	**20.38**	**7.10**	**53.5%**
CAREER	1.36	-	-	-	N/A
Centers Funding (total)	0.64	0.77	0.77	0.01	0.7%
Artificial Intelligence Research Institutes	0.64	0.77	0.77	0.01	0.7%
Education	**6.50**	**11.06**	**7.56**	**-3.50**	**-31.6%**

About SMA

SMA provides a focal point for the wide range of activities that cut across SBE and NSF disciplinary boundaries. SMA supports efforts and activities that seek to improve the scale and effectiveness of the scientific workforce. It supports REU Sites, the Ethical and Responsible Research (ER2) program, and the SPRF program. In FY 2022, SMA will play a major role in several crosscutting NSF investments as well as interdisciplinary research and training, via activities such as the SPRF-Fundamental Research and BP tracks. As the lead directorate for managing the ER2 program, with support from other NSF directorates, SBE coordinates the Online Ethics Center for Engineering and Science award. While all SBE divisions pursue interdisciplinary work, SMA assists with seeding multidisciplinary activities for the future, such as leveraged and targeted co-funding directed towards national, NSF, and directorate priorities.

In general, about 63 percent of the SMA portfolio is available to support new research grants. The remaining 27 percent supports research grants made in prior years.