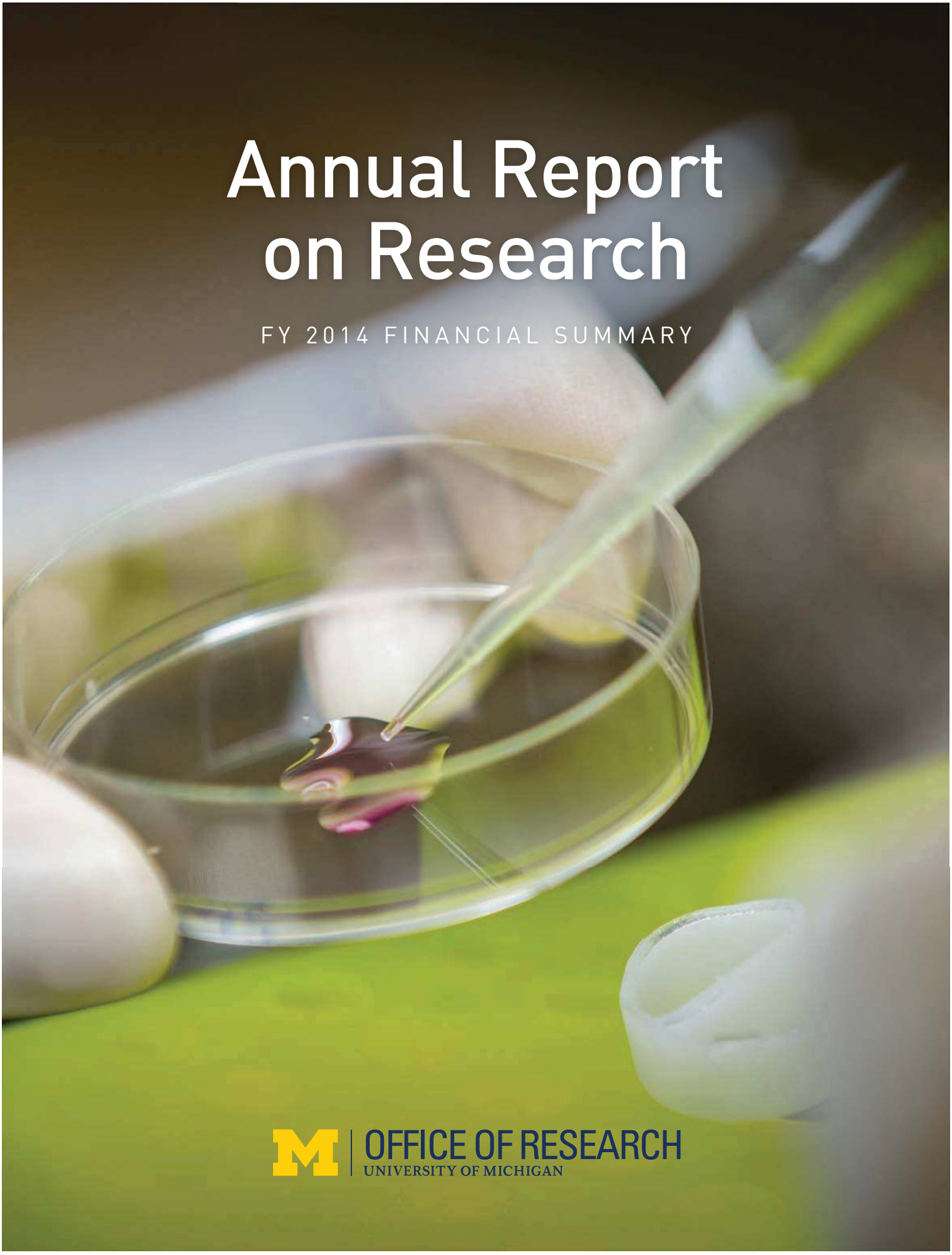
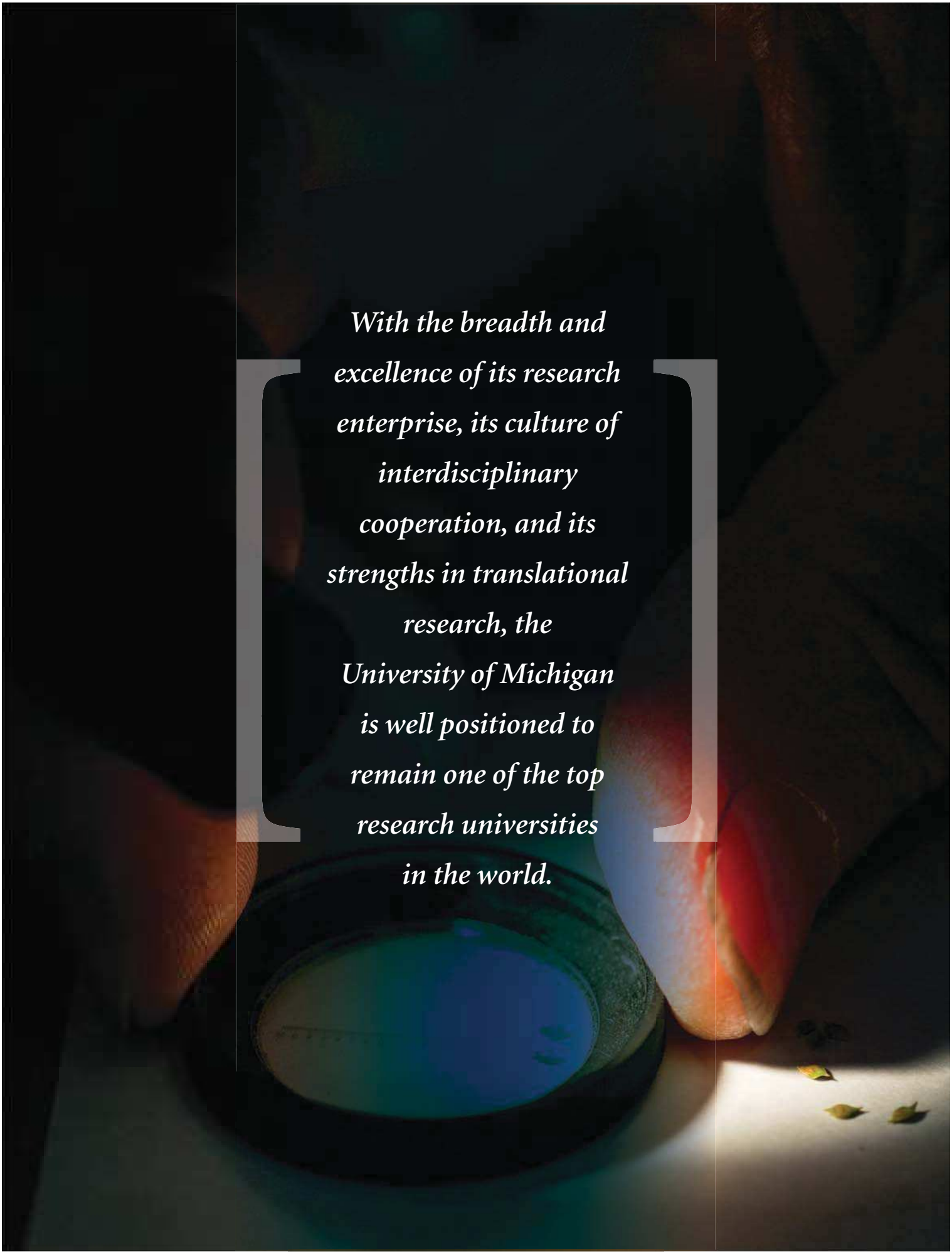


Annual Report on Research

FY 2014 FINANCIAL SUMMARY

OFFICE OF RESEARCH
UNIVERSITY OF MICHIGAN



With the breadth and excellence of its research enterprise, its culture of interdisciplinary cooperation, and its strengths in translational research, the University of Michigan is well positioned to remain one of the top research universities in the world.



Overview

In FY 2014, the University of Michigan's research expenditures totaled $1.3 billion. Although this is slightly below last year's record high, it remains one of the highest levels in the nation and enables the university to sustain the breadth and excellence of its research enterprise.

Over the last year, the total number of research contracts awarded to U-M rose by 4.1 percent, but the total dollar value of those awards fell by about 16 percent. Thus, although the university's success in winning awards is on the rise, the value per award is declining. To help compensate, U-M has increased the number of proposals submitted for research awards by almost 2.7 percent, with a dollar value increase of more than 12 percent.

A key contributor to sustaining the overall volume of research, and therefore to maintaining the core strengths of the U-M research enterprise has been U-M's ability to increase the investment of internal funds in research, particularly in the Medical School. At the same time, we are expanding efforts to increase sponsorship from industry, foundations and other sources.

The quality and impact of U-M research also remain strong. Data compiled by Thomson Reuters placed U-M seventh among universities world wide with the highest number of researchers with the most cited papers in the sciences and social sciences. In addition, the Office of Technology Transfer reported record numbers of inventions, licenses, and startup companies for the year.

Looking ahead, the competition for the pool of available funds from the federal government will become even more intense, and it is essential to continue to strengthen our competitiveness and diversify our sources of funding. In addition to examining financial performance in FY 2014, this report summarizes on-going efforts and emerging opportunities that will help position the university to sustain the health and vitality of its research enterprise.

Annual Research Performance

Total research expenditures at the University of Michigan for Fiscal Year 2014, including the Ann Arbor, Dearborn, and Flint campuses, were down by 1.5 percent, or $20,104,806 from the previous year to reach a total of $1,308,616,358. This number includes externally and internally funded direct and indirect expenses and disbursements, including research initiative and start-up expenses, research related facilities and administrative expenses, and research equipment purchases. This year's total follows an overall growth rate of 40 percent over the last decade through last year. Because research is closely related to education, the volume of research is a measure of the quality of our academic programs as well as the number of students we can educate.

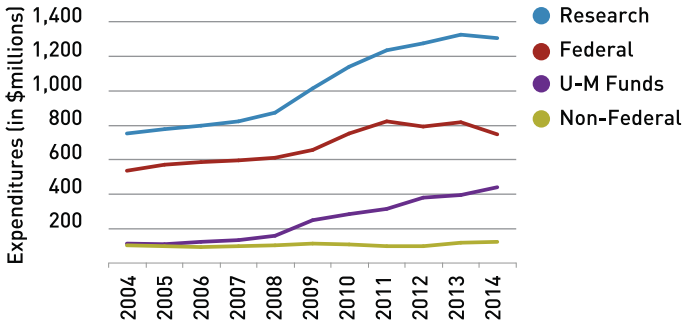
Table 1 shows the relative contributions of the major sponsors of U-M research, with the federal government now providing 57 percent of the total, down from 61.5 percent in the previous year. The table also shows the importance of our own internal investments in sustaining the excellence and vitality of our research enterprise.

TABLE 1. RESEARCH BY MAJOR SPONSORS

Sponsor Group	Expenditures	% of Total
Total Federal Government	$ 745,320,784	57%
Total Non-Federal Sponsors	$ 124,423,043	9.5%
Industry (direct)**	$ 49,690,483	3.7%
Foundations	$ 31,663,206	2.4%
Other	$ 43,069,354	3.2%
Total U-M Funds	$ 438,872,530	33.5%
Total Research Expenditures	**$ 1,308,616,358**	**100%**

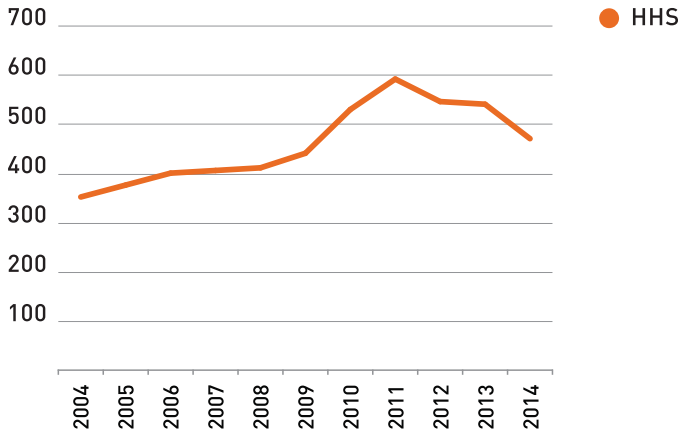
Figure 1 highlights the overall trends over the decade from FY 2004 through FY 2014. Funding from the federal government is consistently the largest component of research expenditures, although it has begun to decline since reaching a peak in FY 2010 both in total volume and percentage of the total, for the first time in decades.

FIGURE 1. U-M RESEARCH EXPENDITURES



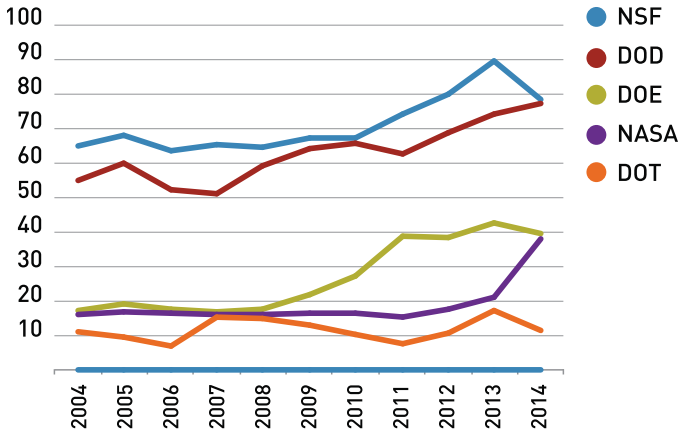
Of the federal total, Health and Human Services, which includes the National Institutes of Health, is by far the largest component, underscoring the broad range of health related research at U-M. Its recent downward turn of 13.4 percent shown in **Figure 2** is largely responsible for the overall decline in federal funding. The sharp increase in funding that peaked in 2011 and eased off in recent years arose primarily from the short-term infusion of funds under the American Recovery and Reinvestment Act of 2009 (ARRA), as well as from a major collaborative oncology research program that was temporarily housed at U-M.

FIGURE 2. HHS FUNDING AT U-M (IN $MILLIONS)



Federal agencies other than Health and Human Services have been of increasing importance to the university's overall research portfolio, as highlighted in **Figure 3**. There has been steady growth in funding from several agencies over the last decade, although we experienced a decline from the NSF last year. Although there was a decline from the Department of Transportation in FY 2014, internal investments in mobility research will help position the university for further growth in external funding from both government and industry in coming years.

FIGURE 3. U-M FEDERAL FUNDING BY AGENCY (IN $MILLIONS)



As shown in **Table 2**, funds from the National Aeronautics and Space Administration saw a dramatic boost of almost 80 percent last year, largely due to a major new long-term award to develop a satellite system to improve weather prediction. At the same time, support from the Department of Defense rose by almost 4.3 percent, and support from foundations grew by 10.3 percent.

Further details on the level of funding from these sources and others are included in **Appendix I**.

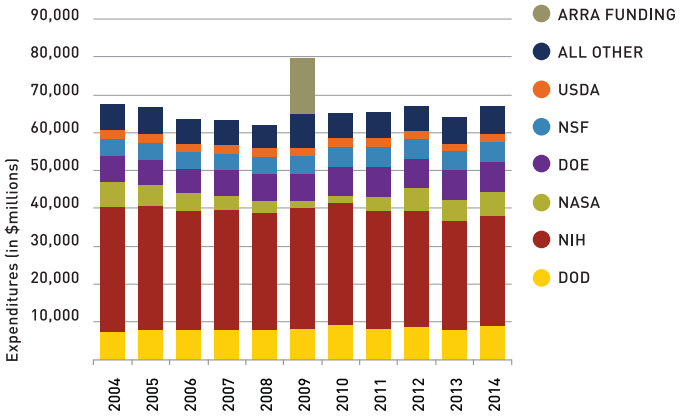
Industry supported research is a critical component of U-M's research mission. Working with companies keeps both faculty and students informed on the needs and perspectives of industry, enriching the experience of our students both in the laboratory and the classroom, and better preparing them for the challenges they will face in industry. Moreover, having strong partnerships with industry has become a key asset in attracting funding from federal agencies as well as more companies.

TABLE 2. PERCENT CHANGE BY MAJOR SPONSOR

Sponsor Group	FY13	% of Total	FY14	% of Total	$ Change	% Change
Total Federal	**$ 817,706,572**	**61.50%**	**$745,320,784**	**56.95%**	**($72,385,788)**	**-8.85%**
NIH	$509,676,889	38.40%	$441,252,732	33.72%	($68,424,157)	-13.43%
NSF	$89,704,539	6.80%	$78,493,661	6.00%	($11,210,878)	-12.50%
DOD	$74,316,848	5.59%	$77,500,664	5.92%	$3,183,816	4.28%
Energy	$42,697,378	3.21%	$39,504,823	3.02%	($3,192,555)	-7.48%
NASA	$21,182,120	1.60%	$38,061,841	2.91%	$16,879,721	79.69%
Transportation	$17,246,319	1.30%	$11,475,418	0.88%	($5,770,901)	-33.46%
Education	$8,069,459	0.60%	$7,395,585	0.57%	($673,874)	-8.35%
Total Non-Federal	**$117,104,817**	**8.80%**	**$124,423,043**	**9.51%**	**$7,318,226**	**6.25%**
Industry	$48,909,843	3.70%	$49,690,483	3.80%	$780,640	1.60%
Foundations	$28,702,517	2.20%	$31,663,206	2.42%	$2,960,689	10.32%
Other	$39,492,457	3.00%	$43,069,354	3.29%	$3,576,897	9.06%
Total U-M Funds	**$393,909,775**	**29.60%**	**$438,872,530**	**33.54%**	**$44,962,755**	**11.41%**
Total Research	**$ 1,328,721,165**	**100%**	**$1,308,616,358**	**100%**	**($20,104,807)**	**-1.51%**

Figure 4 provides the context of broad trends in federal research spending. At the end of FY 2014, total funding was $67 billion, essentially the same in constant 2014 dollars as what it was 10 years previously. There was a short-term boost in the middle of the decade under the American Recovery and Reinvestment Act of 2009.

FIGURE 4. TRENDS IN FEDERAL RESEARCH FUNDING



Over the same period, U-M showed a 10.6 percent net overall gain in federal funds, adjusted for inflation, showing the university's relative strength in competing for research funding.

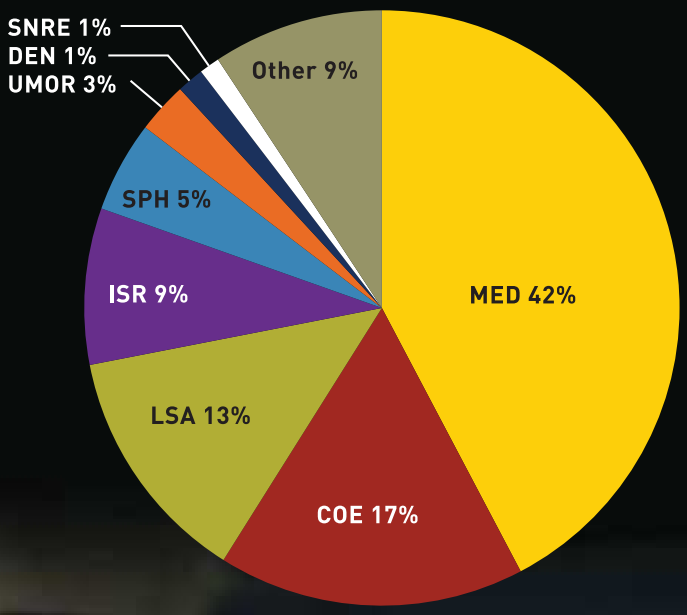
Table 3 provides a closer look at the total funding from industry, including subcontracts from federal contracts awarded to industry and corporate foundations as well as direct contracts. Industry funding is now 7.7 percent of total externally sponsored research expenditures, exceeding the national average of 5 percent of funding from industry for research universities estimated by the National Science Foundation.

TABLE 3. INDUSTRY-FUNDED RESEARCH

Industry Research (total)	FY13	FY14	% Change
Direct Contract	$48,909,842	$49,630,593	1.6%
Subcontract (on Federal Prime)	$19,478,729	$13,395,401	-31.2%
Corporate Foundations (est.)	$3,393,391	$2,834,941	-16.5%
Other Industry Research	$1,445,025	$959,489	-33.6%
Total Research Expenditures	**$73,226,987**	**$66,880,424**	**-8.7%**

Figure 5 shows the expenditures for FY 2014 across U-M's schools and colleges. As usual, the Medical School's portfolio is the largest on campus, at 42 percent of the University total, followed by the College of Engineering; the College of Literature, Science and the Arts; the Institute for Social Research, and the School of Public Health. **Appendix II** provides further detail, documenting the level of funding at each unit and the percentage change from FY2013 to FY 2014.

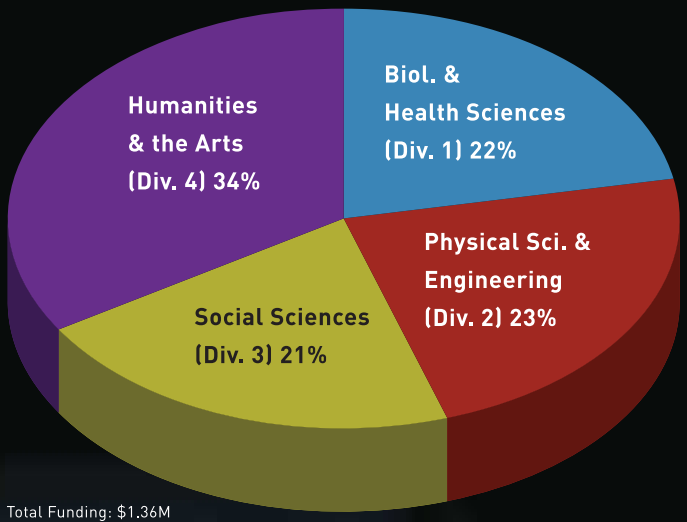
FIGURE 5. RESEARCH EXPENDITURES BY UNIT



The sector labeled UMOR represents the sum of expenditures by research units that report directly to the U-M Office of Research (UMOR) rather than a school or college. These units include The U-M Transportation Research Institute, the U-M Energy Institute, the Mobility Transformation Center, the Center for Human Growth and Development, Advanced Research Computing, Functional Magnetic Resonance Imaging, the Center for Statistical Computation and Research, the Institute for Research on Women and Gender, and the Institute for Research on Labor, Employment, and the Economy.

UMOR also helps spur research and scholarship across the university through its Faculty Grants and Awards Program. **Figure 6** shows the breakdown of these awards for FY 2014 by broad disciplinary area. The program provides bridging funds for projects, seed funding for young faculty as well as for senior faculty who are changing research direction, and support in areas where sponsored funding is unusually constrained. Thus, about 34 percent of the total funding from this program supports the arts and humanities, although the total external funding brought in by these fields is less than 1 percent of U-M's total research volume.

FIGURE 6. UMOR GRANTS & AWARDS



Total Funding: $1.36M



Technology Transfer and Business Engagement

A key responsibility of a public research university is to help ensure that society realizes the benefits of the research it conducts. This benefit is achieved primarily by graduate and undergraduate students who carry the expertise gained in laboratories and classrooms on campus to a wide range of careers in industry, government, and non-governmental organizations across the nation and around the world. The Office of Technology Transfer (OTT) and the Business Engagement Center (BEC) also play a key role.

In FY 2014, OTT reported a record number of 439 inventions. **Figure 7** shows the steady rise of invention disclosures over the last ten years, with a sharp uptick since 2010 to a total of 3,685 for the decade. The office also reported a record 148 option/license agreements last year, up 37 percent from the previous year.

Some patents offer promise as the basis for new entrepreneurial companies. U-M launched a record number of 14 new startups in FY 2014 based on technology developed at U-M, and has averaged one new company every five weeks for the last ten years.

FIGURE 7. TECH TRANSFER RESULTS

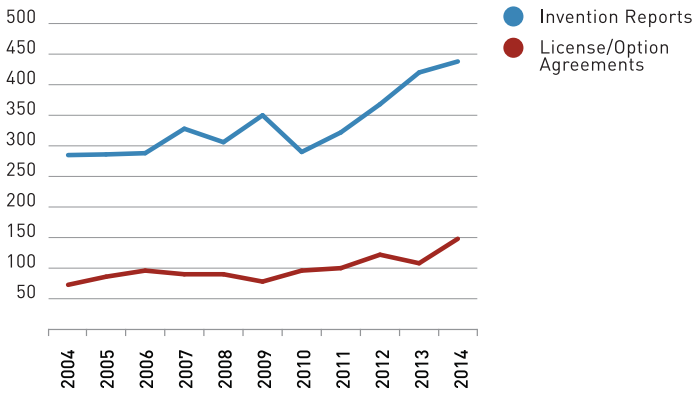
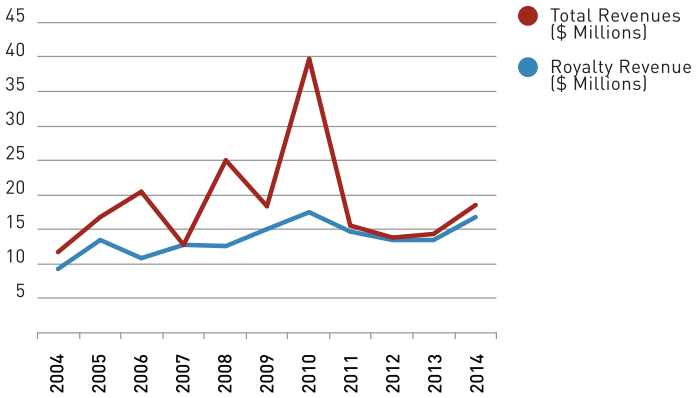


Figure 8 tracks revenue from tech transfer operations over the last decade. The royalty revenue has shown steady growth, as shown in the blue line. Total revenues, which includes royalty revenue and revenue from equity and paid-up royalties, fluctuates considerably depending on specific deals occurring from year to year.

The total revenue amounted to $18.5 million in FY 2014. A portion of these funds provides incentives for faculty inventors. The administration's share goes to support potential high-impact research on campus, to support the Business Engagement Center, and to support the U-M Venture Center, which provides a variety of services for entrepreneurs and investors interested in start-up opportunities based on technology developed at U-M.

The Business Engagement Center, which reports jointly UMOR and the University of Michigan Office of Development, serves

FIGURE 8. TECH TRANSFER REVENUES



as a gateway for companies to access the expertise and resources in the U-M community, including educational programs and access to student talent. It plays a central role in helping industry to find opportunities to invest in U-M research and to provide philanthropic support to the university.

As mentioned above, research expenditures from industry dipped by 9.3 percent in FY 2014, but philanthropic contributions rose by 23.2 percent, yielding a slight increase in overall support from industry. Working to lay the groundwork for even stronger relationships, the BEC hosted 821 visits last year, up by almost 47 percent from the previous year.

Planning for the Future

Although the University of Michigan continues its leadership in research, the prospects for continued significant growth in research expenditures, particularly from the federal government, are not strong for the immediate future. **Table 4** shows that while the total number and value of contracts won each year from external sources rose by 4.13 percent in FY 2014, the total value of those awards declined by more than 16 percent. Since many awards are spent over a period of years specified in the contract, this chart is a measure of the pipeline for expenditures.

TABLE 4. NUMBER AND VALUE OF AWARDS

	Number of Awards	Value of Awards
FY 2014	1,843	$ 817,525,144
FY 2013	1,770	$ 976,062,770
Difference	73	($158,537,626)
% Change	4.12%	-16.24%

On the other hand, **Table 5** shows that the university boosted the number of submissions for awards by 2.69 percent in FY 2014 with an increase in value of 12.14 percent.

TABLE 5. NUMBER AND VALUE OF SUBMISSIONS

	Number of Submissions	Value of Submissions
FY 2014	4,967	$ 4,013,200,065
FY 2013	4,837	$ 3,578,586,791
Difference	130	$ 434,613,274
% Change	2.69%	12.14%

In this challenging climate, the University of Michigan's Office of Research is working with faculty and administrators from across campus to sustain the excellence of the research enterprise and position it for future growth. Key action steps include the following:

Create larger projects that build on the university's interdisciplinary strengths and innovative partnerships—With the broad strengths of its 19 schools and colleges and its culture of cooperation across disciplines, U-M is pulling together teams from diverse fields to address the full complexity of challenges that face society. One of the key goals of the Office of Research moving forward is to encourage the development of new opportunities in this arena.

Encourage new innovative research ideas—Plans call for continuing and expanding **MCubed**, a program launched in 2012 that engaged faculty from all 19 of U-M's schools and colleges in forging new collaborations across disciplines, providing seed funding to kick-start novel research projects, many of which have gone on to garner further funding from external sources.

Strengthen industry outreach—There is room for further growth in support from industry. The Business Engagement Center has refocused its strategy to increase its efforts to help develop mutually beneficial partnerships with industry.

Expand clinical trials—Clinical trials represent an opportunity to build on one of the university's strengths. Working with UMOR's Office of Research and Sponsored Programs, the group that manages the submission of all research proposals and negotiates all research contracts, the Medical School is stepping up its efforts to expand its efforts in this area.

Seek more funding from foundations—U-M's Office of Foundation Relations has recently enhanced its resources and support for faculty seeking funding from foundations.

Pursue philanthropic gifts for research—With the launch of a university-wide capital campaign in the Fall of 2014, U-M is working with the Office of University Development to boost efforts to seek research funding from philanthropic sources.

Develop more international partnerships—In addition to diversifying sources for research funding, international partnerships enrich research and education by bringing together the complementary strengths and perspectives of other cultures to address common challenges. Efforts are under way to seek new opportunities in this arena.

Streamline the proposal submission process—UMOR's Office of Research and Sponsored Programs, is working with faculty and administrators to improve the efficiency and effectiveness of its processes.

Help improve faculty productivity—UMOR's Office of Research Compliance is working to clarify and expedite the increasingly time consuming processes related to complying with regulations, with an eye toward freeing up faculty time to focus on the actual research.

Communicate the value and impact of university research—New efforts are under way at U-M to highlight the role of university research in the economy, competitiveness, and quality of life to key decision makers in government and industry as well as the public.

One example of an initiative that highlights innovative approaches to developing U-M's research enterprise is the **U-M Mobility Transformation Center (MTC)**. Formally launched in the spring of 2013, the MTC is an ambitious public/private R&D partnership to develop the foundations of a commercially viable ecosystem of connected and automated vehicles for moving people and goods. This novel collaboration is bringing together companies from multiple industries, the federal government, the state government, the City of Ann Arbor, and other academic institutions to envision and shape the future of mobility. It draws on U-M's long-term relationships with industry; its ability to address the interrelated technical, social, economic, regulatory, and business challenges; and the strengths of the region to lead a transformation that will dramatically improve the safety, sustainability, and accessibility of ground transportation in our society.

In another arena, UMOR's Advanced Research Computing (ARC) unit is leading an effort to increase the resources and services available to support and inspire the growing range research across campus that requires advanced computing capabilities. Working with the university's Information Technology Services unit, ARC is working to increase resources available to faculty, to boost the efficiency and cost effectiveness of those resources, and to strengthen the services that support their use. At the same time, ARC is coordinating the development of two multidisciplinary programs in data science in computational discovery and engineering. These programs will enhance the university's capabilities and achievements in a wide range of disciplines, including science, engineering, education, health policy, and business.

Conclusion

Investments in university research support the generation of new ideas and insights in our laboratories that have practical implications in fields ranging from medicine to mobility. Perhaps more importantly, since research is closely tied to the educational process at both the graduate and undergraduate levels, continued investments in research are central to our ability to prepare students for the roles they will play as the innovators who go on to shape all aspects of our economy and society. The lack of growth in constant dollars of funding from the federal government, which has been key to the richness and productivity of university research in the United States, poses a serious challenge to the pipeline of ideas and talent moving forward. Another challenge is to reduce the administrative burden on faculty, including the growing range of activities related to compliance with federal regulations.

The Office of Research is working with faculty and administrators from across our three campuses to streamline our processes and reduce the faculty administrative burden. At the same time, with its diverse strengths across disciplines and its longstanding reputation as a top-tier research university, U-M is well positioned to compete for existing funds as well as to develop new sources of funding. As we move forward, we will draw on our inherent strengths while seeking to build new partnerships with government, industry, and academia, in the U.S. and around the world in order to sustain the breadth, excellence, and impact of our research enterprise.



Appendix I:

Volume of Research Expenditures By Sponsor

	FY 2013	% OF TOTAL	FY 2014	% OF TOTAL	% OF CHANGE
FEDERAL SOURCES					
Health and Human Services					
National Institutes of Health	509,676,889	38.4%	441,252,732	33.7%	-13.4%
Centers for Disease Control	14,493,928	1.1%	13,688,820	1.0%	-5.6%
Centers for Medicare & Medicaid Administration	6,020,633	0.5%	6,551,851	0.5%	8.8%
Substance Abuse and Mental Health Services	1,329,014	0.1%	1,353,851	0.1%	1.9%
Food and Drug Administration	1,322,643	0.1%	1,193,278	0.1%	-9.8%
Health Resources & Services Administration	98,854	0.0%	114,383	0.0%	15.7%
Other HHS	8,200,941	0.6%	8,538,171	0.7%	4.1%
Total Health and Human Services	541,142,902	40.7%	472,693,086	36.1%	-12.6%
National Science Foundation	89,704,539	6.8%	78,493,661	6.0%	-12.5%
Department of Defense					
Army	28,624,260	2.2%	31,134,791	2.4%	8.8%
Navy	16,031,640	1.2%	15,017,338	1.1%	-6.3%
Air Force	16,516,329	1.2%	13,362,044	1.0%	-19.1%
Other	12,985,027	1.0%	17,986,491	1.4%	38.5%
Total Department of Defense	74,157,256	5.6%	77,500,664	5.9%	4.5%
Energy	42,697,378	3.2%	39,504,823	3.0%	-7.5%
NASA	21,182,120	1.6%	38,061,841	2.9%	79.7%
Transportation	17,246,319	1.3%	11,475,417	0.9%	-33.5%
Education	8,069,459	0.6%	7,395,585	0.6%	-8.4%
Commerce	6,683,762	0.5%	6,021,149	0.5%	-9.9%
Agriculture	1,917,553	0.1%	2,580,153	0.2%	34.6%
Environmental Protection Agency	3,439,913	0.3%	2,483,589	0.2%	-27.8%
Social Security Administration	2,797,705	0.2%	2,379,431	0.2%	-15.0%
Justice	1,931,233	0.1%	2,264,861	0.2%	17.3%
Homeland Security	1,369,212	0.1%	1,098,600	0.1%	-19.8%
Agency for International Development	797,006	0.1%	942,221	0.1%	18.2%
Smithsonian Institution	464,231	0.0%	494,903	0.0%	6.6%
Nuclear Regulatory Commission	919,899	0.1%	441,644	0.0%	-52.0%
State	519,986	0.0%	382,765	0.0%	-26.4%
National Intelligence Office	663,169	0.0%	352,183	0.0%	-46.9%
Interior	355,735	0.0%	254,231	0.0%	-28.5%
Museum and Library Services, Institute of	718,025	0.1%	194,645	0.0%	-72.9%
National Endowment for the Humanities	62,260	0.0%	158,362	0.0%	154.4%
Veterans Affairs	611,499	0.0%	86,279	0.0%	-85.9%
Federal Reserve	211,265	0.0%	36,442	0.0%	-82.8%
Housing and Urban Development	35,640	0.0%	24,248	0.0%	-32.0%
Other Federal	8,506	0.0%	0	0.0%	-100.0%
Total Federal Government	817,706,572	61.5%	745,320,784	57.0%	-8.9%
NON-FEDERAL SPONSORS					
Industry	48,909,843	3.7%	49,690,483	3.8%	1.6%
Foundations	28,702,517	2.2%	31,663,207	2.4%	10.3%
Public Charities	17,634,952	1.3%	18,914,642	1.4%	7.3%
Other (includes Universities & Gifts)	8,991,510	0.7%	10,876,713	0.8%	21.0%
Trade and Professional Associations	8,263,065	0.6%	10,834,900	0.8%	31.1%
State of Michigan & Local Michigan Authorities	3,461,688	0.3%	1,676,422	0.1%	-51.6%
International Organizations	834,988	0.1%	485,984	0.0%	-41.8%
Foreign National Governments	306,255	0.0%	280,692	0.0%	-8.3%
Total Non-Federal Sponsors	117,104,817	8.8%	124,423,043	9.5%	6.2%
Total Sponsored Research	934,811,390	70.4%	869,743,827	66.5%	-7.0%
UNIVERSITY OF MICHIGAN SOURCES					
University of Michigan Funds	393,909,775	29.6%	438,872,530	33.5%	11.4%
TOTAL RESEARCH EXPENDITURES	**1,328,721,165**	**100.0%**	**1,308,616,357**	**100.0%**	**-1.5%**

Appendix II:

Volume of Research Expenditures by Major University Units

UNIT	FY 2012	FY 2013	FY 2014	AVERAGE % CHANGE	2012-2013 CHANGE	2013-2014 CHANGE
Architecture & Urban Planning, Taubman	1,420,748	1,740,682	1,450,112	2.9%	22.5%	-16.7%
Art and Design, Stamps School of	98,331	178,971	342,008	86.6%	82.0%	91.1%
Business, Ross School of	11,338,880	11,456,643	10,999,550	-1.5%	1.0%	-4.0%
Dentistry	18,595,638	19,053,882	19,070,595	1.3%	2.5%	0.1%
Education	12,816,451	12,836,415	12,004,397	-3.2%	.2%	-6.5%
Engineering	190,457,291	206,688,130	217,941,206	7.0%	8.5%	5.4%
Graduate School, Rackham	2,470,693	533,497	1,068,365	10.9%	-78.4%	100.3%
Information	3,884,498	5,257,657	5,974,336	24.5%	35.3%	13.6%
Kinesiology	4,384,641	4,609,684	5,591,674	13.2%	5.1%	21.3%
Law	3,946,113	3,782,373	4,437,137	6.6%	-4.1%	17.3%
Literature Science, and the Arts	157,898,889	162,242,959	170,122,601	3.8%	2.8%	4.9%
Medical School	557,001,734	573,886,046	553,270,557	-.3%	3.0%	-3.6%
Music	243,865	400,411	584,243	55.1%	64.2%	45.9%
Natural Resources and the Environment	15,911,362	17,553,526	14,564,753	-3.4%	10.3%	-17.0%
Nursing	5,640,236	7,052,606	6,485,579	8.5%	25.0%	-8.0%
Pharmacy	8,443,617	8,884,239	9,772,746	7.6%	5.2%	10.0%
Public Health	73,225,851	70,858,034	64,788,103	-5.9%	-3.2%	-8.6%
Public Policy, G Ford School of	3,801,122	3,870,939	4,366,167	7.3%	1.8%	12.8%
Social Work	5,062,691	4,499,704	4,856,401	-1.6%	-11.1%	7.9%
Institute of Social Research	115,914,869	120,200,002	111,122,463	-1.9%	3.7%	-7.6%
OVPR Units	34,821,728	38,987,820	36,265,535	2.5%	12.0%	-7.0%
Other Units	35,013,189	42,584,474	41,815,847	9.9%	21.6%	-1.8%
UM-Dearborn	5,662,540	6,442,964	7,730,141	16.9%	13.8%	20.0%
UM-Flint	800,932	634,471	730,177	-2.8%	-20.8%	15.1%
Unassignable Services	5,168,989	4,485,037	3,261,665	N/A	N/A	N/A
GRAND TOTAL	**1,274,024,899**	**1,328,721,165**	**1,308,616,358**	**1.4%**	**4.3%**	**-1.5%**



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