



UNIVERSITY OF MINNESOTA
Driven to DiscoverSM

ANNUAL REPORT

THE STATUS OF UNIVERSITY RESEARCH AND
COMMERCIALIZATION OF INTELLECTUAL PROPERTY

FIVE YEARS FORWARD

BRIAN HERMAN, VICE PRESIDENT FOR RESEARCH
DECEMBER 12, 2014

PREFACE

Each year the Vice President for Research provides the Annual Status of University Research report for the Board of Regents, summarizing the university's research metrics for the past year, documenting the trends in research productivity and benchmarking the university's performance and ranking among its peer group. In addition, the Vice President reports progress on a broad, interconnected set of strategic priorities that build upon the University of Minnesota's history of great strength in research and the strategies necessary to address the obstacles institutions like the U of M are facing when it comes to research.

Produce **excellence**

Be **transformative**, lead not follow

Advance **transdisciplinary** work

Focus on critical **global challenges**

Present real, **measurable results**

These principles are the foundation for advancing the strategic priorities coming out of the newly adopted University of Minnesota system-wide research strategic plan which was endorsed by the Board of Regents in February 2014.

The 2014 annual status of research report includes:

Research Statistics | 4

- FY2014 externally sponsored research funding totals and comparison with previous year
- U of M research funding trends by: source of funds, college and campus, CIC/Big 10 Universities
- Technology commercialization results

National & Global Analysis | 14

- Higher education research and development (R&D) expenditures and peer performance
- National and global rankings among public research universities

Opportunities: Investing in Innovation | 18

- Growing funding for academic investments in R&D
- Five Years Forward – the university’s research strategic plan
 - Funding strategic investments: “the 3% solution”
 - The cornerstones of the plan – work already underway
 - Enhance research excellence
 - Advance transdisciplinary partnerships
 - Accelerate transfer of knowledge for the public good
 - Promote culture of serendipity

RESEARCH STATISTICS

University of Minnesota faculty and staff competed successfully for **\$741 million** in externally sponsored research awards in FY2014, **up 6.8% from 2013**. The result is a \$47.2M increase in total funding and is attributed to the receipt of **337 more awards in 2014** (4700 compared with 4363).

Taking a closer look at these increased award totals reveals the university receiving 86 awards of \$1M or more, six of which were over \$5M: Dr. Jim Neaton of the School of Public Health received \$28M from National Institutes of Health (NIH) and \$7.6M from Leidos Biomedical Research, Inc.; Dr. Rachel Quenemoen of the College of Education and Human Development received \$10.6M from the Department of Education; Dr. Bruce Blazar of Academic Health Center's Clinical and Translational Science Institute received \$8.9M from NIH; Dr. Susan Galatowitsch of the College of Food, Agricultural and Natural Resource Sciences received \$8.7M from the State of Minnesota, Legislative-Citizen Commission on Minnesota Resources (LCCMR); and Dr. Tucker LeBien and the Academic Health Center's Mayo Partnership received \$7.5M from the State of Minnesota.

Figures 1 and 2 display annual totals of externally sponsored research data by external funding source and college-campus, respectively. Funding increases are seen for all major funding sources - federal, state and private (Figure 1). Funding levels from individual federal sources varied among agencies but overall resulted in a net increase of 3.1%. Major federal sponsors with increases in funding levels include Environmental Protection Agency (33.3%), Department of Defense (13.8%), Department of Education (9.6%), and NIH (5.8%). NIH, the university's largest federal sponsor, funded 802 awards totaling \$287.4M in FY2014- an increase over the 721 awards for \$271.7M received in FY2013. Federal sponsors showing decreases in award totals include National Science Foundation (-8.6%), Department of Energy (-8.4%),

In FY2014, Susan Galatowitsch, department head of Fisheries, Wildlife and Conservation Biology in CFANS, received

\$8.7 MILLION

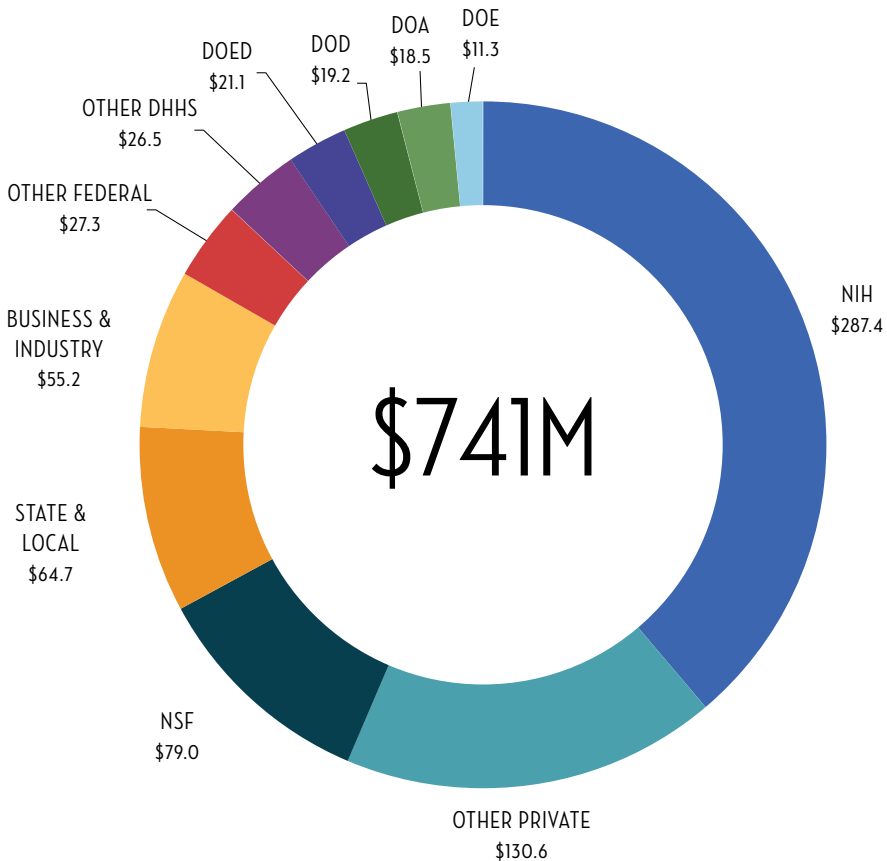
from the Legislative-Citizen Commission on Minnesota Resources to further discovery in the U's Aquatic Invasive Species Research Center.



National Labs (-8.3%), and Department of Agriculture (-2.5%). Despite the overall decrease in funding evidenced by the latter agencies, the university still managed an overall increase in new funding in part due to agencies like EPA, DOD, Education and NIH.

Another view of this same federal funding is to compare university totals with respect to the agency's total budgets. Using the American Association for the Advancement of Science[†] figures on federal funding for fiscal years 2013 and 2014 (the 2014 estimates were the latest estimates), we find that the budgets for federal R&D for the following agencies, DOD, DOE, HHS, NIH, NSF and USDA, **increased by 1.1%** from \$143,956M to \$145,518M. The University of Minnesota **increased its funding from these agencies by 2.4%** during the same period, from \$431.3M to \$441.8M.

FIGURE 1: AWARDS BY SOURCE



Dollar amounts represented in millions

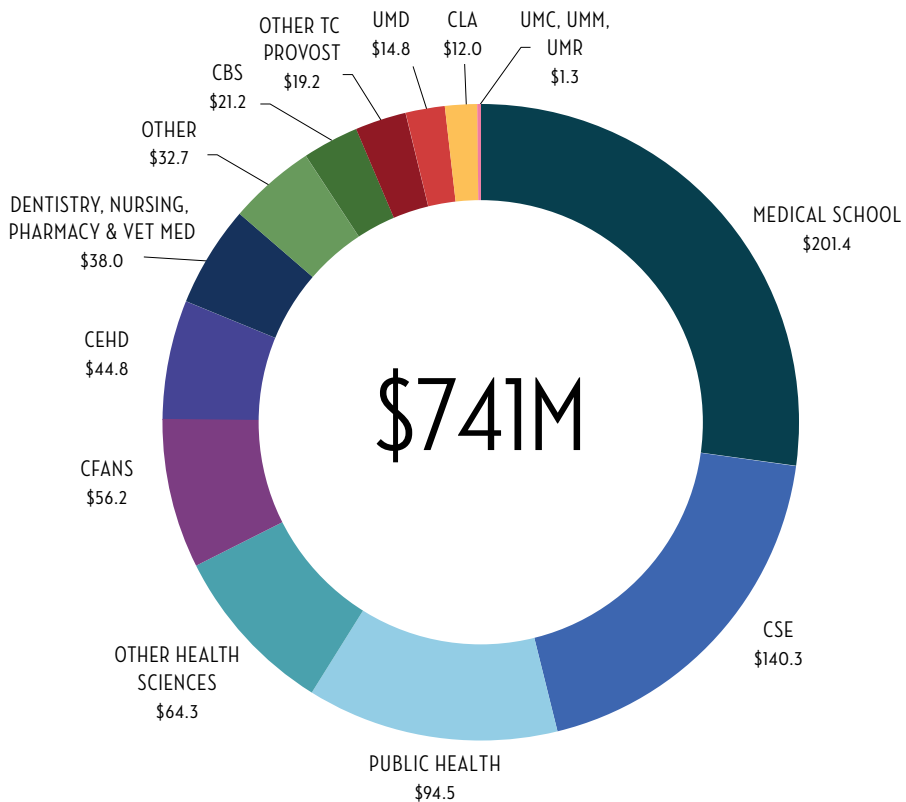
[†] <http://www.aaas.org/page/historical-trends-federal-rd> (Accessed: November 26, 2014)

There was no data for the Department of Education. For the remaining federal agencies (DOT, EPA, DOC, DHS, VA, NASA, Interior and Other), the budgets for R&D funding increased by 5.3% from \$18,260M to \$19,235M. The “Other Federal” for the University of Minnesota increased from \$24.67M to \$27.28M, or 10.6%.

In other words with regards to federal funds available, the U of M is doing about twice as well as expected in competing for these funds.

State of Minnesota funding increased 21.8% in FY2014. The increase in State funding was due to more awards (63 awards compared with 40 last year) and an increase in median award amount of \$1.7M this year compared with \$1.4M last year, primarily due to a large \$8.7M State of Minnesota LCCMR collaborative award noted earlier in this report. It is important to point out that this increase is apart from the

FIGURE 2: AWARDS BY COLLEGE & CAMPUS



Dollar amounts represented in millions

State's investment in Minnesota's Discovery, Research and Innovation Economy (MnDRIVE) and Stem Cell Institute, which are both being accounted for separately.

In a comparable way, Figure 2 illustrates how award funding is distributed within the university both by college and by system campus. The 6.8% annual increase in externally sponsored research funding overall translates into increased funding for more than half of U of M units identified in Figure 2. The College of Science and Engineering (CSE) tops the list in terms of increased amounts with \$22.2M more than FY2013 or an 18.8% increase. The Medical School showed the next greatest total increase with \$14.6M (7.9%). The Medical School and CSE together account for 46% of the university's total new awards in fiscal 2014 and both experienced increased levels in nearly all sponsor groups.

Other units with total funding levels higher than the previous year include the School of Public Health (SPH) with \$5.7M (or 6.4% increase), and College of Veterinary Medicine with \$5.5M (60.0%), and CFANS with \$2.9M (5.4%). The SPH increase was due in part to large NIH and Business & Industry awards to Dr. Jim Neaton for flu studies.

Year to year trends

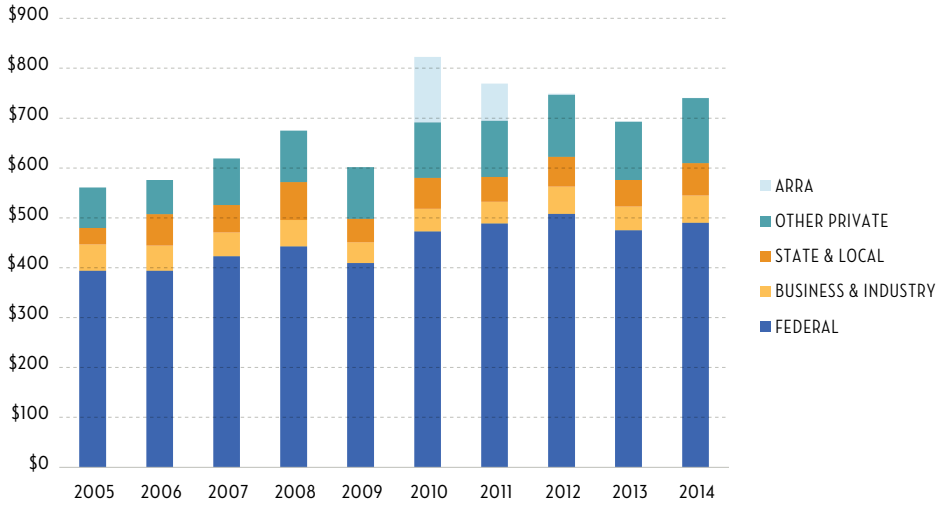
Figure 3 and Table 1 below summarize a ten year distribution trend of university externally sponsored research for the years FY2005 to FY2014. Despite some year-to-year variations in the proportions of funding and a leveling off over the five most recent years (Figure 3), **funding totals for FY2014 are at a level comparable to the maximal amount ever received by the institution (FY2012) excluding ARRA funding.**

Looking more deeply into this picture and juxtaposing federal activity with private sponsors (Table 1: Business & Industry and Other Private), private sponsors show a combined overall annual increase in FY2014 of \$20.6 million – whereas the federal funding increase is \$14.8 million. **Business & Industry funding is up \$7.5 million (15.7%) in 2014** and with fluctuating levels over the recent ten year period, this increase serves as a sign of reasonable stability. The Other Private group shows a more dramatic increase over the same ten years, due primarily to funding from University & College collaborations which in FY2014 increased \$10.8 million (21.6%). **This trend with regard to collaborations is worth noting and underscores the importance of the research priority**

“advance transdisciplinary work.”

Figure 4 shows the percent change in funding by college-campus during the same ten year period. Figure 4 reflects a positive percent change in total externally sponsored research funding for all colleges

FIGURE 3: AWARDS BY MAJOR SOURCE CATEGORY



Dollar amounts represented in millions

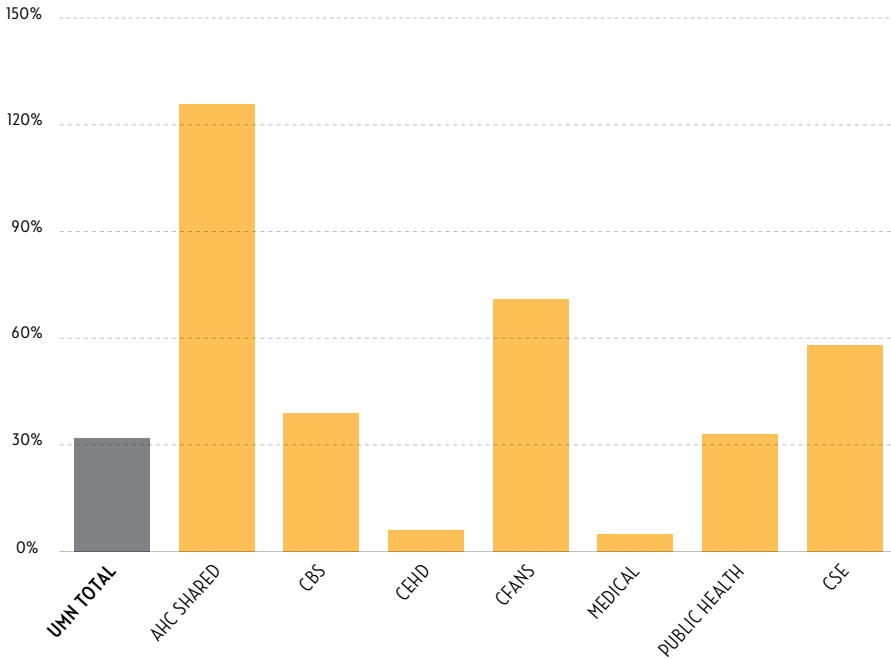
TABLE 1: AWARDS BY CATEGORY

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
ARRA	–	–	–	–	–	\$131.4	\$74.2	\$2.5	\$0.8	\$0.6
OTHER PRIVATE	\$81.6	\$68.8	\$93.6	\$103.2	\$104.1	\$111.3	\$112.8	\$123.9	\$116.8	\$130.1*
STATE & LOCAL	\$32.8	\$62.8	\$55.0	\$75.9	\$46.8	\$61.8	\$50.0	\$59.7	\$53.1	\$64.6
BUSINESS & INDUSTRY	\$52.7	\$50.7	\$47.8	\$52.8	\$41.7	\$45.5	\$43.6	\$55.2	\$47.6	\$55.2
FEDERAL	\$394.1	\$393.8	\$422.9	\$442.9	\$409.3	\$472.7	\$488.5	\$507.7	\$475.2	\$490.0
TOTAL	\$561.2	\$576.1	\$619.2	\$674.8	\$601.9	\$822.7	\$769.1	\$749.1	\$693.4	\$740.6

Dollar amounts represented in millions

* Includes \$60.9 million from “Universities and Colleges”, a 21.6% increase from previous year

FIGURE 4: AWARDS BY COLLEGE: 2014 VS 2005 PERCENT CHANGE

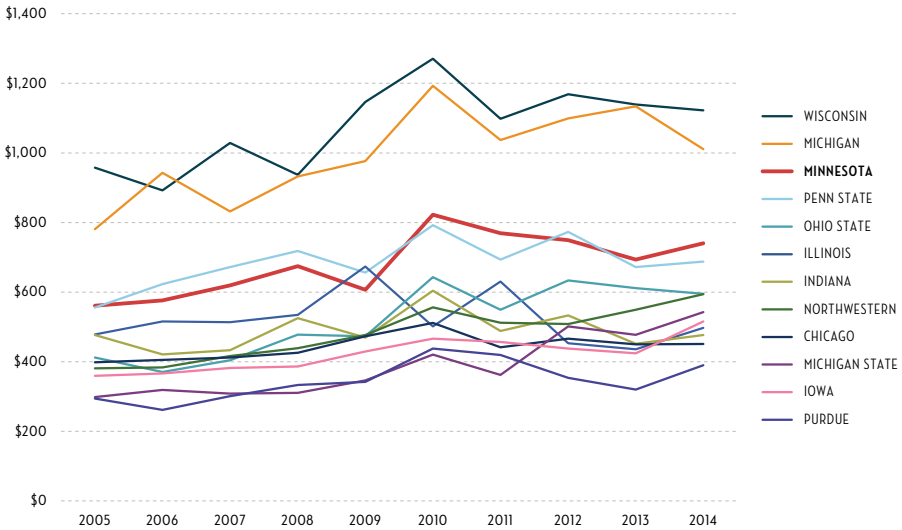


shown (those with at least \$15M in annual research funding). Figure 4 also shows the university’s two largest colleges (Medical School and CSE) experiencing modest growth in the period covered with more positive results occurring during FY2014 (Figure 2).

Figure 5 expands the ten year analysis outside of the university with the members of the Committee on Institutional Cooperation (CIC or more commonly referred to as the “Big Ten”). Within this group of universities, the U of M ranks third in annual externally sponsored research award totals for fiscal 2014. This has further significance because Wisconsin and Michigan show declines in their FY2014 annual award totals.

Note: Wisconsin, Michigan, Minnesota and Penn State are top ten ranked public universities in R&D spending (Table 3).

FIGURE 5: ANNUAL AWARDS BY CIC (“BIG 10”) INSTITUTION



Dollar amounts represented in millions and current dollars

Source: Big Ten-CIC database

Technology commercialization

The Office for Technology Commercialization continued its strong performance and productivity in FY2014. With a few exceptions, all metrics show growth over the previous fiscal year (Table 2). A record 15 startup companies were launched in 2014, topping the previous record set the year prior when 14 startups were spun out. The time period covered in Table 2 is significant measuring progress since the major transformation of the university’s technology commercialization model.

Table 2 also reflects the university meeting its State biennial appropriations performance goal of a 3% increase on invention disclosures between FY2013 and FY2014 (or 343 invention disclosures). This metric is one of the five accountability measures the university was tracking in FY2014 in order to receive one percent of its biennial appropriation from the State of Minnesota.

One area for future opportunity is non-Glaxo revenues. Having anticipated challenges related to the loss of Glaxo revenues due to the patent period ending for Ziagen, the OTC has put in place several new programs designed to significantly increase opportunities for entrepreneurship and technology commercialization. One such

program is MN-IP, also known as the Minnesota Innovation Partnerships program.

By the end of FY2014, 51 new sponsored research agreements had been signed through the MN-IP program- a program with national prominence among our peer institutions known as the “Minnesota Method.”


During 2014, the university expanded its MN-IP program taking it a step further and introducing “Try and Buy.” This new feature of the MN-IP program allows companies to determine the commercial potential behind existing university technologies before committing to a license. “Try and Buy” offers a fee-free “test run” to gauge the viability of an innovation under pre-negotiated licensing terms without incurring any U.S. patent costs until a patent is issued, with an added discount for Minnesota companies.

TABLE 2: UNIVERSITY TECHNOLOGY COMMERCIALIZATION DATA

	2008	2009	2010	2011	2012	2013	2014
INVENTION DISCLOSURES	217	244	255	250	321	331	343
MN-IP AGREEMENTS	-	-	-	-	14	41	51
NEW U.S. PATENT FILINGS	52	65	66	78	115	148	138
NEW LICENSES*	63	44	67	76	71	91	154
STARTUPS	2	3	8	9	12	14	15
CURRENT REVENUE GENERATING AGREEMENTS*	281	306	399	457	426	331	429
GROSS REVENUES	\$86.9	\$95.2	\$83.8	\$10.1	\$45.7	\$39.5	\$27.4
NON-GLAXO REVENUES	\$7.9	\$8.7	\$8.6	\$10.1	\$10.7	\$12.5	\$23.4
OUTGOING MATERIAL TRANSFER AGREEMENTS	67	106	171	271	313	281	288

Dollar amounts represented in millions

** New Licenses and Current Revenue Generating Agreements now include Express Licenses with revenue greater than \$1,000. This accounts for an increase of 56 agreements over FY2013.*



On December 11, 2014 the offices of the Vice President for Research and Technology Commercialization hosted an event to honor the accomplishments of outstanding members of the university research community.

285 INVENTORS

whose work had been licensed or patented during FY2012-2014 were recognized in addition to the presentation of the inaugural Innovation Awards.



NATIONAL & GLOBAL ANALYSIS

PEER COMPARISON

According to the Higher Education Research and Development (HERD) Survey data for FY2013, the university maintained its ninth (top ten) position among public research universities, posting over \$858 million in research expenditures (Table 3). The National Science Foundation's HERD Survey is the primary source of information on R&D expenditures at U.S. colleges and universities. It is completed by over 900 universities and colleges every year, producing the most accurate statistics possible on U.S. higher education R&D spending. Based on survey reporting requirements, the university's \$858 million represents research expenditures for the Twin Cities campus only. If all U of M campuses were reported together, the total would grow to \$882 million.

As is evidenced in Table 3, the university remains among an elite group of top public research universities. While there is no single indicator or composite number that accurately represents what an individual institution has done, can do, or will do, the HERD survey data does provide a credible and nationally accepted basis for comparison.

In addition, Table 3 also includes two other widely accepted and cited ranking systems, the Center for Measuring University Performance (CMUP) and the Academic Ranking of World Universities (ARWU). These systems follow a number of indicators that, taken together, give a reasonable approximation of accomplishment and strength relative to the best performing research institutions in the country and the world. Included in the CMUP performance measurement system are: Total Research, Federal Research, Endowment Assets, Annual Giving, National Academy Members, Faculty Awards, Doctorates Granted, Postdoctoral Appointees, and SAT/ACT range.

TABLE 3: TOP 20 INSTITUTIONS

	NSF/HERD SURVEY 2013		CMUP MEASURES 2013	ARWU (SHANGHAI) RANKINGS 2014		
	PUBLIC	EXPENDITURES	PUBLIC	WORLD	U.S.	U.S. PUBLIC
MICHIGAN	1	\$1,375,117	9 of 9	22	17	6
WASHINGTON	2	\$1,192,513	8 of 9	15	13	4
WISCONSIN	3	\$1,123,501	9 of 9	24	18	7
UC SAN DIEGO	4	\$1,075,554	8 of 9	14	12	3
UC SAN FRANCISCO*	5	\$1,042,841	7 of 8	18	16	5
NORTH CAROLINA	6	\$973,007	9 of 9	36	27	11
UCLA	7	\$966,659	9 of 9	12	10	2
PITTSBURGH	8	\$872,736	8 of 9	65	41	23
MINNESOTA– TWIN CITIES*	9	\$858,378	9 of 9	30	22	9
PENN STATE	10	\$837,880	8 of 9	58	37	20
TEXAS A&M	11	\$820,015	6 of 9	96	51	29
OHIO STATE	12	\$793,373	8 of 9	64	40	22
ILLINOIS	13	\$743,487	9 of 9	28	20	8
GEORGIA TECH	14	\$730,488	7 of 9	99	52	30
UC BERKELEY	15	\$727,002	9 of 9	4	4	1
UC DAVIS	16	\$725,734	5 of 9	55	36	19
TEXAS M.D. ANDERSON CANCER CENTER†	17	\$718,096	4 of 8	101-150	53-64	33
FLORIDA	18	\$695,063	9 of 9	78	44	24
TEXAS	19	\$634,132	9 of 9	39	28	12
ARIZONA	20	\$629,466	5 of 9	86	46	25

Dollar amounts represented in millions

† UC San Francisco and Texas M.D. Anderson Cancer Center are stand-alone medical schools without undergraduate programs. Therefore, the highest CMUP ranking they can obtain is 8 rather than 9 as they do not have SAT scores for consideration.

* Total expenditures for all U of M campuses: \$882M

Source: National Science Foundation's HERD Survey <http://www.nsf.gov/statistics/srvyherd/>

A notable accomplishment

The 2013 CMUP rankings indicate that the university has made an impressive move into the top group of public research universities. Since this ranking system has been in existence, the university has never been in group one, always in the second tier or group two. This achievement means the U of M **for the first time** in its history, is part of a distinguished group of universities that **rank in the top 25 on all nine indicators (“9 of 9”)** that CMUP has determined gives a reasonable approximation of the institution’s research performance, accomplishment and strength.

THE COST OF UNIVERSITY RESEARCH

A growing and significant portion of the University of Minnesota’s total R&D expenditures (Table 3 UMN-all campuses) is the institution’s \$248 million spending of its own funds. Increased use of internal funding of research is a national trend at all research institutions. The illustration below shows how much of the University of Minnesota’s \$882 million total R&D spend is born by the institution and further identifies this funding as what is voluntary and what is not.

Institutional funds—university contributions and the subsidy

UMN 2013 HERD Survey Illustration (most current data available)

\$634 million = externally sponsored R&D spending (expenditures)

\$248 million = institutional R&D spending (**28%**)

\$882 million = total UMN R&D all campuses

Of the \$248 million institutional R&D spending:

\$175 million = institutionally financed research (**71%**)

\$73 million = institutional subsidy of research (**29%**)

Of the \$73 million (29% of institutional spending) which is subsidized:

\$23 million = voluntary subsidy/cost sharing

\$50 million = involuntary subsidy unrecovered indirect costs

Compare with 2012 *National* Institutional Funds HERD R&D Totals[†]
(most current data available)

[†] Council on Government Relations (COGR) June 2014 “Finances of Research Universities”

Of the \$13.7 billion national institutional R&D spending (over 20% of all research expenditures):

\$7.7 billion = institutionally financed research (**56%**)

\$5.9 billion = institutional subsidy of research (**44%**)

Of the \$5.9 billion (44%) which is subsidized:

\$1.3 billion = voluntary subsidy/cost sharing

\$4.6 billion = involuntary subsidy unrecovered indirect costs

From this illustration, you can see the UMN varies significantly from national totals in both categories of institutionally financed research and subsidy of research. Two key questions to be examined are: Why is the U of M rate of institutional funding higher than the national average and what is the ROI on our institutionally financed research? Answers to these questions are currently under analysis and will be discussed over the year as a part of a broader leadership discussion.

OPPORTUNITIES

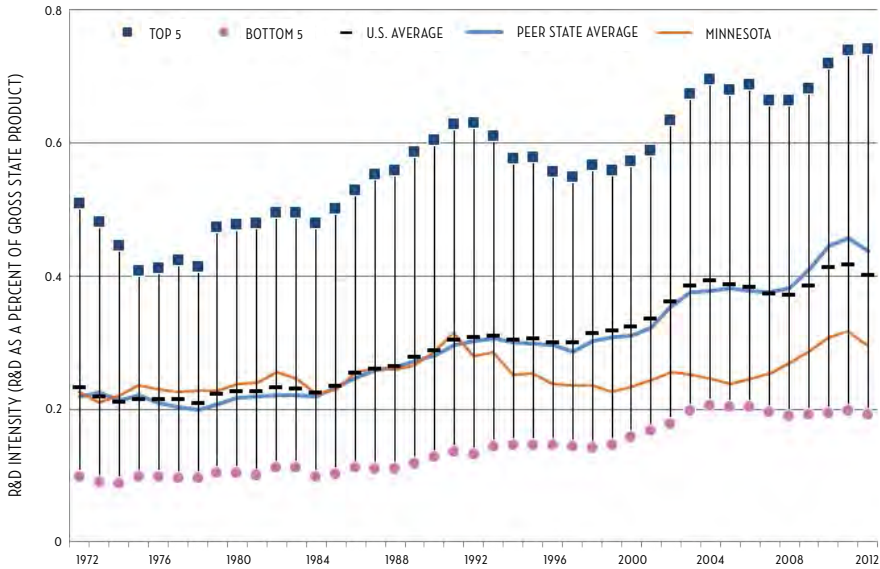
INVESTING IN INNOVATION

Back in December 2006 and as a part of the Board of Regents' annual status of research report, the Vice President for Research presented a strategic assessment titled, "Long Gone Lake Wobegon?" The focus of that report was on the state of investments in university research, placing University of Minnesota trends in a comparative light. Evidence at that time indicated a significant structural slowdown in the growth of funding for academic R&D performed by the University of Minnesota, reaching a point where the university had lost considerable ground and was no longer above average compared with its peers.

Figure 6 is an updated view of the same data. While Minnesota's academic research intensity has grown over the long run, **it is now well below the U.S. average and the average of the states hosting the peer universities.** By 2012 the U.S. average state academic research intensity had grown to 0.40 while the average for the states hosting the peer universities was a little higher, 0.44. In 2012 Minnesota's academic research intensity was just 0.30, precisely the same level of research investment intensity it had over two decades earlier in 1991. Minnesota resumed growing its academic research intensity in 2005 but has considerable catching up to do. In fact, over the past decade Minnesota has gained little ground relative to the top performing states in this regard. **In 2000 the average academic research intensity for the top five performing states was 2.43 times greater than the corresponding Minnesota ratio; by 2012 the ratio for the top performers was 2.51 times larger than Minnesota's.**

The encouraging sign is that this ratio is increasing for Minnesota, but in light of developments in the United States and elsewhere in the world, the state will need to continue to increase its investment in academic R&D if it is to regain the considerable ground it has lost over the past several decades.

FIGURE 6: TRENDS OF ACADEMIC R&D INTENSITIES, 1972-2012



Source: Bureau of Economic Analysis (2013). National Science Foundation & National Center for Educational Statistics (various years).

The response will need to be a combination of short term and long term actions by the university and its key partners like the state that focus on incentives for increased investment in innovation. An action already taken and not yet represented in these data is the State of Minnesota’s MnDRIVE commitment.

MnDRIVE

Minnesota’s Discovery, Research and Innovation Economy

Through a landmark partnership between the University of Minnesota, the corporate community and the state, U researchers and industry partners are working to solve grand challenges across the globe.

In 2013, the Minnesota Legislature made a \$36 million investment in four university research areas to address issues of societal impact: robotics, sensors and advanced manufacturing; global food ventures; advancing industry, conserving our environment; and discoveries and treatments for brain conditions.

One year later, more than 75 external partners are supporting MnDRIVE research, 340 researchers are collaborating on 120 projects, 111 faculty, students and staff have been hired, and 21 patents and licenses based on MnDRIVE discoveries have been submitted.

Notable early successes in the research areas include:

- Robotics, sensors and advanced manufacturing constructed a 4,300 sq. ft. robotics laboratory in Nils Hasselmo Hall to advance cutting-edge robotics research.
- Global food ventures formed partnerships with 58 Minnesota companies, including General Mills, Land O' Lakes and Cargill, to develop new technologies for a safer, more secure and more sustainable food supply.
- Advancing industry, conserving our environment started two field-based demonstration projects using microorganisms to clean up mining-impacted waters and agricultural runoff, developing novel technologies to improve water quality and environmental stewardship across Minnesota.
- Discoveries and treatments for brain conditions kicked off a 20-site clinical study funded by Boston Scientific to test a new device intended to curb the effects of Parkinson's disease, which affects nearly 1 million people in the U.S.

In support of MnDRIVE and its work to solve the world's most formidable global challenges, additional response in increased investment in academic R&D must be laid out clearly in the university's research strategic plan.

FIVE YEARS FORWARD

The university's research strategic plan

Funding strategic investments—"The 3% solution"

Five Years Forward through Collective Inspiration and Discovery represents the collective voice of the research community, the university's leadership and external partners. From the start, the strategic planning process has been collaborative, engaging a broad and diverse group of participants from throughout the university's five campuses and in the surrounding business and nonprofit communities.

Our plans fully embrace the commitment to excellence, innovation and community engagement that is critical to advancing the university's research mission. As such, the Vice President for Research has determined that in order to provide funding for research strategic initiatives, it will be necessary to reallocate and direct some of the Operations and Maintenance (O&M) funds provided to OVPR departments. The OVPR will retain 3% of its own O&M allocation in order to provide a one-time investment back into the research strategic plan. As a result, the OVPR provides assurance that it stands ready to fully invest and finance the plan the institution worked so hard to create.

As the implementation of the plan continues to unfold, the research strategic plan leadership has brought into the plan both short term and long term gains for the University including initiatives like the ones that follow which are already underway.

Enhancing excellence and advancing partnerships




In the past five years, the OVPR has invested \$108M in research funding across the university's colleges and campuses. With closer analysis, this means approximately \$20M a year goes directly to research and supporting resources to ensure that our scholars and innovators have the opportunity to advance knowledge in their fields, conduct critical, basic research and explore promising new ideas. These seed funds are also designed to leverage other investments and promote collaborations with business and industry partners. Examples of programs being leveraged are:

Grant-in-Aid

Grant-in-Aid program funds are awarded in the belief that the quality of faculty research or artistic endeavors is a major determinant of the overall vitality of the institution. The program promotes the research, scholarly and artistic activities of faculty and supports academic excellence throughout the university.

Support from the OVPR during the past five years includes approximately \$15M for 560 projects. This enables a significant amount of research to continue, and these awards run the gamut of disciplines—humanities, history, art, engineering and biology.



We're creating opportunities
to bring people together in new
ways, foster discoveries and
make our world a better place.

\$20 MILLION

in research funding is
awarded internally across the
U's colleges and campuses
by the OVPR each year.



Research infrastructure

The Research Infrastructure Reinvestment Program awards are investments in U of M research infrastructure designed to form strong partnerships and interdisciplinary alliances, especially between the health sciences and other disciplines.

While the OVPR helps to fund these awards, they also require matching funds from the colleges and departments as well demonstrating our joint commitment to supporting critical research. When added together, the OVPR and matching investment from the colleges and departments represents more than a \$38 million investment in 22 projects and equipment.

One of these projects will help the university to develop capacity in mass cytometry, a cutting-edge technology that allows for rapid analysis of individual cells at various stages of development. Mass cytometry is used in medical fields to test drugs and other treatments for life threatening diseases such as cancer and other chronic health conditions. Investments in mass cytometry bring the university up to speed with other leading institutions across the nation and help our researchers to translate their discoveries into real world solutions at a competitive pace. The U's initial investment also helped to leverage an additional \$400K award from the Minnesota Partnership for Biotechnology and Medical Genomics, creating a partnership with the Mayo Clinic.

Minnesota Futures program

The Minnesota Futures awards are large grants of approximately \$250K that support collaborative research, encourage faculty to advance new ideas and reach across academic disciplines. In five years of administering the program, there were many successes, including Professor Vipin Kumar's project using satellite imagery to track changes in forest cover that has helped scientists, policymakers and others around the world to better understand climate change. His project alone leveraged approximately \$13.2M in external funding; overall leveraging for Minnesota Futures was 1-to-7, or \$7 leveraged for every \$1 invested.

University of Minnesota Informatics Institute (UMII)

The UMII was formed in January 2014 to foster data-intensive research in agriculture, engineering, environment, design, art, health,

humanities, and social sciences and is supported in part by MnDRIVE. UMII awarded six Transdisciplinary Faculty Fellowships from across two campuses to provide leadership in transdisciplinary collaborative projects that involve informatics. UMII has also been partnering with local non-profits as well as global industries around data analytics.

Operational excellence: risk recalibration

For maximum benefit, these institutional investments must be paired with increased efficiencies and reduction of administrative burden on the researchers. These efforts also align with the President's long term goal of operational excellence.

Approximately 42% of faculty time is spent on non-research related administration. The OVPR has been working hard to make a big dent on areas of burden. The total financial impact of these initiatives as of the end of FY2014 is nearly \$9M and includes:

- Improved regulatory inspections for animal research, reducing duplication of efforts across units and resulting in a time savings of 686 hours
- Streamlined new research faculty training requirements by transitioning Responsible Conduct of Research I and II to single online format
- Eliminated RCR continuing education course requirement for faculty, resulting in 3,900 hours in total annual time savings
- Reduced administrative review and researcher certification for effort reporting by approximately 10,000 statements per year

Over the next year, the reduction in faculty administration focus will move into college and departmental activities. A pilot project aimed at reducing administrative burden from the ground up is underway at the University of Minnesota Duluth and the Twin Cities campus in the College of Science and Engineering.

The project will result in the development of a model to facilitate collaborative review of policies and procedures between faculty and staff and ultimately improve decision making related to risk recalibration and the reduction of administrative burden.

Accelerating transfer of knowledge for the public good



Economic development

The U of M is among the top research institutions in the nation and is a powerful economic engine for the state, creating \$8.6 billion in total economic impact annually. In renewed focus on economic development, the office of University Economic Development was established in 2014 as a result of the research strategic planning process that identified an increasing need for strengthening public-private partnering to address the economic development goals of the state and region. The UED serves as the public face for economic development at the U of M, helping external partners to connect with the resources, services and expertise at the university and its system campuses.

The University of Minnesota Foundation and the OVPR are now partnering on a comprehensive corporate engagement strategy that supports the university's strategic plan. Both the UMF and the OVPR are well-positioned to work as "facilitators," partnering to lead a university-wide corporate relations community (Corporate Engagement Workgroup) and ready to communicate a three-part vision for corporate engagement: connect, convene and collaborate.

Discovery Capital investment program

A new Discovery Capital investment program was launched in 2014 and provides seed funding to startup companies based on university technology to kick-start the transfer of university inventions to the market. Through Discovery Capital, startups that are currently developing their product or service may apply in two stages for up to \$700K in equity financing from Discovery Capital.

The Discovery Capital board of advisors determines which applicants to approve for funding based on factors including the U of M's potential return on investment, its interest in commercializing technology developed through federally-funded research and its desire to facilitate faculty involvement with early-stage companies. If selected, the company must secure a matching investment of an equal or greater amount from an outside investor.

Seeking a culture of serendipity



Recognizing that serendipity is no mere accident, the U of M's new five year strategic plan for research seeks to create a culture of serendipity.

Our world's grand challenges and most pressing problems span many disciplines. To create solutions, we need to bring together people from many different backgrounds who possess synergistic knowledge that, together, lead to impactful, comprehensive solutions.

Our goal is to try to create an environment at the university where creative conversations can occur in somewhat random and unpredictable ways. That is what we mean by "creating a culture of serendipity." We bring together groups of people from different backgrounds and competencies to think about large problems.

CONCLUSION

We see tremendous potential to refine and transform our research enterprise in a way that will create opportunities for faculty, students, staff and external partners to come together to address the most crucial issues that can have a profound impact on society.

By building upon the university's existing strengths, nurturing a collaborative research environment, and working with public and private partners, we will advance research outcomes that increase our competitive advantage, nationally and internationally, and generate new knowledge and discoveries that make our world a better place.

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UNIVERSITY OF MINNESOTA
Driven to Discover

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