



InfoBrief

Businesses Performed 60% of Their U.S. R&D in 10 Metropolitan Areas in 2018

NSF 21-331 | June 2021

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Businesses performed \$262 billion of research and development in 10 U.S. metropolitan statistical areas (MSAs) in 2018, according to estimates from the Business Research and Development Survey (BRDS) ([table 1](#)). This R&D represents 59.7% of the total business R&D performance in the United States.¹ The geographic concentration of business R&D in the United States is much higher than that of other economic indicators, such as gross domestic product (GDP) or population (Shackelford and Wolfe 2019). This InfoBrief explores the geographic patterns of business R&D performance in the United States and presents new data on the distribution of business R&D personnel by state.

Table 1

Domestic R&D performed by companies and GDP, by core-based statistical area: 2018

(Millions of U.S. dollars)

Core-based statistical area	CBSA code	Total business R&D performance	GDP	R&D-GDP
Domestic U.S. total	-	441,036	20,463,457	0.022
San Jose-Sunnyvale-Santa Clara, CA	41940	67,394	331,020	0.204
San Francisco-Oakland-Berkeley, CA	41860	40,364	548,613	0.074
New York-Newark-Jersey City, NY-NJ-PA	35620	29,782	1,772,320	0.017
Seattle-Tacoma-Bellevue, WA	42660	29,321	392,037	0.075
Boston-Cambridge-Newton, MA-NH	14460	25,458	463,571	0.055
Detroit-Warren-Dearborn, MI	19820	17,943	267,731	0.067
Los Angeles-Long Beach-Anaheim, CA	31080	16,565	1,047,661	0.016
San Diego-Chula Vista-Carlsbad, CA	41740	12,445	245,139	0.051
Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	37980	11,780	444,148	0.027
Chicago-Naperville-Elgin, IL-IN-WI	16980	10,678	689,465	0.015
Portland-Vancouver-Hillsboro, OR-WA	38900	8,451	164,420	0.051
Austin-Round Rock-Georgetown, TX	12420	7,812	146,785	0.053
Dallas-Fort Worth-Arlington, TX	19100	7,180	512,510	0.014
Washington-Arlington-Alexandria, DC-VA-MD-WV	47900	7,092	540,684	0.013
Minneapolis-St. Paul-Bloomington, MN-WI	33460	6,757	263,691	0.026
St. Louis, MO-IL	41180	5,918	169,839	0.035

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(Millions of U.S. dollars)

Core-based statistical area	CBSA code	Total business R&D performance	GDP	R&D-GDP
Indianapolis-Carmel-Anderson, IN	26900	4,750	140,762	0.034
Houston-The Woodlands-Sugar Land, TX	26420	4,540	478,779	0.009
Phoenix-Mesa-Chandler, AZ	38060	4,437	255,212	0.017
Durham-Chapel Hill, NC	20500	4,430	54,687	0.081
Atlanta-Sandy Springs-Alpharetta, GA	12060	4,172	397,261	0.011
Norwich-New London, CT	35980	3,914	19,295	0.203
Cincinnati, OH-KY-IN	17140	3,643	141,053	0.026
Raleigh-Cary, NC	39580	3,465	83,666	0.041
Baltimore-Columbia-Towson, MD	12580	2,674	205,314	0.013
All other CBSAs	-	95,252	8,641,229	0.011
Locations outside a CBSA	-	2,235	2,046,565	0.001
Undistributed ^a	-	2,584	0	na

i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse; na = not applicable.

CBSA = core-based statistical area; GDP = gross domestic product.

^a 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):

Rankings are based on point estimates and do not take into account sampling variability. A CBSA is a U.S. geographic area that consists of one or more counties (or equivalents) anchored by an urban center of at least 10,000 people plus adjacent counties that are socioeconomically tied to the urban center by commuting. CBSAs are defined by the Office of Management and Budget in the Executive Office of the President. Detail for other CBSAs available in Business Research and Development Survey data tables.

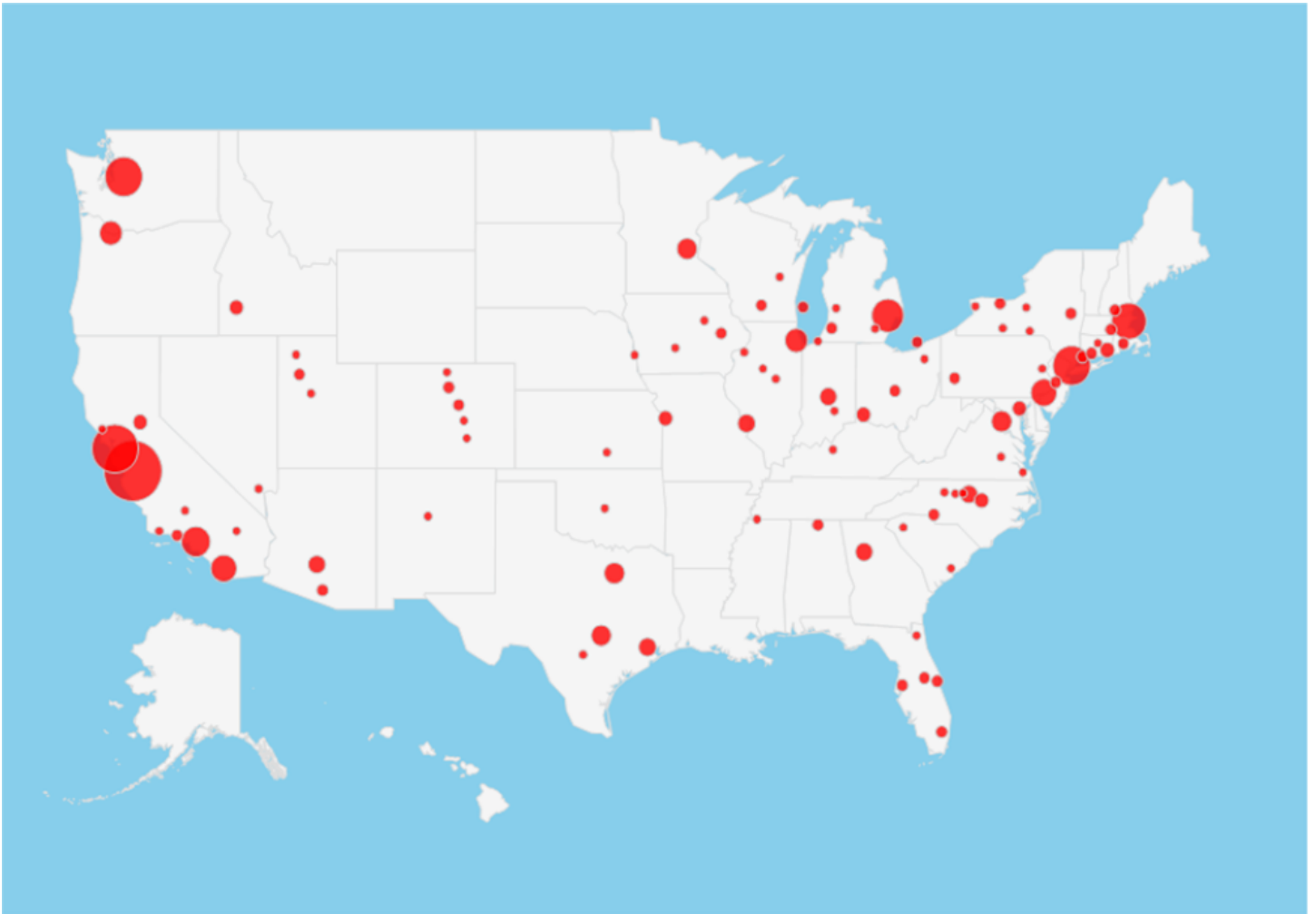
Source(s):

National Center for Science and Engineering Statistics and Census Bureau, Business Research and Development Survey, 2018. Bureau of Economic Analysis, Gross Domestic Product by Metropolitan and Micropolitan Area. Accessed 16 August 2020.

Geographic Patterns of Business R&D in the United States

BRDS estimates that 100 metropolitan and micropolitan statistical areas—collectively referred to as core-based statistical areas (CBSAs)—account for 94% of the distributed total U.S. business R&D ([figure 1](#)).² The San Jose-Sunnyvale-Santa Clara, CA is by far the largest CBSA in terms of business R&D, accounting for 15% (\$67.4 billion) of the U.S. total. This CBSA, which includes the area commonly known as “Silicon Valley,” has a business R&D-GDP ratio of 0.204, almost 10 times that of the ratio for the entire United States (0.022). The ratio of R&D to GDP is a common indicator of R&D intensity.

The largest centers of business R&D are located on either coast of the United States ([figure 1](#)). San Jose-Sunnyvale-Santa Clara, CA together with its neighbor the San Francisco-Oakland-Berkeley, CA CBSA account for almost one-quarter of all business R&D performed in the United States. In comparison, the area commonly known as the Northeast or Acela Corridor, spanning from Boston, MA to Washington, DC, includes CBSAs that together account for 20% of all business R&D performed in the United States. Only 2 of the 10 CBSAs with business R&D estimates over \$10 billion, Detroit-Warren-Dearborn, MI and Chicago-Naperville-Elgin, IL-IN-WI, are located within the interior of the United States.

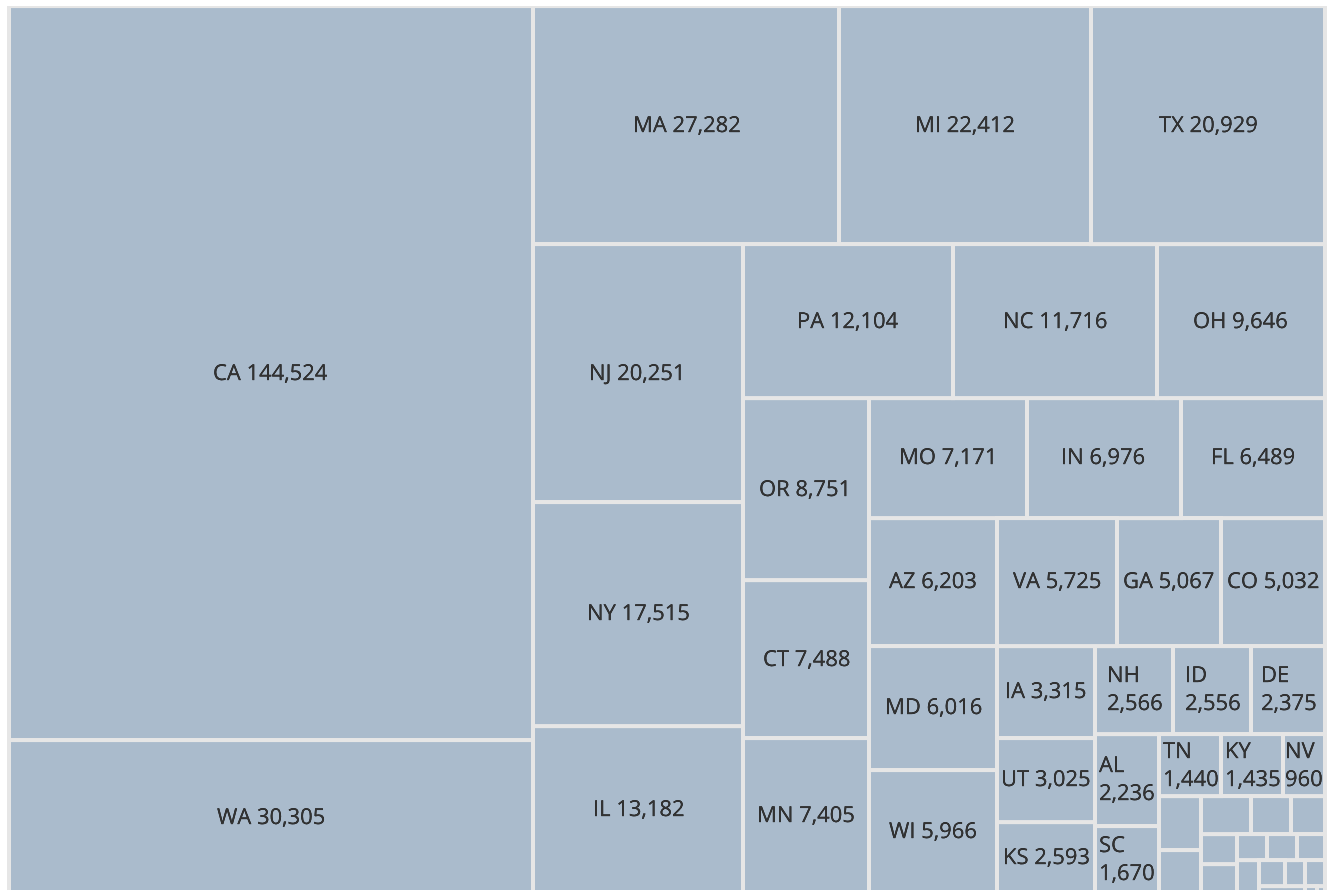
Figure 1**Domestic R&D performed by companies, by core-based statistical area: 2018****Note(s):**

A core-based statistical area (CBSA) is a U.S. geographic area that consists of one or more counties (or equivalents) anchored by an urban center of at least 10,000 people plus adjacent counties that are socioeconomically tied to the urban center by commuting. CBSAs are defined by the Office of Management and Budget in the Executive Office of the President. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies. For certain CBSAs, more than 50% of the estimate is a combination of imputation and reweighting to account for nonresponse; these CBSAs are marked with "i" in the accompanying data view/Excel download. Data that were not allocated to a specific state by multi-establishment companies are reported as undistributed. For single-establishment companies, data reported were allocated to the state in the address used to mail the survey form.

Source(s):

National Center for Science and Engineering Statistics and Census Bureau, Business Research and Development Survey, 2018. Bureau of Economic Analysis, Gross Domestic Product by Metropolitan and Micropolitan Area. Accessed 17 August 2020.

The geographic concentration of business R&D is also evident ([figure 2](#)). Ten states accounted for almost three-quarters (73%) of all business R&D in the United States in 2018. Five of these states—California, Massachusetts, Michigan, New Jersey, and Washington—had R&D intensities much higher than the national average, ranging from 0.033 in New Jersey to 0.054 in Washington. The five states with the next largest levels of business R&D performance—Illinois, North Carolina, Pennsylvania, New York, and Texas—had R&D intensities at or below that of the United States as a whole. Of the remaining 40 states and Washington, DC, only 5 had high business R&D intensities compared to the U.S. average: Connecticut, Delaware, Idaho, New Hampshire, and Oregon.

Figure 2**Business R&D performance, by state: 2018**

Millions of U.S. dollars

Note(s):

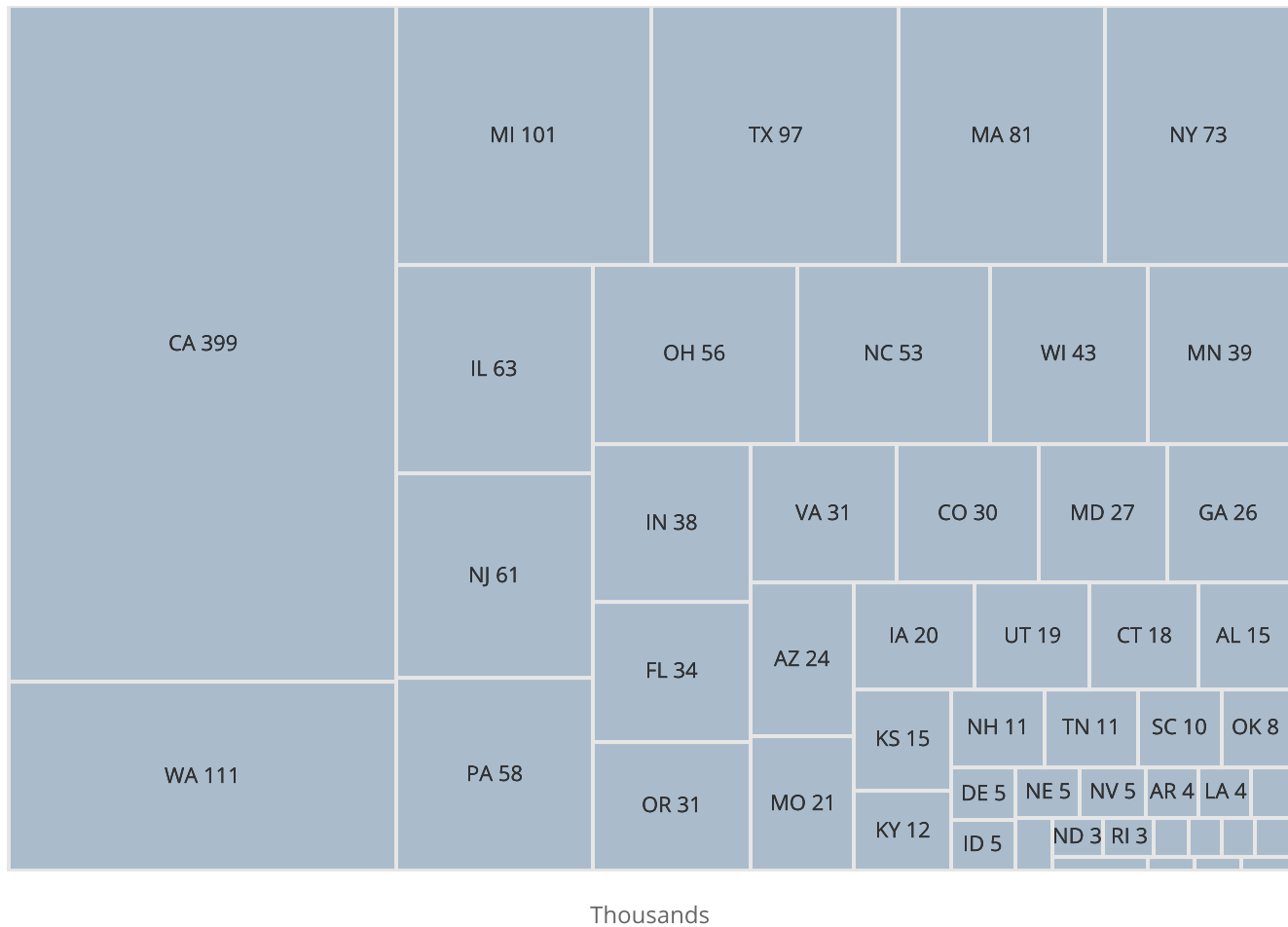
States sized in proportion to business R&D performance. Labels for some states with small amounts of business R&D are not displayed in the image; data for all states are available in the accompanying data view/Excel download.

Source(s):

National Center for Science and Engineering Statistics and Census Bureau, Business Research and Development Survey, 2018. Bureau of Economic Analysis, Gross Domestic Product by State. Accessed 17 August 2020.

Business R&D Personnel by State

The largest cost component for business R&D in the United States is that associated with the salaries, wages, and benefits of the estimated 1.8 million scientists, engineers, technicians, and support staff who worked on R&D in 2018. The distribution of these R&D personnel across states may not have the same geographic patterns as R&D expenditures, however, because average wages and benefits for these employees vary from industry to industry, between businesses within the same industry, and from city to city. To address this issue, BRDS introduced a question in 2018 that asked R&D-active businesses to report their total employment and R&D employment by state. Estimated business R&D employment in each state and Washington, DC is shown in [figure 3](#).

Figure 3**Business R&D employment, by state: 2018****Note(s):**

States sized in proportion to business R&D employment. Labels for some states with small amounts of business R&D are not displayed in the image; data for all states with 500 or more employees in business R&D are available in the accompanying data view/Excel download.

Source(s):

National Center for Science and Engineering Statistics and Census Bureau, Business Research and Development Survey, 2018. Bureau of Labor Statistics, Quarterly Census of Employment and Wages. Accessed 22 March 2021.

Although there is a strong relationship between the dollars spent in a state on R&D performed by businesses and the number of R&D personnel employed by businesses in the state, R&D employment is less concentrated than R&D performance in the largest states. The five states with the largest amounts of business R&D account for 47% of U.S. business R&D employment but account for 56% of dollars spent on R&D performance in the United States.³

The R&D employment intensity of a state can be assessed by taking the ratio of R&D employment in the state to total private sector employment (including employment of non-R&D performing businesses) in the state.⁴ It is estimated that 14 out of every 1,000 private sector employees in the domestic United States was a business R&D employee in 2018. For the 10 states with the highest rates of business R&D employment, this ratio ranged from a high of 39 per 1,000 in Washington to 9 per 1,000 in New York and Texas.

Data Sources and Limitations

In this InfoBrief, money amounts are expressed in current U.S. dollars. 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.

The sample for BRDS is selected to represent all for-profit, nonfarm companies that were publicly or privately held and had 10 or more employees in the United States. Because the statistics from the surveys are based on samples, they are subject to both sampling and nonsampling errors (see technical notes in the data tables reports at <https://www.nsf.gov/statistics/srvyindustry/>). This InfoBrief highlights only a portion of the geographic data available from BRDS. Data for all U.S. states and locations estimated by the survey are available in the BRDS data tables linked above.

Notes

1 A total of \$2.6 billion of the \$441.0 billion of R&D performed by businesses in the United States could not be assigned to a specific location and is reported as “undistributed” in BRDS data tables. This InfoBrief does not include this undistributed amount in the denominator when calculating location shares of total U.S. R&D. The concept of R&D performance is distinct from that of R&D funding as a business may perform R&D in one location that is funded by another organization in another location.

2 CBSAs consist of the county or counties or equivalent entities associated with at least one core (urbanized area or urban cluster) of at least 10,000 population, plus adjacent counties having a high degree of social and economic integration with the core as measured through commuting ties with the counties associated with the core. Metropolitan statistical areas are CBSAs with at least one urbanized area with a population of at least 50,000. Micropolitan statistical areas are CBSAs with at least one urbanized area with a population of at least 10,000 but less than 50,000 (<https://www.census.gov/programs-surveys/metro-micro/about.html>).

3 A total of 77,000 of the 1,766,000 estimated R&D employees of businesses in the United States could not be assigned to a specific location and is reported as “undistributed” in BRDS data tables. This InfoBrief does not include this undistributed amount in the denominator when calculating location shares of total U.S. R&D employment.

4 Total private sector employment in the 50 United States and Washington, DC was 123.9 million in 2018, according to estimates from the Bureau of Labor Statistics (<https://www.bls.gov/cew/publications/employment-and-wages-annual-averages/2018/home.htm>, table 6).

References

Shackelford B and Wolfe R. National Center for Science and Engineering Statistics (NCSES). 2019. *Over Half of U.S. Business R&D Performed in 10 Metropolitan Areas in 2015*. NSF 19-322. Alexandria, VA: National Science Foundation. Available at <https://nsf.gov/statistics/2019/nsf19322/>.

Suggested Citation

Shackelford B and Wolfe R; National Center for Science and Engineering Statistics (NCSES). 2020. *Businesses Performed 60% of Their U.S. R&D in 10 Metropolitan Areas in 2018*. NSF 21-331. Alexandria, VA: National Science Foundation. Available at <https://ncses.nsf.gov/pubs/nsf21331>.

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