National Center for Science and Engineering Statistics

InfoBrief

# U.S. Businesses Reported $441 Billion for R&D Performance in the United States During 2018, a 10.2% Increase from 2017

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Businesses spent $441 billion on research and development performance in the United States in 2018, a 10.2% increase from 2017 (table 1). Funding from the companies' own sources was $378 billion in 2018, an 11.4% increase from 2017. Funding from other sources was $63 billion in 2018 and $61 billion in 2017. Data for this InfoBrief are from the 2018 Business Research and Development Survey (BRDS), developed and cosponsored by the National Center for Science and Engineering Statistics within the National Science Foundation and by the U.S. Census Bureau, which collected and tabulated data for the survey.[1]

**Table 1**

**Funds spent for business R&D performed in the United States, by type of R&D, source of funds, and size of company: 2017–18**

(Millions of U.S. dollars)

| Selected characteristic and company size | 2017 | | 2018 | |
|---|---|---|---|---|
| Domestic R&D performance[a] | 400,100 | | 441,036 | |
| Type of R&D[b] | | | | |
| Basic research | 24,829 | | 28,980 | |
| Applied research | 62,132 | | 65,222 | |
| Development | 313,139 | | 346,834 | |
| Paid for by the company[c] | 339,036 | | 377,806 | |
| Basic research | 18,732 | | 22,312 | |
| Applied research | 49,149 | | 53,229 | |
| Development | 271,155 | | 302,264 | |
| Paid for by others | 61,065 | | 63,230 | |
| Basic research | 6,097 | | 6,668 | |
| Applied research | 12,984 | | 11,993 | |
| Development | 41,984 | | 44,570 | |
| Source of funds | | | | |
| Federal | 24,277 | i | 24,685 | |
| Other[d] | 36,788 | | 38,545 | |
| Size of company (number of domestic employees) | | | | |
| Small companies[e] | | | | |

**Table 1**

**Funds spent for business R&D performed in the United States, by type of R&D, source of funds, and size of company: 2017–18**

(Millions of U.S. dollars)

| Selected characteristic and company size | 2017 | 2018 |
|---|---|---|
| 10–19 | 3,311 | 4,390 |
| 20–49 | 9,435 | 11,252 |
| Medium companies | | |
| 50–99 | 10,141 | 12,321 |
| 100–249 | 17,216 | 18,547 |
| Large companies | | |
| 250–499 | 14,103 | 19,645 |
| 500–999 | 17,871 | 17,657 |
| 1,000–4,999 | 65,112 | 68,578 |
| 5,000–9,999 | 40,198 | 45,337 |
| 10,000–24,999 | 73,485 | 84,420 |
| 25,000 or more | 149,227 | 158,889 |

i = more than 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

[a] Domestic R&D performance is the cost of R&D paid for and performed by the respondent company and paid for by others outside of the company and performed by the company.

[b] R&D is planned, creative work aimed at discovering new knowledge or devising new applications of available knowledge. This includes (1) activities aimed at acquiring new knowledge or understanding without specific immediate commercial applications or uses (basic research), (2) activities aimed at solving a specific problem or meeting a specific commercial objective (applied research), and (3) systematic work, drawing on research and practical experience and resulting in additional knowledge, which is directed to producing new processes or to improving existing products—goods or services—or processes (development).

[c] Includes foreign subsidiaries of U.S. companies.

[d] Includes companies located inside and outside the United States; U.S. state government agencies and laboratories; U.S. universities, colleges, and academic researchers; and all other organizations located inside and outside the United States.

[e] The Business Research and Development Survey does not include companies with fewer than 10 domestic employees.

**Note(s)**
Detail may not add to total because of rounding. Beginning in survey year 2018, companies that performed or funded less than $50,000 of R&D were excluded from tabulation. These companies in aggregate represented a very small share of total R&D expenditures in prior years. Had the companies under this threshold been included in the 2018 estimates, they would have contributed approximately $90 million to overall R&D expenditures. Excludes data for federally funded research and development centers.

**Source(s)**
National Center for Science and Engineering Statistics and U.S. Census Bureau, Business Research and Development Survey.

## R&D Performance, by Type of R&D, Industry Sector, and Source of Funding

In 2018, of the $441 billion that companies spent on R&D, $29 billion (7%) was spent on basic research, $65 billion (15%) on applied research, and $347 billion (79%) on development. The distribution was similar to the 2017 distribution (6%, 16%, and 78%, respectively) (table 1). In 2018, companies in manufacturing industries performed $274 billion (62%) of *domestic R&D*, defined as R&D performed in the 50 states and Washington, DC (table 2). Most of the funding was from these companies' own funds (86%). Companies in nonmanufacturing industries performed $167 billion of domestic R&D (38% of total domestic R&D performance), 86% of which was paid for from companies' own funds.

## Table 2

**Funds spent for business R&D performed in the United States, by source of funds, selected industry, and company size: 2018**

(Millions of U.S. dollars)

| Industry, NAICS code, and company size | All R&D[a] | Paid for by the company[b] | Paid for by others | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Total | Federal | Companies | | All other organizations[d] | |
| | | | | | Domestic | Foreign[c] | | |
| All industries, 21–33, 42–81 | 441,036 | 377,806 | 63,230 | 24,685 | 19,087 | 18,333 | 1,125 | |
| Manufacturing industries, 31–33 | 274,075 | 234,682 | 39,393 | 18,980 | 5,323 | 14,623 | 467 | |
| Chemicals, 325 | 84,137 | 73,584 | 10,553 | 204 | 2,277 | 8,001 | 71 | |
| Pharmaceuticals and medicines, 3254 | 74,592 | 64,800 | 9,792 | 188 | 2,257 | 7,276 | 71 | |
| Other 325 | 9,545 | 8,784 | 761 | 16 | 20 | 725 | * | |
| Machinery, 333 | 14,799 | 13,765 | 1,034 | 175 | 187 | D | D | |
| Computer and electronic products, 334 | 83,697 | 73,922 | 9,775 | 5,174 | 1,499 | 2,966 | 136 | |
| Electrical equipment, appliance, and components, 335 | 4,487 | 4,222 | 266 | 39 | 23 | 202 | 2 | |
| Transportation equipment, 336 | 52,629 | 35,894 | 16,735 | 13,321 i | 1,118 | 2,057 | 239 | |
| Motor vehicles, bodies, trailers, and parts, 3361–63 | 25,586 | 23,080 | 2,506 | D | 436 | 1,978 | D | |
| Aerospace products and parts, 3364 | 24,291 | 11,160 | 13,131 i | 12,167 i | 680 | D | D | |
| Other 336 | 2,752 | 1,654 | 1,098 | D | 2 | D | D | |
| Manufacturing nec, other 31–33 | 34,326 | 33,295 | 1,030 | 67 i | 219 | D | D | |
| Nonmanufacturing industries, 21–23, 42–81 | 166,961 | 143,123 | 23,838 | 5,705 | 13,764 | 3,710 | 659 | |
| Information, 51 | 94,349 | 93,487 | 862 | 50 | 51 | 729 | 32 | |
| Software publishers, 5112 | 32,639 | 32,150 | 489 | 36 | 10 | 423 | 20 | |
| Other 51 | 61,710 | 61,337 | 373 | 14 | 41 | 306 | 12 | |
| Finance and insurance, 52 | 7,471 | 7,426 | 45 | 0 | 0 | 0 | 45 | |
| Professional, scientific, and technical services, 54 | 44,860 | 22,374 | 22,486 | 5,620 | 13,504 | 2,797 | 565 | |
| Computer systems design and related services, 5415 | 15,923 | 13,633 | 2,291 | 493 | 409 | 1,343 | 46 | |
| Scientific research and development services, 5417 | 20,185 | 2,424 | 17,761 | 3,920 | 12,313 | 1,301 | 227 | |
| Other 54 | 8,752 | 6,317 | 2,434 | 1,207 | 782 | 153 | 292 | |
| Nonmanufacturing nec, other 21–23, 42–81 | 20,281 | 19,836 | 445 | 35 | 209 | 184 | 17 | |
| Size of company (number of domestic employees) | | | | | | | | |
| Small companies[e] | | | | | | | | |
| 10–19 | 4,390 | 3,340 | 1,050 | 462 | 348 | 183 | 57 | |
| 20–49 | 11,252 | 9,556 | 1,695 | 759 | 496 | 371 i | 69 | i |
| Medium companies | | | | | | | | |
| 50–99 | 12,321 | 10,446 | 1,875 | 561 | 550 | 643 | 121 | |
| 100–249 | 18,547 | 14,626 | 3,921 | 1,378 | 920 | 1,515 | 108 | |
| Large companies | | | | | | | | |
| 250–499 | 19,645 | 16,604 | 3,041 | 1,016 | 622 | 1,317 i | 86 | i |
| 500–999 | 17,657 | 15,561 | 2,096 | 128 | 467 | 1,291 i | 210 | i |
| 1,000–4,999 | 68,578 | 58,509 | 10,068 | 1,462 | 1,202 | 7,335 | 69 | |
| 5,000–9,999 | 45,337 | 36,274 | 9,063 | 1,175 | 7,064 i | 802 | 22 | |
| 10,000–24,999 | 84,420 | 74,423 | 9,997 | 2,161 | 3,259 | 4,558 | 19 | |
| 25,000 or more | 158,889 | 138,465 | 20,423 | 15,583 | 4,161 | 319 | 360 | |

* = amount is less than $500,000; D = suppressed to avoid disclosure of confidential information; i = more than 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = North American Industry Classification System; nec = not elsewhere classified.

[a] All R&D is the cost of R&D paid for and performed by the respondent company and paid for by others outside of the company and performed by the company.
[b] Includes foreign subsidiaries of U.S. companies ($23.5 billion).
[c] Includes foreign parent companies of U.S. subsidiaries ($15.8 billion) and unaffiliated companies ($2.6 billion). Excludes funds from foreign subsidiaries to U.S. companies paid for through inter-company transactions ($23.5 billion).
[d] Includes U.S. state government agencies and laboratories ($0.1 billion); U.S. universities, colleges, and academic researchers ($0.1 billion); and all other organizations located inside ($0.4 billion) and outside the United States ($0.3 billion).
[e] The Business Research and Development Survey does not include companies with fewer than 10 employees.

**Note(s)**
Detail may not add to total because of rounding. Beginning in survey year 2018, companies that performed or funded less than $50,000 of R&D were excluded from tabulation. These companies in aggregate represented a very small share of total R&D expenditures in prior years. Had the companies under this threshold been included in the 2018 estimates, they would have contributed approximately $90 million to overall R&D expenditures. Industry classification was based on dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Excludes data for federally funded research and development centers.

**Source(s)**
National Center for Science and Engineering Statistics and U.S. Census Bureau, Business Research and Development Survey, 2018.

The U.S. federal government was the largest source of *external funding for R&D* (also referred to as *R&D paid for by others*) across all industries. Of the $63 billion paid for by others, the federal government accounted for $25 billion, most of which came from the Department of Defense ($15 billion) (data available in full set of data tables). Ninety-three percent of federal government funding went toward aerospace products and parts (North American Industry Classification System [NAICS] code 3364) ($12 billion), professional, scientific, and technical services (NAICS 54) ($6 billion), and computer and electronic products (NAICS 334) ($5 billion). Next among external funders were other U.S. companies ($19 billion) and foreign companies—including foreign parent companies of U.S. subsidiaries ($18 billion) (table 2). (See "Survey Information and Data Availability" for information on the availability of data tables with full industry detail.)

## R&D Performance, by Company Size

Small- and medium-sized companies (10 to 249 domestic employees) performed 11% of the nation's total business R&D in 2018 (table 1).[2] In these companies, the R&D-to-sales ratio (or R&D intensity) was 9.0% (table 1 and table 3). These companies accounted for 5% of sales and employed 7% of the 20.6 million employees who worked for R&D-performing or R&D-funding companies. They employed 17% of the 1.8 million employees engaged in business R&D in the United States.

**Table 3**

**Sales, R&D, R&D intensity, and employment for companies that performed or funded business R&D in the United States, by selected industry and company size: 2018**

(Millions of U.S. dollars, percent R&D intensity, and thousands of employees)

| Industry, NAICS code, and company size | Domestic net sales (US$millions)[a] | All R&D (US$millions)[b] | R&D intensity (%)[c] | Domestic employment (thousands)[d] | |
|---|---|---|---|---|---|
| | | | | Total | R&D[e] |
| All industries, 21–33, 42–81 | 10,698,764 | 441,036 | 4.1 | 20,645 | 1,766 |
| Manufacturing industries, 31–33 | 5,951,870 | 274,075 | 4.6 | 10,013 | 981 |
| Chemicals, 325 | 1,165,161 | 84,137 | 7.2 | 1,383 | 189 |
| Pharmaceuticals and medicines, 3254 | 653,729 | 74,592 | 11.4 | 624 | 138 |
| Other 325 | 511,432 | 9,545 | 1.9 | 759 | 51 |
| Machinery, 333 | 372,991 | 14,799 | 4.0 | 902 | 93 |
| Computer and electronic products, 334 | 821,622 | 83,697 | 10.2 | 1,296 | 277 |
| Electrical equipment, appliance, and components, 335 | 131,419 | 4,487 | 3.4 | 289 | 24 |
| Transportation equipment, 336 | 1,310,128 | 52,629 | 4.0 | 1,881 | 197 |
| Motor vehicles, bodies, trailers, and parts, 3361–63 | 871,129 | 25,586 | 2.9 | 957 | 110 |
| Aerospace products and parts, 3364 | 369,214 | 24,291 | 6.6 | 745 | 75 |

## Table 3

**Sales, R&D, R&D intensity, and employment for companies that performed or funded business R&D in the United States, by selected industry and company size: 2018**

(Millions of U.S. dollars, percent R&D intensity, and thousands of employees)

| Industry, NAICS code, and company size | Domestic net sales (US$millions)[a] | All R&D (US$millions)[b] | R&D intensity (%)[c] | Domestic employment (thousands)[d] | |
|---|---|---|---|---|---|
| | | | | Total | R&D[e] |
| Other 336 | 69,785 | 2,752 | 3.9 | 179 | 12 |
| Manufacturing nec, other 31–33 | 2,150,549 | 34,326 | 1.6 | 4,262 | 201 |
| Nonmanufacturing industries, 21–23, 42–81 | 4,746,894 | 166,961 | 3.5 | 10,632 | 785 |
| Information, 51 | 1,310,041 | 94,349 | 7.2 | 2,030 | 342 |
| Software publishers, 5112 | 220,388 | 32,639 | 14.8 | 535 | 114 |
| Other 51 | 1,089,653 | 61,710 | 5.7 | 1,495 | 228 |
| Finance and insurance, 52 | 954,685 | 7,471 | 0.8 | 1,394 | 47 |
| Professional, scientific, and technical services, 54 | 424,784 | 44,860 | 10.6 | 1,446 | 271 |
| Computer systems design and related services, 5415 | 156,026 | 15,923 | 10.2 | 487 | 92 |
| Scientific research and development services, 5417 | 71,852 | 20,185 | 28.1 | 300 | 97 |
| Other 54 | 196,906 | 8,752 | 4.4 | 659 | 82 |
| Nonmanufacturing nec, other 21–23, 42–81 | 2,057,384 | 20,281 | 1.0 | 5,762 | 125 |
| Size of company (number of domestic employees) | | | | | |
| Small companies[f] | | | | | |
| 10–19 | 20,349 | 4,390 | 21.6 | 64 | 25 |
| 20–49 | 69,771 | 11,252 | 16.1 | 236 | 68 |
| Medium companies | | | | | |
| 50–99 | 126,982 | 12,321 | 9.7 | 342 | 80 |
| 100–249 | 300,151 | 18,547 | 6.2 | 771 | 126 |
| Large companies | | | | | |
| 250–499 | 279,802 | 19,645 | 7.0 | 732 | 102 |
| 500–999 | 408,482 | 17,657 | 4.3 | 849 | 91 |
| 1,000–4,999 | 1,450,957 | 68,578 | 4.7 | 2,816 | 306 |
| 5,000–9,999 | 1,001,344 | 45,337 | 4.5 | 1,713 | 178 |
| 10,000–24,999 | 2,262,566 | 84,420 | 3.7 | 3,454 | 304 |
| 25,000 or more | 4,778,360 | 158,889 | 3.3 | 9,667 | 486 |

NAICS = North American Industry Classification System; nec = not elsewhere classified.

[a] Dollar values for goods sold or services rendered by R&D-performing or R&D-funding companies located in the United States to customers outside of the company, including the U.S. federal government, foreign customers, and the company's foreign subsidiaries. Included are revenues from a company's foreign operations and subsidiaries and from discontinued operations. If a respondent company is owned by a foreign parent company, sales to the parent company and to affiliates not owned by the respondent company are included. Excluded are intracompany transfers, returns, allowances, freight charges, and excise, sales, and other revenue-based taxes.

[b] All R&D is the cost of R&D paid for and performed by the respondent company and paid for by others outside of the company and performed by the company.

[c] R&D intensity is the cost of domestic R&D paid for by the respondent company and others outside of the company and performed by the company divided by domestic net sales of companies that performed or funded R&D.

[d] Data recorded on 12 March represent employment figures for the year.

[e] Includes researchers, R&D managers, technicians, clerical staff, and others assigned to R&D groups.

[f] The Business Research and Development Survey does not include companies with fewer than 10 employees.

**Note(s)**
Detail may not add to total because of rounding. Beginning in survey year 2018, companies that performed or funded less than $50,000 of R&D were excluded from tabulation. These companies in aggregate represented a very small share of total R&D expenditures in prior years. Had the companies under this threshold been included in the 2018 estimates, they would have contributed approximately $90 million to overall R&D expenditures. Estimates of aggregate sales and total domestic employment would have been similarly affected. Industry classification was based on dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Excludes data for federally funded research and development centers.

**Source(s)**
National Center for Science and Engineering Statistics and U.S. Census Bureau, Business Research and Development Survey, 2018.

Large companies with 250 to 24,999 domestic employees performed 53% of the nation's total business R&D in 2018, and their R&D intensity was 4.4%. They accounted for 51% of sales, employed 46% of those who worked for R&D-performing or R&D-funding companies, and employed 56% of R&D employees in the United States.

The largest companies (25,000 or more domestic employees) performed 36% of the nation's total business R&D in 2018, and their R&D intensity was 3.3%. They accounted for 45% of sales, employed 47% of those who worked for R&D-performing or R&D-funding companies, and employed 28% of R&D employees in the United States.

## R&D Performance, by State

Business R&D is concentrated in a relatively small number of states. In 2018, of the $441 billion of R&D performed in the United States, businesses in California alone accounted for 33% (table 4). Other states with large amounts of business R&D in 2018 were Washington (7% of the national total), Massachusetts (6%), Michigan (5%), Texas (5%), New Jersey (5%), New York (4%), Illinois (3%), and Pennsylvania (3%).[3]

**Table 4**

**Funds spent for business R&D performed in the United States, by state and source of funds: 2018**

(Millions of U.S. dollars)

| State | All R&D[a] | | Paid for by the company | | Paid for by others | |
|---|---|---|---|---|---|---|
| United States | 441,036 | | 377,806 | | 63,230 | |
| Alabama | 2,236 | | 1,284 | | 952 | |
| Alaska | 25 | e | 20 | e | 5 | |
| Arizona | 6,203 | | 4,673 | | 1,530 | |
| Arkansas | 471 | | 423 | | 48 | |
| California | 144,524 | | 129,656 | | 14,868 | |
| Colorado | 5,032 | | 4,286 | | 746 | |
| Connecticut | 7,488 | | 6,193 | | 1,295 | |
| Delaware | 2,375 | i | 1,432 | i | 942 | i |
| District of Columbia | 400 | | 278 | | 122 | |
| Florida | 6,489 | | 4,498 | | 1,991 | i |
| Georgia | 5,067 | | 4,094 | | 973 | i |
| Hawaii | 146 | | 89 | | 57 | |
| Idaho | 2,556 | | 2,376 | | 180 | |
| Illinois | 13,182 | | 12,239 | | 943 | |
| Indiana | 6,976 | | 6,004 | | 972 | |
| Iowa | 3,315 | | 2,556 | | 759 | |
| Kansas | 2,593 | | 1,645 | | 948 | |
| Kentucky | 1,435 | | 1,178 | | 257 | |
| Louisiana | 415 | | 359 | | 56 | |
| Maine | 285 | | 266 | | 19 | |
| Maryland | 6,016 | | 4,227 | | 1,789 | |
| Massachusetts | 27,282 | | 22,581 | | 4,702 | |
| Michigan | 22,412 | | 20,323 | | 2,089 | |
| Minnesota | 7,405 | | 7,021 | | 384 | |
| Mississippi | 276 | | 250 | | 26 | |
| Missouri | 7,171 | i | 3,976 | | 3,195 | i |
| Montana | 180 | | 157 | | 23 | |
| Nebraska | 570 | | 513 | | 57 | |
| Nevada | 960 | | 638 | | 322 | i |
| New Hampshire | 2,566 | | 992 | | 1,573 | |
| New Jersey | 20,251 | | 16,843 | | 3,408 | |

**Table 4**

**Funds spent for business R&D performed in the United States, by state and source of funds: 2018**

(Millions of U.S. dollars)

| State | All R&D[a] | | Paid for by the company | | Paid for by others | |
|---|---|---|---|---|---|---|
| New Mexico | 699 | | 374 | | 325 | i |
| New York | 17,515 | | 15,370 | | 2,144 | |
| North Carolina | 11,716 | | 7,790 | | 3,926 | |
| North Dakota | 312 | | 284 | | 28 | |
| Ohio | 9,646 | | 6,820 | | 2,825 | |
| Oklahoma | 868 | | 822 | | 47 | |
| Oregon | 8,751 | | 8,446 | | 304 | |
| Pennsylvania | 12,104 | | 10,633 | | 1,471 | |
| Rhode Island | 703 | | 663 | | 39 | |
| South Carolina | 1,670 | | 1,462 | | 208 | |
| South Dakota | 201 | | 179 | | 22 | |
| Tennessee | 1,440 | | 1,184 | | 255 | |
| Texas | 20,929 | | 18,267 | | 2,662 | |
| Utah | 3,025 | | 2,642 | | 383 | |
| Vermont | 300 | | 233 | | 67 | |
| Virginia | 5,725 | | 4,092 | | 1,633 | |
| Washington | 30,305 | | 29,498 | | 807 | |
| West Virginia | 238 | i | 209 | i | 29 | |
| Wisconsin | 5,966 | | 5,334 | | 632 | |
| Wyoming | 39 | | 34 | | 5 | |
| Undistributed funds[b] | 2,584 | | 2,399 | | 186 | |

e = more than 50% the value of the state estimate uses a hybrid estimator modeling technique; see "Survey Information and Data Availability" for more details. i = more than 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

[a] All R&D is the cost of domestic R&D paid for by the respondent company and others outside of the company and performed by the company.
[b] Includes data reported that were not allocated to a specific state by multi-establishment companies. For single-establishment companies, data reported were allocated to the state in the address used to mail the survey form.

**Note(s)**
Beginning in survey year 2018, companies that performed or funded less than $50,000 of R&D were excluded from tabulation. These companies in aggregate represented a very small share of total R&D expenditures in prior years. Had the companies under this threshold been included in the 2018 estimates, they would have contributed approximately $90 million to overall R&D expenditures. Excludes data for federally funded research and development centers.

**Source(s)**
National Center for Science and Engineering Statistics and U.S. Census Bureau, Business Research and Development Survey, 2018.

## Sales, R&D Intensity, and Employment of Companies that Performed or Funded R&D

U.S. companies that performed or funded R&D reported domestic net sales of $11 trillion in 2018 (table 3).[4] For all industries, the R&D intensity was 4.1%; for manufacturers, 4.6%; and for nonmanufacturers, 3.5%. Manufacturing industries with high levels of R&D intensity in 2018 were pharmaceuticals and medicines (NAICS 3254) (11.4%), computer and electronic products (NAICS 334) (10.2%), and aerospace products and parts (NAICS 3364) (6.6%). Among the nonmanufacturing industries, industries with high levels of R&D intensity were scientific research and development services (NAICS 5417) (28.1%), software publishers (NAICS 5112) (14.8%), and computer systems design and related services (NAICS 5415) (10.2%).

Businesses that performed or funded R&D employed 20.6 million people in the United States in 2018. Approximately 1.8 million (9%) were R&D employees.[5] Not surprisingly, industries with high levels of R&D intensity also had high numbers of R&D employees: computer and electronic products (NAICS 334) (277,000 R&D employees), pharmaceuticals and medicines (NAICS 3254) (138,000), and aerospace products and parts (NAICS 3364) (75,000). Nonmanufacturing industry groups with high numbers of R&D employees were software publishers (NAICS 5112) (114,000 R&D employees), scientific R&D services (NAICS 5417) (97,000), and computer systems design and related services (NAICS 5415) (92,000) (table 3).

## Capital Expenditures

Companies that performed or funded R&D in the United States in 2018 spent $665 billion on assets with expected useful lives of more than 1 year (table 5). Of this amount, $35 billion (5%) was spent on land acquisitions, buildings and land improvements, equipment, software, and other assets used for R&D: $19 billion by manufacturing industries and $16 billion by nonmanufacturing industries. Manufacturing industries with high levels of capital expenditures on assets used for R&D in 2018 were pharmaceuticals and medicines (NAICS 3254) ($4.3 billion, 12% of national capital expenditures on assets used for R&D), semiconductor and other electronic products (NAICS 3344) ($2.8 billion, 8%), and motor vehicles, bodies, trailers, and parts (NAICS 3361–63) ($1.6 billion, 5%). Among the nonmanufacturing industries with high levels of capital assets used for R&D were telecommunications services (NAICS 517) ($2.1 billion, 6%), software publishers (NAICS 5112) ($1.3 billion, 4%), and computer systems design and related services (NAICS 5415) ($1.2 billion, 3%). Among all types of capital assets, manufacturing industries spent the most on capitalized equipment (62%) and nonmanufacturing industries spent the most on capitalized software (49%) (table 6).

**Table 5**

**Capital expenditures in the United States and for domestic R&D paid for and performed by the company, by type of expenditure, industry, and company size: 2018**

(Millions of U.S. dollars)

| Selected industry, NAICS code, and company size | Total[b] | Used for domestic R&D[a] | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Total[b,c] | | Land acquisition | | Buildings and land improvement[d] | | Equipment | | Capitalized software | | All other and undistributed[e] | |
| All industries, 21–33, 42–81 | 665,199 | 34,743 | | 659 | | 4,063 | | 16,393 | | 9,659 | | 3,969 | |
| Manufacturing industries, 31–33 | 283,452 | 18,582 | | 240 | | 3,047 | | 11,541 | | 1,750 | | 2,004 | |
| Chemicals, 325 | 56,821 | 5,434 | | 101 | | 1,705 | | 2,690 | | 369 | | 569 | |
| Pharmaceuticals and medicines, 3254 | 22,286 | 4,275 | | 76 | | 1,394 | | 1,972 | | 360 | | 473 | |
| Other 325 | 34,535 | 1,159 | | 25 | | 311 | | 718 | | 9 | | 96 | |
| Machinery, 333 | 13,194 | 1,066 | | 5 | | 228 | | 620 | | 101 | | 112 | |
| Computer and electronic products, 334 | 38,527 | 6,350 | | 25 | | 541 | | 4,729 | | 669 | | 387 | |
| Communication equipment, 3342 | 3,862 | 788 | | * | i | 62 | | 662 | | 38 | | 25 | |
| Semiconductor and other electronic products, 3344 | 19,366 | i 2,755 | i | 10 | i | 96 | i | 2,089 | i | 338 | i | 222 | i |
| Other 334 | 15,299 | 2,807 | | 14 | | 383 | | 1,978 | | 293 | | 140 | |
| Electrical equipment, appliance, and components, 335 | 4,318 | 404 | | 56 | | 76 | | 159 | | 5 | | 107 | |
| Transportation equipment, 336 | 66,386 | 2,205 | | 17 | i | 138 | | 1,643 | | 178 | | 229 | |
| Motor vehicles, bodies, trailers, and parts, 3361–63 | 52,122 | 1,571 | | 15 | i | 102 | | 1,161 | | 142 | | 150 | |
| Aerospace products and parts, 3364 | 10,893 | 492 | | * | | 27 | | 398 | | 7 | | 60 | |
| Other 336 | 3,371 | 142 | | 1 | | 9 | | 84 | | 29 | | 19 | |
| Manufacturing nec, other 31–33 | 104,206 | 3,123 | | 36 | | 359 | | 1,700 | | 428 | | 600 | |
| Nonmanufacturing industries, 21–23, 42–81 | 381,747 | 16,161 | | 419 | | 1,016 | | 4,852 | | 7,908 | | 1,965 | |
| Information, 51 | 141,471 | 7,968 | | 413 | | 715 | | 2,691 | | 3,404 | | 745 | |
| Software publishers, 5112 | 17,191 | 1,296 | | 26 | | 186 | | 584 | | 433 | | 68 | |
| Telecommunications services, 517 | 66,906 | 2,142 | | 382 | | 386 | | 508 | | 459 | | 407 | |
| Other 51 | 57,374 | 4,530 | | 5 | | 143 | | 1,599 | | 2,512 | | 270 | |

## Table 5

**Capital expenditures in the United States and for domestic R&D paid for and performed by the company, by type of expenditure, industry, and company size: 2018**

(Millions of U.S. dollars)

| Selected industry, NAICS code, and company size | Total[b] | Used for domestic R&D[a] | | | | | |
|---|---|---|---|---|---|---|---|
| | | Total[b,c] | Land acquisition | Buildings and land improvement[d] | Equipment | Capitalized software | All other and undistributed[e] |
| Finance and insurance, 52 | 16,534 | 2,865 | 0 | 29 | 291 | 2,119 | 425 |
| Professional, scientific, and technical services, 54 | 15,422 | 2,438 | 5 | 176 | 859 | 854 | 543 |
| Computer systems design and related services, 5415 | 6,508 | 1,210 | 4 | 73 | 450 | 357 | 325 |
| Scientific research and development services, 5417 | 2,647 | 682 | * | 88 | 260 | 190 | 144 |
| Other 54 | 6,267 | 546 | 0 | 15 | 149 | 307 | 74 |
| Nonmanufacturing nec, other 21–23, 42–81 | 208,320 | 2,890 | 1 | 96 | 1,011 | 1,531 | 252 |
| Size of company (number of domestic employees) | | | | | | | |
| Small companies[f] | | | | | | | |
| 10–19 | 1,136 | 359 | 3 | 42 | 197 | 35 | 82 |
| 20–49 | 6,080 | 1,077 | 2 | 84 | 530 | 142 | 319 |
| Medium companies | | | | | | | |
| 50–99 | 7,827 | 1,043 | 48 | 151 | 476 | 115 | 253 |
| 100–249 | 16,303 | 1,328 | 9 | 195 | 667 | 279 | 178 |
| Large companies | | | | | | | |
| 250–499 | 11,995 | 1,795 | 6 | 187 | 831 | 497 | 274 |
| 500–999 | 16,450 | 1,505 | 9 i | 137 | 633 | 409 | 318 |
| 1,000–4,999 | 76,061 | 5,562 | 66 | 792 | 2,237 | 1,868 | 599 |
| 5,000–9,999 | 69,863 | 3,630 | 21 | 501 | 1,910 | 998 | 199 |
| 10,000–24,999 | 159,038 | 6,719 | 90 | 894 | 2,887 | 2,015 | 834 |
| 25,000 or more | 300,447 | 11,724 | 405 | 1,081 | 6,024 | 3,301 | 913 |

* = amount < $500,000; i = more than 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = North American Industry Classification System; nec = not elsewhere classified.

[a] Domestic R&D is the R&D paid for by the respondent company and others outside of the company and performed by the company.

[b] Capital expenditures are payments by a business for assets that usually have a useful life of more than 1 year. The value of assets acquired or improved through capital expenditures is recorded on a company's balance sheet. BRDS statistics exclude the cost of assets acquired through mergers and acquisitions.

[c] Capital expenditures for long-lived assets used in a company's R&D operations are not included in its R&D expense, but any depreciation recorded for those assets is included in its R&D expense. For 2018, depreciation associated with domestic R&D paid for and performed by the company was $14.8 billion and with domestic R&D performed by the company and paid for by others was $1.6 billion.

[d] Includes the cost of purchased or improved buildings and other facilities that are fixed to the land.

[e] Includes the cost of other capital expenditures, including purchased patents and other intangible assets, and expenditures not distributed among the categories shown.

[f] The Business Research and Development Survey does not include companies with fewer than 10 employees.

**Note(s)**
Detail may not add to total because of rounding. Beginning in survey year 2018, companies that performed or funded less than $50,000 of R&D were excluded from tabulation. These companies in aggregate represented a very small share of total R&D expenditures in prior years. Had the companies under this threshold been included in the 2018 estimates, they would have contributed approximately $90 million to overall R&D expenditures. Estimates of aggregate capital expenditures would have been similarly affected. Industry classification was based on dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Excludes data for federally funded research and development centers.

**Source(s)**
National Center for Science and Engineering Statistics and U.S. Census Bureau, Business Research and Development Survey, 2018.

**Table 6**

**Capital expenditures in the United States and for domestic R&D paid for and performed by the company, by type of expenditure and industry sector: 2018**

(Millions of U.S. dollars)

| Selected industry and NAICS code | Total[b] | Used for domestic R&D[a] | | | | | |
|---|---|---|---|---|---|---|---|
| | | Total[b,c] | Land acquisition | Buildings and land improvement[d] | Equipment | Capitalized software | All other and undistributed[e] |
| All industries, 21–33, 42–81 | 665,199 | 34,743 | 659 | 4,063 | 16,393 | 9,659 | 3,969 |
| Manufacturing industries, 31–33 | 283,452 | 18,582 | 240 | 3,047 | 11,541 | 1,750 | 2,004 |
| Nonmanufacturing industries, 21–23, 42–81 | 381,747 | 16,161 | 419 | 1,016 | 4,852 | 7,908 | 1,965 |

NAICS = North American Industry Classification System.

[a] Domestic R&D is the R&D paid for by the respondent company and others outside of the company and performed by the company.

[b] Capital expenditures are payments by a business for assets that usually have a useful life of more than 1 year. The value of assets acquired or improved through capital expenditures is recorded on a company's balance sheet. BRDS statistics exclude the cost of assets acquired through mergers and acquisitions.

[c] Capital expenditures for long-lived assets used in a company's R&D operations are not included in its R&D expense, but any depreciation recorded for those assets is included in its R&D expense. For 2018, depreciation associated with domestic R&D paid for and performed by the company was $14.8 billion and with domestic R&D performed by the company and paid for by others was $1.6 billion.

[d] Includes the cost of purchased or improved buildings and other facilities that are fixed to the land.

[e] Includes the cost of other capital expenditures, including purchased patents and other intangible assets, and expenditures not distributed among the categories shown.

**Note(s)**
Detail may not add to total because of rounding. Beginning in survey year 2018, companies that performed or funded less than $50,000 of R&D were excluded from tabulation. These companies in aggregate represented a very small share of total R&D expenditures in prior years. Had the companies under this threshold been included in the 2018 estimates, they would have contributed approximately $90 million to overall R&D expenditures. Estimates of aggregate capital expenditures would have been similarly affected. Industry classification was based on dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Excludes data for federally funded research and development centers.

**Source(s)**
National Center for Science and Engineering Statistics and U.S. Census Bureau, Business Research and Development Survey, 2018.

## Survey Information and Data Availability

The sample for BRDS was selected to represent all for-profit, nonfarm companies that were publicly or privately held, had 10 or more employees in the United States, and performed or funded R&D either domestically or abroad. Because the statistics from the survey are based on a sample, they are subject to both sampling and nonsampling errors (see Technical Notes in the detailed statistical tables reports at https://www.nsf.gov/statistics/srvybrds/).

Beginning in survey year 2018, companies that performed or funded less than $50,000 of R&D were excluded from tabulation. In prior years, companies that performed or funded any amount of R&D were tabulated. This change has affected the comparability of these estimates to those published in prior years. These companies in aggregate represented a very small share of total R&D expenditures in prior years, but they accounted for a larger share of count estimates. Had the companies under this threshold been included in the 2018 estimates, they would have contributed approximately $90 million to overall R&D expenditures and would have added around 6,000 to the estimated count of U.S. companies with R&D expenditures (company counts are available in the full set of data tables).

In this InfoBrief, money amounts are expressed in current U.S. dollars and are not adjusted for inflation. A *company* is defined as a business organization located in the United States, either U.S. owned or a U.S. affiliate of a foreign parent company, of one or more establishments under common ownership or control.

For 2017, a total of 45,075 companies were sampled to represent the population of 1,097,607 companies; for 2018, a total of 45,806 companies were sampled, representing 1,115,950 companies. The actual numbers of reporting units in the sample that remained within the scope of the survey between sample selection and tabulation were 41,998 for 2017 and 42,426 for 2018. These lower counts represent the number of reporting units that were determined to be within the scope of the survey after all data collected were processed. Reasons for the reduced counts include mergers, acquisitions, and instances where companies had fewer than ten employees in the United States or had gone out of business in the interim. Of these in-scope reporting units, 74.5% were considered to have met the criteria for a complete response to the 2017 survey; 73.0% met the 2018 complete response criteria. Among the units with account managers—that is, the top R&D companies based on prior year reported or imputed data that were assigned an analyst to act as a single point of contact for all communications—82.0% met the 2017 complete response criteria and 80.9% met the 2018 criteria. Coverage of the previous year's known positive R&D stratum for 2017 was 84.9%; the coverage rate for 2018 was 85.2%. Industry classification was based on the dominant business activity for domestic R&D performance where available. For reporting units that did not report business activity codes for R&D, the classification used for sampling was assigned.

The estimation methodology for BRDS state estimates takes the form of a hybrid estimator, combining the unweighted reported amount, by state, with a weighted amount apportioned (or raked) across states with relevant industrial activity. The hybrid estimator smooths the estimate over states with R&D activity, by industry, and accounts for real observed change within a state. Table 4 shows this estimation methodology for state estimates.

The full set of data tables from this survey will be available in the report ***Business Research and Development: 2018***. Individual data tables and tables with relative standard errors and imputation rates from the 2018 survey are available in advance of the full report. Statistics for new items added to the survey for 2018 are available in the full set of tables, including location of all employees by country and for Puerto Rico and location of R&D employees.

## Notes

1 The National Science Foundation has co-sponsored an annual business R&D survey since 1953. The Survey of Industrial Research and Development (SIRD) collected data for 1953–2007, and its successor, the Business R&D and Innovation Survey, collected data for 2008–16. Beginning with 2017, the collection of innovation data was moved to the Annual Business Survey, another survey co-sponsored with the U.S. Census Bureau, and the business R&D data collection reported here was renamed the Business Research and Development Survey.

2 Company size classifications changed for 2017 and subsequent years in response to the revised Frascati Manual (OECD 2015). Anderson and Kindlon (2019) provide estimates of R&D performance and employment using these new classifications over 2008–15. The authors also compare the trends to those observed in SIRD for the time prior to 2008. The Annual Business Survey, also co-sponsored by NCSES and Census, collects R&D data from companies with fewer than 10 employees for 2017 and beyond.

3 In addition to statistics for all states, below-state level statistics are available in the full set of tables and in other InfoBriefs (see Shackelford and Wolfe [2016] and [2019]).

4 Determining the amount of domestic net sales and operating revenues was left to the reporting company. However, guidance was given to include revenues from foreign operations and subsidiaries and from discontinued operations and to exclude intracompany transfers, returns, allowances, freight charges, and excise, sales, and other revenue-based taxes.

5 Employment statistics in this InfoBrief are head counts. Full-time equivalent statistics are available in the data tables. R&D employees include researchers (defined as R&D scientists and engineers and their managers) and the technicians, technologists, and support staff members who work on R&D or who provide direct support to R&D activities.

## References

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