

Federal and Non-Federal Research Funding:

A Detailed Analysis of Research Expenditures at All IRIS Member Universities

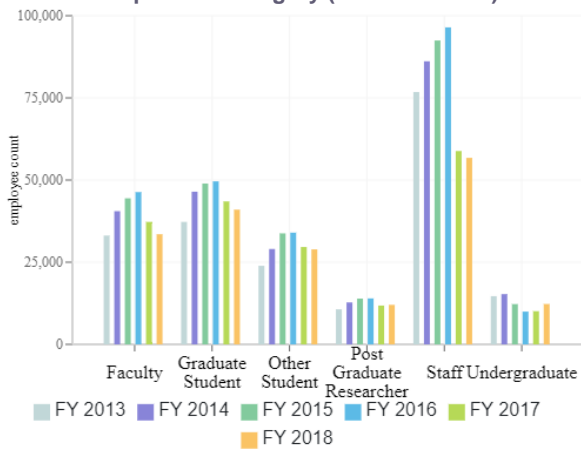
This report characterizes federal and non-federal research expenditures at All IRIS Member Universities and is based on UMETRICS data submitted to IRIS. These are based on actual financial and payroll records for fiscal years 2013 - 2018. Note: This report consists of information from 33 IRIS member universitiesnull.

Individuals Employed by Federal and Non-Federal Research Funding

During FY 2013 - 2018, federal and non-federal research expenditures supported a yearly average of 216,376 individuals at All IRIS Member Universities.

On average, 40.1% of individuals supported by federal and non-federal research funding at these universities every year were students, while 18.1% were faculty.

Counts of total individuals on All IRIS Member Universities' federal and non-federal research awards, broken down by occupational category (FY 2013 - 2018)

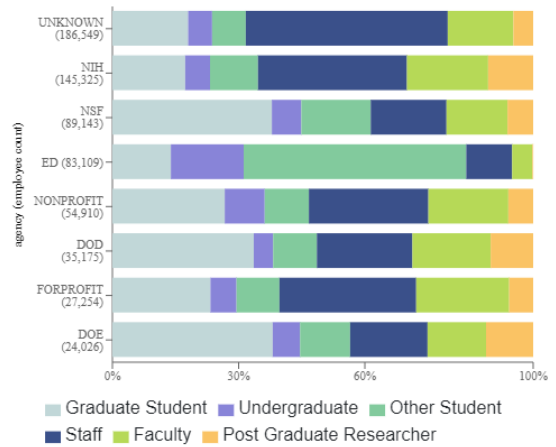


Organization of the Scientific Workforce

During FY 2013 - 2018, students at All IRIS Member Universities constituted 61.4% of the research workforce supported by NSF awards and 34.6% of employees supported by awards from NIH.

Post graduate researchers comprised 11.3% (2,712), 10.7% (3,557), 10.1% (3,557), and 6.2% (5,502) of the employees on awards from DOE (24,026), NIH (145,325), DOD (35,175) and NSF (89,143), respectively.

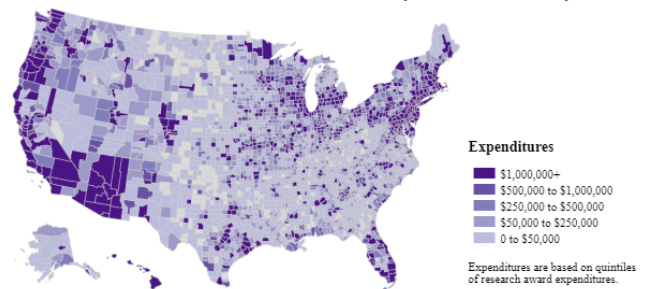
Employment patterns of federal and non-federal research awards from All IRIS Member Universities for FY 2013 - 2018



National Distribution of Research-Related Expenditures

The production of science requires the purchase of scientific equipment and technology as well as collaboration with private/public research organizations. All IRIS Member Universities federal and non-federal on research-related goods and services expenditures exceeded \$27.8 billion during FY 2013 - 2018 and included transactions with vendors in 2971 US counties. Vendor and subaward spending in Cook, Illinois exceeded \$1.4 billion, making it the highest-ranking county in the U.S.

Total vendor and subaward expenditures on federal and non-federal research awards from All IRIS Member Universities (FY 2013 - 2018)*



*Generally, about 74% of research expenditures can be matched to location information with available data and methodology.

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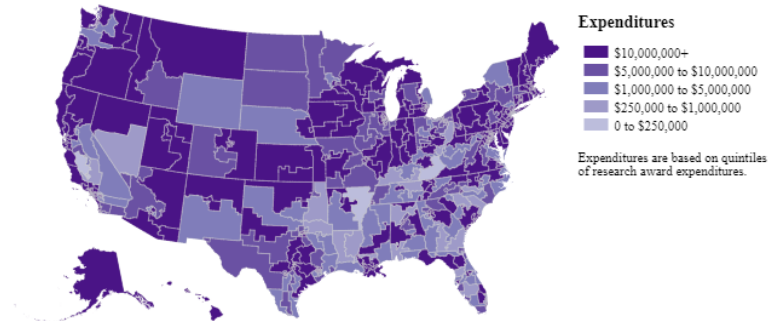
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Congressional District Map.

National Distribution of Research-Related Expenditures

Total vendor and subaward expenditures on federal and non-federal research awards from All IRIS Member Universities by congressional district (FY 2013 - 2018)

The production of science requires the purchase of scientific equipment and technology as well as collaboration with private/public research organizations. Federal and non-federal on research-related goods and services at All IRIS Member Universities exceeded \$27.8 billion during FY 2013 - 2018 and included transactions with vendors in 442 US congressional districts (includes Washington, D.C.). Purchases from vendors in Illinois's 7th congressional district vendors exceeded \$961.1 million, making it the top-ranking district in the U.S.



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Federal Research Funding

Spending Report Methodology

This technical documentation describes how IRIS generates the aggregate data for the federal spending and all spending reports.

Updates

An improved location imputation system has been implemented, allowing more spending to be accurately mapped. This report uses inflation adjusted dollars normalized to 2019 for all calculations, rather than nominal dollars. For this report, we are implementing a new system of classifying job titles that provides a more accurate picture of student involvement in sponsored research. The new method emphasizes employees' status over their production function, and integrates job titles, occupational classes, CDFA codes, and object code descriptions. IRIS incorporates a dataset that allows for more spending to be successfully mapped to congressional district, as well as improving the accuracy of spending allocation in the congressional maps. Congressional spending is mapped by ZIP code. ZIP codes are matched to congressional districts using data from the U.S. Department of Housing and Urban Development. HUD provides a value for the percentage of businesses in each congressional district when a ZIP code spans multiple congressional districts. This percentage is used when allocating funds to ZIP codes with multiple associated congressional districts. The HUD data as well as the associated documentation can be found here: https://www.huduser.gov/portal/datasets/usps_crosswalk.html.

We also implemented the following updates in this report:

- Improvement of the script that censors people names from appearing in the vendor maps, causing it to censor fewer organization names.
- New scripts to correct vendor and subaward state names when full state names were given rather than abbreviations, to correct state names that did not agree with the city and zipcode when the city and zipcode provided by the university were not in the state provided by the university, and to correct city names that were misspelled.
- New code to prevent universities from being included in the group they are benchmarking against.
- Broadening of the definition of "Unknown" CFDA codes to include missing or missshapen CFDAs, increasing the number of employees included in by-agency measures.

Identifying and Characterizing Federal Awards in UMETRICS Data

Federal awards are identified by their corresponding CFDA (Catalog of Federal Domestic Assistance) code. All other awards are considered nonfederal and are filtered out before the Federal Spending Report is generated. Both Federal and nonfederal awards are reported in the All Spending Report.

The CFDA code is submitted to IRIS in each university's UMETRICS award file and corresponds to a specific Federal agency. In order to qualify for inclusion in the Federal Spending Report, an award must have a CFDA code that has the following characteristics:

- CFDA code IS NOT NULL (That means that a CFDA code was submitted with the award)
- CFDA code IS NOT 99.xxx (99 is designated as 'UNKNOWN' and cannot be classified into a Federal agency)
- CFDA code does not start with 00. or 0. unless your university has specifically assigned a 00.700 code, which is a federal code as per the IRIS portal's OFS coding scheme
- CFDA code must have a period (.) in it. (This is important to place awards in the proper agencies, e.g., 12.800 - Air Force Defense Research Sciences Program.)

More information about the CFDA code can be found here: <https://beta.sam.gov/>

Work-Study

Some universities send IRIS the employment data for students who are paid by the federal work-study program. The federal government categorizes its work-study program with a CFDA number (program number) of 84.033, and we use this definition to identify a university's work-study-related records in this data. In this report, the option to include work-study data is available if a university has included students paid by federal work-study in the employee records it sends; if the work-study toggle is not available then the university has not provided those records.

Chart 1: Individuals Employed by Research Funding

Chart 1 displays counts of unique employees who are paid on all awards or all Federal awards, broken out by job categories.

IRIS has developed a keyword-based sorting algorithm which uses job title, university-provided occupational class, CDFA, and employee accounting code description to sort each job into one of six categories. This mechanism ensures a standardized application of sorting rules across all employees at all universities. It also emphasizes an employee's status as a student, postgraduate researcher, or faculty member rather than their role in an award's production function.

More information on this method, known as "Emphasization and Prioritizing of Student Status" or EPSS, can be found in the slide presentation from the 2019 IRIS Summit at <http://myumi.ch/BoeWQ>

The resulting categories used in Chart 1 are:

1. Faculty
2. Staff
3. Post-Graduate Researcher
4. Graduate Student
5. Undergraduate Student
6. Other Student (graduate or undergraduate, unable to be classified)

Federal Research Funding

Spending Report Methodology

It is possible that an individual employee has multiple classifications if they have multiple job titles for the given time period in the report. To avoid duplication in this case, we use a ranking system to determine which job classification should be used in the report.

Below is the ranking approach to resolve multiple occupational classifications for a given employee. The ranking shows which classifications take precedence over others.

Occupational Classification	Rank
Student	1
Faculty	2
Post Graduate Research	3
Staff	4

Chart 2: Individuals Employed by Agency

Chart 2 displays counts of unique employees who are paid on all awards or all Federal awards, broken out by occupational categorization and funding source. (If a university employee is paid on multiple awards funded by different sources, they are counted for each of those funding sources.)

Funding source (agency) for Federal awards is defined by the CFDA code in the UMETRICS award file. If the CFDA code is identified as a federal agency then it is counted in federal reporting, all other CFDA codes are considered non-federal. Non-federal CFDA codes that a university has supplied according to the File and Field guide, such as state, nonprofit, for profit, foreign, etc., are grouped by those categories. Those that cannot be categorized are grouped as "UNKNOWN". Funding source (agency) for Federal awards is defined by the CFDA code in the UMETRICS award file. If the CFDA code is identified as a federal agency then it is counted in federal reporting, all other CFDA codes are considered non-federal. Those that cannot be categorized are grouped as "UNKNOWN".

Occupational classifications for these data are assigned as described above.

Charts 3 and 4: Research Expenditures

These national and state maps display total expenditures to university vendors and subawardees, by US county. The data are aggregated from the university's UMETRICS vendor and subaward data files.

IRIS applies geocodes to all of the vendor and subaward transactions in the data files. The geocoding relies on accurate addresses for vendors and subawardees. Vendor and subaward transactions that are missing ZIP codes are not included in the map visualization. These transactions are counted toward the total dollar amount in the text of the report.

Transactions without complete location data may cause discrepancies between data downloads and map visuals.

Congressional spending is mapped by ZIP code. ZIP codes are matched to congressional districts using data from the U.S. Department of Housing and Urban Development. HUD provides a value for the percentage of businesses in each congressional district when a ZIP code spans multiple congressional districts. This percentage is used when allocating funds to ZIP codes with multiple associated congressional districts. The HUD data as well as the associated documentation can be found here: https://www.huduser.gov/portal/datasets/usps_crosswalk.html.

Benchmarking and QA

The third tab of the report allows universities to review the quality of their submitted UMETRICS data and to benchmark their data against a set of aggregated data from selected peer universities. Technical documentation is embedded throughout the QA report.

Citation

Institution for Research on Innovation and Science, All IRIS Member Universities Federal Spending Report, Fiscal Year 2013 - 2018 <http://iris.isr.umich.edu>

*If a university employee is paid on multiple awards funded by different sources, they are counted for each of those funding sources.