InfoBrief
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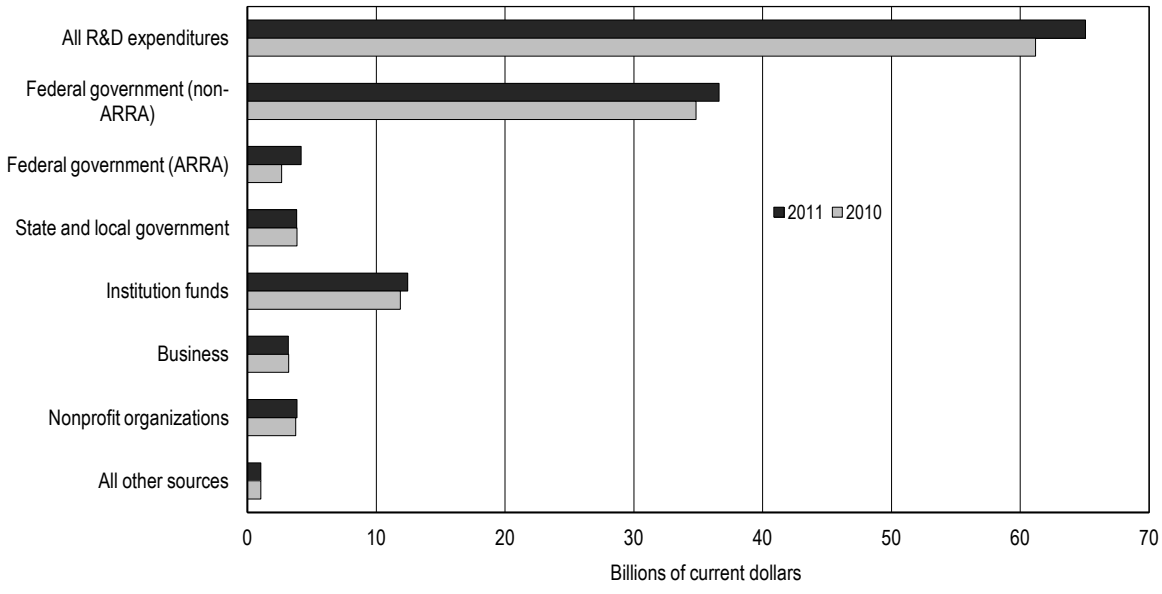
Universities Report Highest-Ever R&D Spending of $65 Billion in FY 2011

by Ronda Britt[1]

University spending on research and development in all fields continued to increase between FY 2010 and FY 2011, rising 6.3% from $61.2 billion to $65.1 billion, according to FY 2011 data from the National Science Foundation's Higher Education Research and Development (HERD) Survey (figure 1). When adjusted for inflation, higher education R&D rose by 4.3% in FY 2011. It should be noted that the survey population also increased from 742 universities in 2010 to 912 universities in 2011. These new units added $533 million in total R&D expenditures in FY 2011. (See "Data Sources, Limitations, and Availability" for more information.)

Once again, funding from the American Recovery and Reinvestment Act of 2009 (ARRA) was responsible for much of the increase, with ARRA-funded expenditures totaling $4.2 billion in FY 2011. ARRA funding represented 10.2% of the federally funded R&D expenditures for FY 2011. Including ARRA funding, the total federal

FIGURE 1. Higher education R&D expenditures, by source of funds: FY 2010–11



ARRA = American Recovery and Reinvestment Act of 2009.

SOURCE: National Science Foundation/National Center for Science and Engineering Statistics, Higher Education Research and Development Survey.

funding for higher education R&D rose to $40.8 billion in FY 2011, or 62.6% of the $65.1 billion total.

Among the nonfederal sources of funding, only nonprofit organizations and the academic institutions themselves contributed more in FY 2011 than in FY 2010 (figure 1). Institution-funded R&D rose by over $500 million to $12.4 billion, and nonprofit-funded R&D increased by a more modest $104 million to $3.8 billion in FY 2011. Expenditures funded by state and local government, business, and other sources were virtually unchanged.

Unless otherwise indicated, references to dollar amounts or percentages in this InfoBrief are in current dollars.

R&D Expenditures by Field and Source of Funding

Life sciences continued to dominate among the 10 broad fields collected, growing 6.6% to $37.2 billion in FY 2011 (table 1). The majority of the funding ($20.4 billion) was spent within the subfield of medical sciences. Engineering was the next largest broad field and increased 7.7% in FY 2011 to $10.0 billion in reported R&D expenditures. Social sciences grew by 2.7% in FY 2011 to $2.0 billion, almost returning to its FY 2009 total after a decline in FY 2010. R&D within non-science and engineering (non-S&E) rose rapidly, showing a 10.5% increase from FY 2010 to $3.2 billion.

The life sciences received the largest amount of funding from each of the sources, ranging from 66.8% of the funding provided by nonprofit organizations to just over half (51.6%) of institution funds (table 2). Engineering was the second largest

TABLE 1. Higher education R&D expenditures, by R&D field: FY 2010–11

(Million of current dollars)

Field	FY 2010	FY 2011	% change 2010–11
All R&D fields	61,191	65,073	6.3
Science	48,983	51,845	5.8
Computer sciences	1,637	1,735	6.0
Environmental sciences	2,992	3,167	5.8
Atmospheric sciences	429	481	12.1
Earth sciences	1,085	1,142	5.3
Oceanography	1,022	1,049	2.6
Environmental sciences, nec	456	495	8.6
Life sciences	34,924	37,232	6.6
Agricultural sciences	2,984	3,129	4.9
Biological sciences	10,917	11,802	8.1
Medical sciences	19,265	20,356	5.7
Life sciences, nec	1,758	1,945	10.6
Mathematical sciences	592	636	7.4
Physical sciences	4,619	4,779	3.5
Astronomy	573	582	1.6
Chemistry	1,748	1,786	2.2
Physics	1,996	2,109	5.7
Physical sciences, nec	302	303	0.3
Psychology	1,075	1,119	4.1
Social sciences	1,991	2,045	2.7
Economics	349	389	11.5
Political sciences	373	364	-2.4
Sociology	418	425	1.7
Social sciences, nec	851	866	1.8
Sciences, nec	1,154	1,132	-1.9
Engineering	9,327	10,045	7.7
Aeronautical/astronautical engineering	635	672	5.8
Bioengineering/biomedical engineering	744	815	9.5
Chemical engineering	821	927	12.9
Civil engineering	1,107	1,211	9.4
Electrical engineering	2,053	2,209	7.6
Mechanical engineering	1,461	1,556	6.5
Metallurgical/materials engineering	704	738	4.8
Engineering, nec	1,802	1,918	6.4
Non-science and engineering	2,880	3,183	10.5
Business and management	365	395	8.2
Communications, journalism, and library science	129	148	14.7
Education	991	1,104	11.4
Humanities	258	296	14.7
Law	96	119	24.0
Social work	177	191	7.9
Visual and performing arts	64	73	14.1
Non-science and engineering, nec	799	857	7.3

nec = not elsewhere classified.

SOURCE: National Science Foundation/National Center for Science and Engineering Statistics, Higher Education Research and Development Survey.

TABLE 2. Higher education R&D expenditures, by source of funds and R&D field: FY 2011

(Millions of current dollars)

Field	All R&D expenditures	Federal government	State and local government	Institution funds	Business	Nonprofit organizations	All other sources
All R&D fields	65,073	40,765	3,819	12,445	3,162	3,840	1,042
Computer sciences	1,735	1,289	64	240	76	44	21
Environmental sciences	3,167	2,188	176	512	136	96	60
Life sciences	37,232	23,680	2,148	6,427	1,762	2,565	649
Agricultural sciences	3,129	1,041	805	938	141	134	69
Biological sciences	11,802	8,227	527	1,876	339	690	143
Medical sciences	20,356	13,200	733	3,190	1,243	1,589	401
Life sciences, nec	1,945	1,212	83	424	38	152	36
Mathematical sciences	636	459	31	115	10	15	7
Physical sciences	4,779	3,538	107	796	123	170	44
Psychology	1,119	816	40	190	16	47	9
Social sciences	2,045	947	193	587	66	214	37
Sciences, nec	1,132	463	103	415	69	63	19
Engineering	10,045	6,277	702	1,766	820	339	142
Non-science and engineering	3,183	1,107	256	1,397	85	286	52

nec = not elsewhere classified.

NOTES: Because of rounding, detail may not add to total. Not all subfields reported in this table.

SOURCE: National Science Foundation/National Center for Science and Engineering Statistics, Higher Education Research and Development Survey, FY 2011.

field across all sources, ranging from 8.8% of the funding from nonprofit organizations to 25.9% of business-funded expenditures. The remaining fields were funded in relatively equal proportions by the various sources, with the exception of institutional funding of non-S&E R&D. Reflecting the relatively fewer sources of external support for R&D in such fields, institutions themselves contributed 11.2% of their total funding to projects within non-S&E fields, surpassing the federal government's contribution for non-S&E R&D projects.[2]

R&D Spending for Top 30 Performers

Of the 912 institutions surveyed, the top 30 in terms of R&D expenditures in all fields accounted for 40.1% of total academic R&D spending (table 3). There were only two changes to the top 30 between FY 2010 and FY 2011. The University of Southern California moved from number 28 to 31, and Harvard University entered the top 30 at number 27. Six institutions now report over $1 billion each in R&D spending, up from four in FY 2010.

Among the top 30, the percentage of R&D funds provided by the federal government, including ARRA funding, varied dramatically: from 35.6% of the University of Texas M. D. Anderson Cancer Center total to 87.8% of the total for the Johns Hopkins University, including its Applied Physics Laboratory. The percentage of total R&D funded by ARRA also varied, ranging from 2.1% of Texas A&M University's total to 13.8% of the University of Washington Seattle's total.

ARRA Funding by State

On average, ARRA funds contributed 6.4% of the total spent on higher education R&D within a state. The state with the highest proportion was Maine, with 13.3% of its $140 million total funded by ARRA. Vermont (11.4%) and Washington (11.3%) were also well above the national average. North Dakota (2.0%), Mississippi (2.1%), and South Dakota (2.7%) had the lowest proportions of ARRA funding for higher education R&D (figure 2).

R&D Expenditures within Medical Schools

In FY 2010, the redesigned HERD Survey began capturing the amount of R&D spending that occurred within an institution's medical school. This detail allows institutions with and without medical schools to more accurately compare themselves with peer institutions, and it provides a national total for R&D spending within medical schools.[3]

Of the $65.1 billion total, 35.5% ($23.1 billion) was spent within medical schools. Duke University reported the largest amount of medical school R&D in FY 2011 ($831 million, or 81.3% of their FY 2011 total). Of the top 10 institutions, six reported medical school R&D spending that accounted for more than 70% of their total R&D expenditures (table 4).

TABLE 3. Thirty institutions reporting the largest FY 2011 R&D expenditures in all fields, by source of funds: FY 2011
(Millions of current dollars)

Rank	Institution	All R&D expenditures	Federal government (non-ARRA)	Federal government (ARRA)	State and local government	Institution funds	Business	Nonprofit organizations	All other sources
	All institutions	65,073	36,605	4,160	3,819	12,445	3,162	3,840	1,042
	Leading 30 institutions	26,086	15,059	1,767	1,305	3,959	1,527	1,912	553
1	Johns Hopkins U.[a]	2,145	1,801	83	8	78	59	104	12
2	U. MI, Ann Arbor	1,279	707	113	2	363	40	47	7
3	U. WA, Seattle	1,149	790	159	20	57	21	76	25
4	U. WI, Madison	1,112	542	52	103	220	28	125	42
5	Duke U.	1,022	511	74	32	120	215	69	1
6	U. CA, San Diego	1,009	583	54	42	99	67	112	53
7	U. CA, San Francisco	995	509	61	31	136	54	126	78
8	U. CA, Los Angeles	982	502	61	38	160	49	93	79
9	Stanford U.	908	573	83	39	72	58	81	2
10	U. Pittsburgh, main campus	899	590	73	8	196	12	21	0
11	U. PA	886	612	95	22	52	44	62	0
12	Columbia U. in the City of New York	879	564	82	12	99	36	65	21
13	U. MN, Twin Cities	847	439	50	60	190	31	61	15
14	OH State U.	832	430	63	101	95	104	26	14
15	PA State U., University Park, and Hershey Medical Ctr.	795	438	31	56	161	65	40	4
16	Cornell U.	782	432	44	62	137	24	80	2
17	U. NC, Chapel Hill	767	494	68	6	122	26	51	0
18	U. FL	740	265	41	98	281	23	27	5
19	Washington U., St. Louis	725	414	55	19	103	42	49	42
20	MA Institute of Technology	724	441	48	0	17	110	73	34
21	U. CA, Berkeley	708	309	27	60	122	87	84	19
22	U. CA, Davis	708	324	39	60	146	37	66	36
23	TX A&M U.	706	276	15	132	187	55	36	5
24	U. TX M. D. Anderson Cancer Ctr.	663	208	28	199	70	60	98	0
25	Yale U.	657	454	66	5	62	12	47	12
26	GA Institute of Technology	655	412	16	11	158	42	13	4
27	Harvard U.	650	470	73	2	0	26	68	10
28	U. TX, Austin	632	326	29	41	129	68	31	7
29	Northwestern U.	619	346	54	5	144	15	55	NA
30	U. AZ	611	298	30	31	183	17	26	24

NA = not available.

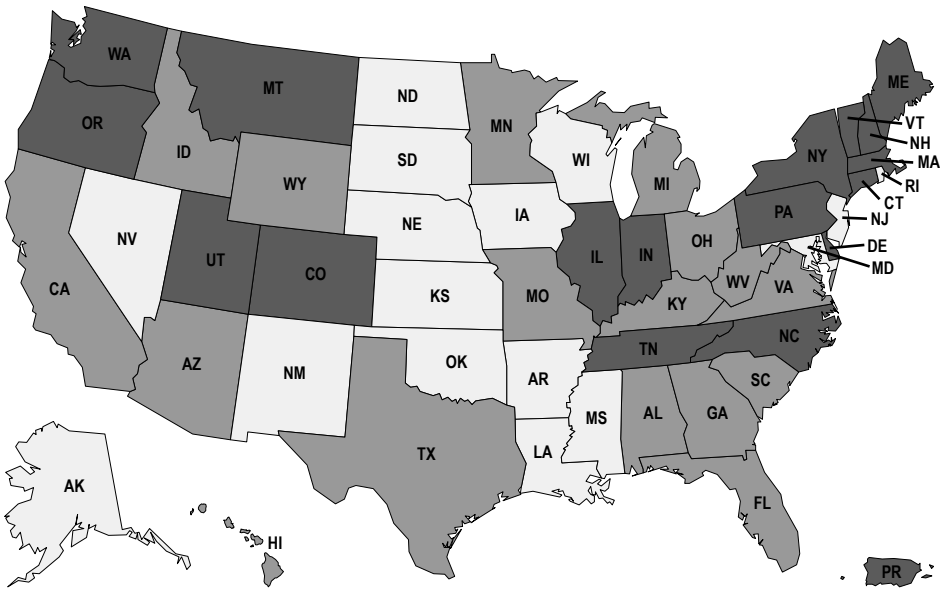
ARRA = American Recovery and Reinvestment Act of 2009.

[a] Johns Hopkins University includes Applied Physics Laboratory, with $1,161 million in total R&D expenditures in FY 2011.

NOTES: Because of rounding, detail may not add to total. Institutions ranked are geographically separate campuses headed by a campus-level president or chancellor.

SOURCE: National Science Foundation/National Center for Science and Engineering Statistics, Higher Education Research and Development Survey, FY 2011.

FIGURE 2. Higher education R&D expenditures funded by the American Recovery and Reinvestment Act of 2009, by state: FY 2011



ARRA = American Recovery and Reinvestment Act of 2009.

SOURCE: National Science Foundation/National Center for Science and Engineering Statistics, Higher Education Research and Development Survey, FY 2011.

TABLE 4. Ten institutions reporting the largest FY 2011 medical school R&D expenditures: FY 2011

(Millions of current dollars)

Rank	Institution	Medical school R&D expenditures	Non-medical school R&D expenditures
	All institutions	23,115	41,958
1	Duke U.	831	191
2	U. CA, San Francisco	785	210
3	Johns Hopkins U.[a]	646	1,499
4	U. Pittsburgh, main campus	638	261
5	Washington U., St. Louis	631	94
6	U. PA	629	257
7	U. WA, Seattle	603	546
8	U. MI, Ann Arbor	545	734
9	Stanford U.	536	372
10	Yale U.	489	168

[a] Johns Hopkins University includes Applied Physics Laboratory, with $1,161 million in total R&D expenditures in FY 2011.

SOURCE: National Science Foundation/National Center for Science and Engineering Statistics, Higher Education Research and Development Survey, FY 2011.

Data Sources, Limitations, and Availability

The fiscal year referred to throughout this report is the academic fiscal year; for most institutions FY 2011 represents the period 1 July 2010 through 30 June 2011. The higher education R&D expenditures data presented in this InfoBrief were obtained from 912 universities and colleges that grant bachelor's or higher degrees and expended at least $150,000 in R&D during the survey period. The survey population included an additional 170 institutions in FY 2011. This increase is due to the screening conducted in FY 2010 via the HERD Short Form Survey. For more details on the Short Form, see appendix D of the FY 2010 HERD

detailed statistical tables at http://www.nsf.gov/statistics/nsf12330/.

Although ARRA funding was awarded to institutions in federal FY 2009, much of the funding was for multi-year projects. ARRA expenditures are expected to appear in HERD totals through academic FY 2013. The amounts reported include all funds expended for activities specifically organized to produce research outcomes and sponsored by an outside organization or separately budgeted using institution funds. R&D expenditures at university-administered federally funded research and development centers (FFRDCs) are collected in a separate survey. Data from the FFRDC R&D Survey are available at http://www.nsf.gov/statistics/ffrdc/.

The full set of detailed tables from this survey will be available in the report *Higher Education Research and Development: Fiscal Year 2011* at http://www.nsf.gov/statistics/rdexpenditures/. Individual detailed tables from the 2011 survey may be available in advance of publication of the full report. For further information, please contact the author.

Notes

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2. For more details on the specific fields within each of these broad field categories, see pages 10–15 of the FY 2011 HERD Survey questionnaire, http://www.nsf.gov/statistics/srvyherd/surveys/srvyherd_2011.pdf.

3. This amount includes only the spending that is accounted for within the institution's accounting systems. R&D performed by faculty at outside hospitals or clinics is not included unless the R&D project award was administered by the faculty's home institution.

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