2018 ANNUAL REPORT
RESEARCH AND TECHNOLOGY COMMERCIALIZATION

Office of the Vice President for Research

University of Minnesota
Driven to Discover*
The University of Minnesota’s research expenditures continue to rank it in the top ten among public universities nationwide. That’s a point of pride and proof of the breadth of contributions by our students, faculty, and staff—our influence on fields from biomedicine to public policy, from sustainability to social justice, from economics to animal husbandry, from education to engineering. We are entrusted with doing it all, and with an extraordinary commitment to research ethics.

Moreover, the intensity of our research activity is a barometer of the transformative experiences we offer to our students, at every level, and at all of our system campuses. As the only Carnegie R1 (Highest Research Activity) institution in Minnesota, we provide our students with access to state-of-the-art resources that let them engage outside the classroom, harnessing their diverse talents and perspectives to enhance the scope of our research mission. This year’s award activity—the measure of external support for University research—is also encouraging, with a 6.5% increase over last year.

As we look forward, the new agreement between the University and Fairview Health Services bodes well for increased research activity involving human health and clinical trials.

As our technology transfer statistics indicate, we continue to cultivate our engagement with business and industry, with a record number of new license deals (230) and Minnesota Innovation Partnership agreements (MN-IP; 86).

As the University undergoes a presidential transition, the Office of the Vice President for Research is privileged to facilitate the efforts of University researchers as they pursue excellence in their endeavors.

Christopher J. Cramer
Vice President for Research
@VPRCramer on Twitter
## RESEARCH EXCELLENCE

- 4,650 faculty across five campuses
- Ranked 9th among public research institutions (NSF survey)
- More than 300 research, education, and outreach centers and institutes

## ECONOMIC IMPACT

- $1.2 billion economic impact from U of M research
- $948 million in systemwide research expenditures (2017)
- $407+ million in revenue generated from U of M inventions for Minnesota (2009-2018)

## INNOVATION

- Ranked 29th worldwide in the number of patents granted to universities (2017)
- 230 new technology licenses executed (2018)
- Three U of M startup companies transitioned ownership: Calyxt became publicly traded, Medication Management and Flipgrid were acquired by larger companies (2018)
RESEARCH HIGHLIGHTS

A U of M technology for non-invasive jaw fracture management, Minne Ties Agile MMF, won a Silver Award from the Medical Design Excellence Awards.

Three U of M faculty were awarded Guggenheim Fellowships in 2018: Carl Elliott, Medical School, Center for Bioethics; Christy Haynes, College of Science and Engineering, Chemistry; and, Chris Larson, College of Liberal Arts, Art.

Ana Forcinito, College of Liberal Arts, Spanish and Portuguese Studies, won the 2018 Literary Prize by Casa de Las Americas for her book on Latin American Women’s Cinema.

The Institute on the Environment was recognized as one of five exemplary projects in the W.K. Kellogg Foundation Community Engagement Scholarship Awards.

Representatives from U-Spatial and U of M GIS experts in the colleges of Liberal Arts and Design were featured presenters at the international 2018 Esri User Conference.

TECHNOLOGY COMMERCIALIZATION

University of Minnesota Technology Commercialization facilitates the transfer of University research to licensee companies for the development of new products and services that benefit the public good, foster economic growth, and generate revenue to support the University’s mission. The U of M holds more than 900 issued patents and 1,800 current licenses.

<table>
<thead>
<tr>
<th>Year</th>
<th>New Licenses*</th>
<th>Gross Revenues</th>
<th>MN-IP Sponsored Research Commitments</th>
<th>Startup Companies</th>
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<tr>
<td>2014</td>
<td>154</td>
<td>$27.4</td>
<td>$4.3</td>
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</tr>
<tr>
<td>2018</td>
<td>230</td>
<td>$16.1</td>
<td>$21.3</td>
<td>13</td>
</tr>
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</table>

Dollar amounts represented in millions
Technology Commercialization, InfoEd System; UMN Enterprise Financial System
* Updated in FY2014 to include express licenses with revenue greater than $1,000; FY2015 includes 94 licenses for FAST technology, spun out that year as FastBridge Learning.
University of Minnesota researchers competed for and won $793 million in research awards in FY2018.

**BY SOURCE** FY2018

Federal awards comprised 62% of the research portfolio, including awards from the National Institutes of Health (NIH) and National Science Foundation (NSF). Agencies in the Federal: Other category include agriculture ($32.1M), defense ($26.2M), energy ($21.9M), and education ($14.5M).

BY RECIPIENT (College/Campus) FY2018

The University’s medical and health sciences research received 51% of awards in FY2018. Health Sciences represents the School of Public Health ($63.9M), four other colleges, and shared centers within the Academic Health Center (AHC).

**BY SOURCE** FY2009–2018

In FY2018, external awards grew by 6.5% year-over-year to $793M, a record level when federal stimulus funds are excluded.

See more U of M research statistics: research.umn.edu/statistics
DISCOVERIES & INNOVATION

CLINICAL AND TRANSLATIONAL SCIENCE INSTITUTE

The University of Minnesota's Clinical and Translational Science Institute (CTSI) was awarded $42.6 million in renewed funding from the National Institutes of Health (NIH) through the National Center for Advancing Translational Sciences' Clinical and Translational Science Award (CTSA) program. CTSA funding supports programs that help clinical and translational researchers and professionals across the University to accelerate their discoveries and collaborate with colleagues throughout the state to address health challenges and expand medical research.

Lead researcher: Bruce Blazar, Office of Academic Clinical Affairs, and Pediatrics, Medical School

AMMONIA SYNTHESIS FROM WIND ENERGY

With a $2.6 million grant from the US Department of Energy’s (DOE) ARPA-E agency, the U of M is leading a project to develop a small-scale ammonia synthesis system using water and air, powered by wind energy. The system increases efficiency by absorbing ammonia at modest pressures as soon as it is formed. In turn, stored ammonia can be used for fertilizer, fuel, and as energy for an electrical grid, creating a renewable and local source of energy for farms and other businesses. The U of M’s West Central Research and Outreach Center (WCROC) in Morris, MN serves as a demonstration site, and the research builds on earlier work funded by the University and by the state’s Environment and Natural Resources Trust Fund, administered through the Legislative-Citizen Commission on Minnesota Resources.

Lead researchers: Alon McCormick and Ed Cussler Jr., Chemical Engineering and Materials Science (CEMS), College of Science and Engineering, with Paul Dauenhauer and Prodromos Daoutidis (also CEMS), Mike Reese (WCROC, College of Food, Agricultural, and Natural Resource Sciences), and collaborators at Proton OnSite (Connecticut) and the National Renewable Energy Laboratory (NREL)
FINDING NEW THERAPIES FOR ALCOHOL USE DISORDER

The high prevalence of alcohol use disorder and lack of effective treatments makes developing new therapies a public health priority. The U of M’s Mark Thomas, Wei Chen, and Xiao-Hong Zhu are working with Mitsubishi Tanabe Pharma to better understand the changes in neural circuits that underlie persistent alcohol-induced changes in behavior. The project combines an animal model with sophisticated whole-brain fMRI imaging to create a baseline of knowledge of how brain cell dynamics change during specific phases of addiction. Understanding these changes will provide new targets for therapeutic intervention and a means to evaluate whether these targets are engaged by new pharmacotherapies.

Lead researcher: Mark Thomas, Neuroscience, Medical School

CENTER FOR COLLABORATIVE RESEARCH AT CROOKSTON

The Office of the Vice President for Research (OVPR) supported the construction of a new Center for Collaborative Research (CCR) on the University of Minnesota Crookston campus. The new center, which allows UMN Crookston faculty, staff, and students to conduct research in chemistry, microbiology, and molecular and cellular biology in one place, will encourage new collaborations, provide better access to shared equipment, and support much-needed laboratory space vital to faculty research. OVPR provided a 2017 Research Infrastructure Investment Award of $288,361, matched one-to-one by UMN Crookston for a total of $576,722 in funding.

Lead researchers: Venugopal Mukku and Timothy Dudley, Math, Science, and Technology, with Anthony Schroeder and Karl Anderson, (also Math, Science, and Technology), University of Minnesota Crookston

SUPPORTING TEACHERS WITH RESEARCH-BASED INTERVENTIONS

U of M professor Clayton Cook, along with colleagues from the University of Washington, received two grants from the federal Institute of Education Sciences (IES) to develop and evaluate teacher intervention methods. Cook is lead principal investigator (PI) on a $1.4 million three-year project to help elementary educators to adopt and deliver evidence-based classroom practices (EBPs) to better meet the social, emotional, and behavioral needs of students. Cook is PI on the second project, a four-year, $1.4 million project to pilot test a dropout prevention strategy for 9th grade students as they transition into high school.

Lead researcher: Clayton Cook, Educational Psychology, College of Education and Human Development