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NSF Higher Education R&D Survey

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National Science Foundation National Center for Science and Engineering Statistics www.nsf.gov/statistics/



Presentation Outline

- Overview of the National Center for Science and Engineering Statistics (NCSES)
- Overview of the Survey of Science and Engineering Research Facilities
- Overview of the Higher Education R&D Survey
- Data trends
- Demonstration of new NCSES Table Tool
- Discussion of potential survey revisions and additions
- Open Forum
- Next steps



Overview of NCSES

• A federal statistical agency that reports to the National Science Foundation's Directorate for Social, Behavioral, and Economic Sciences.

• NCSES provides data users with objective, high-quality statistical information on U.S. and international science, engineering, technology, and R&D, and fosters research that improves the measurement and understanding of the science and engineering enterprise.



NCSES Home Page: ncses.nsf.gov

WHERE DISCOV	Foundation ERIES BEGIN		Sea	rch	٩
Research Areas	Funding	Awards	Document Library	News	About NSF
Social, Behavioral & Economic Sciences (SBE)	Home + Research	Areas + SBE			is Email - ⊖ Print r# Share
Social, Behavioral & Economic > Sciences (SBE) Home	Nationa	al Center for	Science and Engine	eering Sta	tistics
Behavioral and Cognitive > Sciences (BCS)	The National C U.S. science an	enter for Science and Eng nd engineering enterprise.	pineering Statistics (NCSES) is the natio	on's leading provide	r of statistical data on the
National Center for Science and Engineering Statistics (NCSES)	Explore our we of STEM educe	bsite for data on research tion, and U.S. competitive	and development, the science and eng eness in science, engineering, technolo	ineering workforce, gy, and R&D.	the condition and progress
About NCSES	Learn More A	About NCSES			144
Data				$2x^{-}x^{-}$	
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Surveys	What's New?			Univer	rsities Report Increased
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Schedule of Next Release Dates				-	
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Get NCSES Email Updates				Learn	MORE
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Survey of Science and Engineering Research Facilities Overview

- Congressionally mandated
- Conducted biennially from 1986 to 2017
- Census of all U.S. universities and colleges with minimum of \$1,000,000 of S&E R&D spending (N = 575 in FY 2017)
- Eligible institutions identified through the Higher Education Research & Development survey
- Voluntary (response rates consistently over 95%)
- Institution level tables available on NCSES website



Survey of S&E and Engineering Research Facilities

- Types of data collected:
 - ✓ Current research space
 - ✓ New construction and repairs/renovations
 - ✓ Planned construction and repairs/renovations
 - ✓ Deferred construction and repairs/renovations
 - \checkmark Fields of science and engineering
 - \checkmark Dollars and net assignable square feet
 - ✓ Research animal space (confidential)
 - ✓ Condition of research space (confidential)



NCSES National Center for Science and Engineering Statistics

S&E Research Space at Academic Institutions, by Field: 2007 and 2017



SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, Survey of Science and Engineering Research Facilities.

Higher Education R&D Survey Overview

- Conducted annually since 1972, significantly redesigned in 2010
- Census of all U.S. universities and colleges with minimum of \$150,000 of R&D spending (N = 924 in FY 2018)
- Survey response rate has consistently been over 95%
- Requests expenditures for all separately accounted for R&D performed at institutions during previous academic FY
- Institution level tables available on NCSES website



Higher Education R&D Survey Overview

- Types of data collected:
 - ✓ Federal agency sources of funding by field
 - ✓ Nonfederal sources of funding by field
 - Type of R&D (basic research, applied research, and experimental development)
 - ✓ Spending on R&D equipment by field
 - ✓ R&D spending passed through to subrecipients or received as a subrecipient



Higher Education R&D Survey Overview

- Types of data collected (continued):
 - \checkmark Foreign sources of funding
 - ✓ Medical school R&D
 - ✓ Clinical trial R&D
 - ✓ Type of funding agreement: contracts vs. grants
 - ✓ Specific cost elements of R&D expenditures (salaries, software, equipment, etc.)
 - ✓ Headcounts of personnel paid from R&D accounts



Survey Products and Publications

- InfoBriefs
- Data tables
- Public use files
- Database access through the NCSES Data Table Tool
- Academic Institution Profiles
- Technical documentation

All available from NCSES homepage

List of all data resources at ncses/nsf.gov/data.cfm



Trends in Higher Education R&D Spending by Source of Funds: FYs 1972-2017





Higher Education R&D Spending by Federal Funding Agency: FY 2017





Higher Education R&D Spending by Source of Funds and Type of R&D: FY 2017





Higher Education R&D Spending by Source of Funds and Type of Control: FY 2017





NCSES's New Table Tool

- Located at https://ncsesdata.nsf.gov/ids/
- Data from 5 NCSES surveys are currently available
 - HERD
 - Survey of S&E Research Facilities
 - Federal S&E Support for Universities, Colleges, Nonprofits
 - Graduate Students & Postdocs (GSS)
 - Earned Doctorates (SED)
- More to come including IPEDS
- Continual improvements



NCSES's New Table Tool

The https://ncsesdata-dev.nst.gov/idsdev/								▼ 90% C Q Search	+ 🗆
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The NCSES Table Tool provides easy acce	ss to a large bo	dv of statistical o	lata for science a	nd enaineerina (S	E) at U.S. acad	emic institutions	The tool emphas	sizes S&E. but its data resources als	o provide information on
			non-S	&E fields and high	er education in	general.			
				Comin	g Soon!				
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Survey Description ~	nce and Engine	ering (GSS)							Go to Table
Survey of Earned Doctorates (SED)									
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Higher Education Research and Development Survey (H	IERD)								Go to Table
Survey of Federal Funds for Research and Developmen	•								
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Survey of Federal Science and Engineering Support to I	Universities, Co	lleges, and No	nprofit Institutio	ns					
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Science and Engineering Research Facilities Survey									Go to Table



NCSES's New Table Tool

L060	NCSES Table Tool Release No								Release Notes
Home su Hi	RVEY igher Education Research and Developm	nent Survey (HERD)		data availability 2010 - 2017		PUBLIC USE FILES (RAW DATA) Available			
Fiscal Year	E Rows	instName instState (1 o	f 55)						
R&D Field	iii Columns (Year (1 of 8) fundingAgency								
Detailed Field ()	Drag and drop fields above to rearrange table								
Broad Field ()	INFLATION ADJUSTMENT O Current Dollars 🗸 UNITS Dollars 🧹								
 Funding Source 	● 2017								
Federal or Nonfederal ()		Department of	Department of	Department of Energy	Department of Health and	National Aeronautics and	National Science	Nonfederal	Other
Detailed Source of Funds ()		Agriculture	Defense		Human Services	Space Administration	Foundation		
 Detailed Source of Funds(Passthrough) 	C. of William and Mary and Virginia Institute of Marine Science	250,000	2,184,000	1,448,000	2,048,000	514,000	6,900,000	31,367,000	19,416,000
	Christopher Newport U.	-	22,000	163,000	-	372,000	199,000	307,000	201,000
Federal Agency	Eastern Virginia Medical School	-	100,000	-	7,185,000	834,000 -		7,462,000	13,090,000
Foreign Organization Type 1	Edward Via C. of Osteopathic Medicine	-	29,000	-	9,000	-	52,000	8,025,000	4,000
✓ Other Dimensions	George Mason U.	339,000	17,426,000	538,000	8,164,000	6,973,000	11,958,000	55,059,000	11,947,000
Type of R&D Conducted 1	Hampton U.	-	1,742,000	1,072,000	3,796,000	5,849,000	3,790,000	233,000 -	
	James Madison U.	83,000	71,000	70,000	206,000	159,000	1,437,000	975,000	247,000
Personnel Role 😈	Norfolk State U.	-	999,000	3,779,000	20,000		2,303,000	195,000 -	
Institution Dimensions	Old Dominion U.	250,000	6,526,000	3,394,000	7,271,000	3,431,000	7,093,000	25,578,000	14,447,000
 Basic information 	U. Richmond	7,000	115,000	293,000	768,000	13,000	638,000	1,236,000	36,000
Institution Name 1	U. Virginia, Charlottesville	190,000	25,008,000	8,461,000	147,302,000	3,431,000	22,650,000	240,772,000	21,868,000
State 0	Virginia Commonwealth U.	235,000	12,036,000	2,264,000	105,039,000	390,000	5,592,000	87,879,000	22,029,000
Public or Private	 Virginia Polytechnic Institute and State U. 	19,374,000	42,806,000	11,918,000	35,745,000	4,647,000	39,598,000	336,371,000	31,966,000
Conducts Clinical Trials ()	Virginia State U.	3,508,000		-	150,000	-	947,000	5,946,000	174,000
Form Type 0									
 Degrees Awarded 									
Highest Degree Awarded 3									



Discussion of potential future survey revisions and additions

- Last comprehensive survey redesign began 10 years ago
- Several new areas of content and revisions needed to fill data needs and improve international comparability
- Site visits conducted over the past two summers to assess feasibility

Potential new content areas: Capital expenditures for R&D (1)

- HERD only collects capital expenditures for R&D equipment purchased on R&D project accounts
- Other countries measuring HERD include all capital expenditures for R&D
- NCSES considering adding a question to the survey to collect capital R&D expenditures for land, buildings, equipment, software and intellectual property



Potential New Content Areas: Capital expenditures for R&D (2)





Potential New Content Areas: Full-time equivalents working on R&D (1)

- HERD has collected head counts of R&D principal investigators and other personnel since FY 2010
- International comparisons of R&D personnel are made using full-time equivalents (FTE)
- NSF considering the best way to collect FTE for R&D in addition to head counts



Potential New Content Areas: Full-time equivalents working on R&D (2)

Question 15. How many (paid) full-time equivalents (FTEs) worked on research activities in FY 2020?

FTE research personnel are calculated as the total working (paid) effort spent on research during a specific period (usually a calendar year) divided by the total effort representing a full-time schedule within the same period.

For example, if you have 2 people working full-time for 13 and 26 weeks per year plus 1 half-time person working 52 weeks on research activities, and a full-time yearly schedule is 52 weeks, your research FTE calculation is (13 + 26 + (52 * 0.5))/52 = 1.25 FTE

- A principal investigator (PI) is designated by your institution to direct the R&D project or program and be responsible for the scientific and technical direction of the project. Co-investigators (co-PIs) may be designated for this role and should also be included in column 1.
- If a person serves as a PI or co-PI on one project and other personnel on another project, count that person as a PI.
- Include all personnel and students paid from R&D accounts regardless of how much they received.

	(1) Principal	(2) All other	(3)	
	investigators	personnel	Total	
FTEs			TOTAL	



Other Issues Under Consideration

- Improving consistency of institution funding and personnel counts across institutions
- Separate reporting for R&D expenditures at foreign satellite campuses



Open Forum

- Reactions to planned or potential changes?
- What additional areas on HERD would you like to see changed or refined?
- Other questions or concerns?



Next Steps

- A workshop will be held later this year to continue discussion of reporting capital expenditures
- Additional site visits and phone interviews with institutions to test potential new questions before summer of 2020
- Your feedback is always welcome



Thank You!

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