INSPIRED DISCOVERIES

RESEARCH REPORT

2017

University of Idaho
Office of Research and
Economic Development

Photos of IRIC Building: Sean Airhart, NBBJ Design, Seattle

RESEARCH: INSPIRED, INTEGRATIVE, RESPONSIVE

A MESSAGE FROM JANET E. NELSON, VPR

Joining the University of Idaho as Vice President for Research and Economic Development last year offered me the opportunity of a lifetime. Every day I get a firsthand look at the leading-edge scholarship and the exciting research that contributes to fulfilling our land-grant mission. Every day I get to know the men and women who make that success happen.

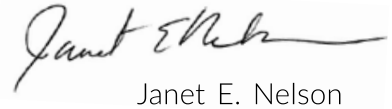
The breadth and depth of our research enterprise, and the creativity to which we are committed, are constant sources of inspiration. Vandal faculty are taking a brave and bold approach to the complex problems and critical issues that face Idaho and the world. We're leaders in fire science, in alternative energy, in cybersecurity challenges, in complex modeling and so much more.

Interdisciplinary research is increasingly a driver of our success at UI. In January, we opened the Integrated Research and Innovation Center (IRIC) in Moscow. With over 20 dynamic projects ranging from the Center for Modeling Complex Interactions, to brain-inspired autonomous navigation, to potato cyst nematode research, the IRIC is home to projects that transcend traditional academic boundaries.

This was the inaugural year of the Vandal Ideas Project (VIP): Innovate program. Our Polymorphic Games design studio and the "Visualizing Science" project that debuted at the Prichard Art Gallery in downtown Moscow are but two notable examples of outcomes of this internal investment program.

That expertise translates into our highest research success to date. As the state's only R2 "Higher Research Activity" institution according to the Carnegie Classification, we passed an important threshold with $102 million in annual research expenditures for fiscal year 2016 as reported to the National Science Foundation's Higher Education Research and Development (HERD) Survey. While that is an important milestone, it is more than a dollar figure. Every dollar represents determined effort, thoughtful creativity, and a consistent commitment to the hard but rewarding work of discovery and innovation.

You will see more examples of that success highlighted in this report. The achievements described here are worthy of celebration. They also make me very optimistic for the future of Vandal excellence in research, scholarship and creative activity.



Janet E. Nelson
Vice President for Research
and Economic Development

INSPIRING THE ART OF SCIENCE

Art inspired by science. That is the core of Visualizing Science, a $40,000 internal grant shared by seven interdisciplinary teams of scientists and artists—and the first year of an ongoing investment in UI's own people.

Each team was comprised of a scientist and an artist.

The goal was to show the science through art.

The outcome? Hundreds of 3-D printed aphids hanging in beautifully complex swarms. A children's book explaining the complexities of evolutionary biology through endearing characters. Even a human-size "robot" built to replicate the powerful jumping motion of some animals.

"It's really informative for scientists to learn how involved the research of creative activity is. It's also fascinating for them to articulate what they do and to think about it in visual terms," said Sally Machlis, a professor in both the College of Education, Health and Human Sciences and the College of Art and Architecture and co-principal investigator. Roger Rowley, director of the UI Prichard Art Gallery is also a co-principal investigator.

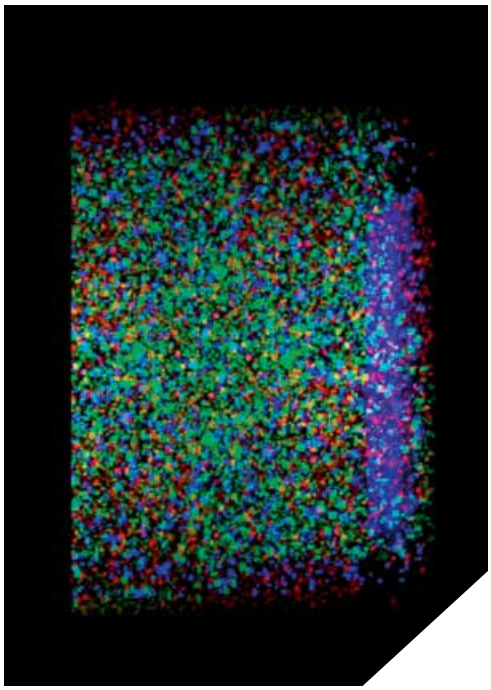
The internal grant is the first of an ongoing program deemed the Vandal Ideas Project. The program is designed to give funding to interdisciplinary groups of researchers and staff to tackle projects on a particular theme.

As part of the *Abundant* installation, this piece uses aphids to represent the one and the many to interpret the roles of insects in the human food system.

Team: Delphine Keim, Sally Graves Machlis and Sanford Eigenbrode.

Nebulous employs 3-D printing to interpret the type of eye nerve damage some astronauts experience during space flight.

Team: J. Casey Doyle and Bryn Martin.



Threshold visually interprets the abstract information contained in complex mathematical equations.

Team: Mike Sonnichsen and Jennifer Johnson-Leung.

Photos by: Roger Rowley.

TRAINING CULTURALLY RESPONSIVE TEACHERS BENEFITS IDAHO

Sometimes research and scholarly work aren't developed in a laboratory and then given practical application. For Vanessa Anthony-Stevens, assistant professor in the College of Education, Health and Human Sciences, her work is being applied directly to Native American students in the form of bachelor's degrees to teach in Idaho's Native communities.

A $1.2 million grant from the Department of Education's Office of Indian Education supports 12 scholarships for the Indigenous Knowledge for Effective Education Program (IKEEP). The students will earn a bachelor's degree in K-12 education and participate in a three-week Indigenous Pedagogies Summer Institute focused on teaching in diverse settings.

UI collaborates with 10 tribes through a memorandum of understanding, and all students in the project will commit to returning to a tribal community to apply the teaching methods. The goal of the program is to educate teachers and to reflect the culture in which they will be teaching.

Specializing in culturally responsive teaching methods will benefit Idaho's youth as well as provide a rewarding career for the Vandal alumni engaged in the project.

RESEARCH IDENTIFIES NEW USES FOR YESTERDAY'S WASTE

Repurposing and reusing food, energy and water to sustain robust and resilient landscapes is being documented in a user-friendly tool to help food processors, dairies, farmers and others use the waste of other industries to benefit their own.

A nearly $3 million grant from the National Science Foundation allows UI researchers in the Center for Resilient Communities (CRC) to map these activities across the landscape and across industries. The goal is to identify points where pairing inputs of one industry to outputs of another could benefit all involved—for example, finding ways to reuse water from aquaculture to help irrigate fields.

"We are gathering data and gleaning information from our industry partners who are creating and potentially using the materials we identify. They live in the system, so they provide us with the realistic possibilities," said Andrew Kliskey, a professor in the College of Natural Resources and CRC co-director with Lilian Alessa, professor in the College of Art and Architecture.

COLLABORATIVE GRANT HELPS SOLVE NATIONAL CYBERSECURITY QUESTIONS

UI researchers received $2.1 million to develop new systems for protecting the nation's infrastructure from cyberattacks.

The statewide collaboration and partnership with cybersecurity leader Idaho National Laboratory (INL) benefited from an infusion from the Idaho State Board of Education, Higher Education Research Council's Idaho Global Entrepreneurial Mission (IGEM) program.

The team, including INL and the Center for Advanced Energy Studies (CAES) has four goals:

- Strengthen capacity
- Strengthen collaboration
- Foster technology transfer
- Strengthen and expand the workforce

The research and development will include key sectors of the economy including transportation, water supply and fundamental elements of the power grid.

"We are going to work with industry and other universities to develop products and build expertise to protect these vital systems," said Larry Stauffer, dean of the College of Engineering, and principle investigator on the project.

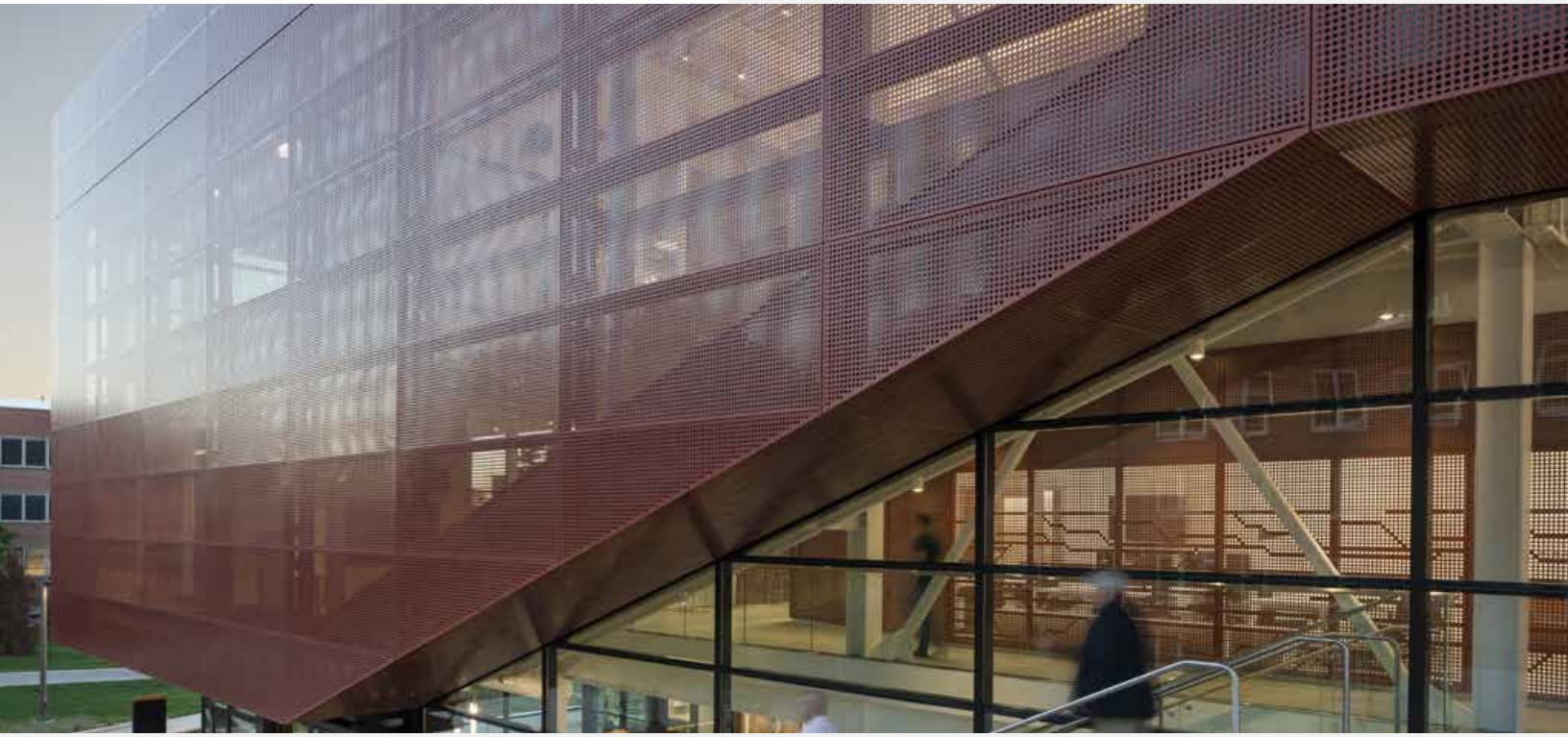
NEW OFFICE ADDRESSES RESEARCH NEEDS

With a focus on providing the best customer service to the researchers of the University of Idaho, the Office of Research and Economic Development has added new key players. Jeremy Tamsen and Jana Jones, in the Office of Technology, Innovation and Economic Development (TIED), will enhance and build strategic partnerships connecting UI resources, expertise, and assets to companies and communities.

TIED is tasked with promoting scholarly, research and creative activities around the state. These efforts are essential to fulfilling the research, outreach and engagement elements of UI's mission.

Jeremy Tamsen
Director of
Technology Transfer

Jana Jones
Executive Director of
Economic Development



NATIONAL SCIENCE FOUNDATION SEES MERIT IN UI SCHOLARS

Three UI students received Graduate Research Fellowships from the National Science Foundation to support their research in mathematics, engineering and geology. The trio increases the list to 16 UI students who have earned this prestigious award in the last decade. The program provides a stipend and tuition allowances for three years while the recipients pursue their graduate degrees.

Benjamin Anzis, a senior from Marshalltown, Iowa, is studying mathematics in the College of Science. Anzis is a member of the UI Honors Program and is a Goldwater Scholar. He will use his award to pursue his doctorate in algebraic geometry.

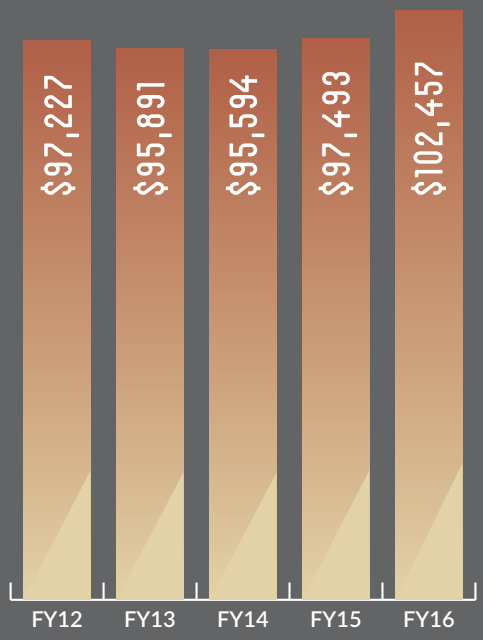
Isaac Curtis, originally from Potlatch, Idaho, is a master's student studying materials science and engineering in the College of Engineering. Curtis will use his award to pursue his doctorate. He is studying the use of modern computer vision and machine learning tools to unearth hidden trends in complex multidimensional data space.

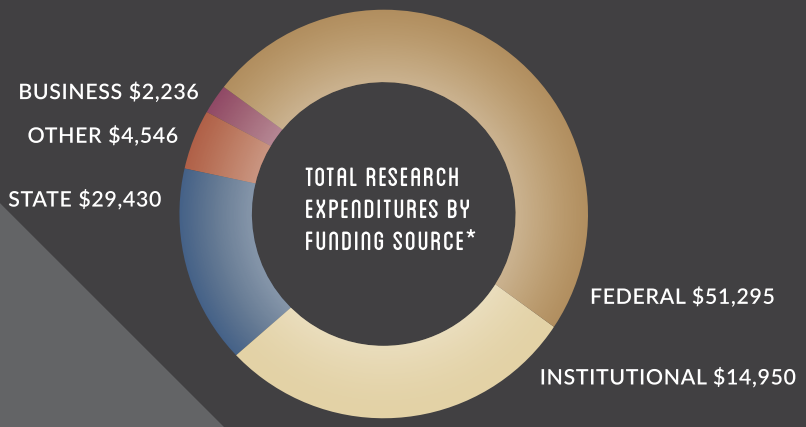
Emily White, of Hawthorne, California, is pursuing her doctorate in geology in the College of Science. She is studying the timing of uplift of the Andes using isotope geochemistry and basin analysis.

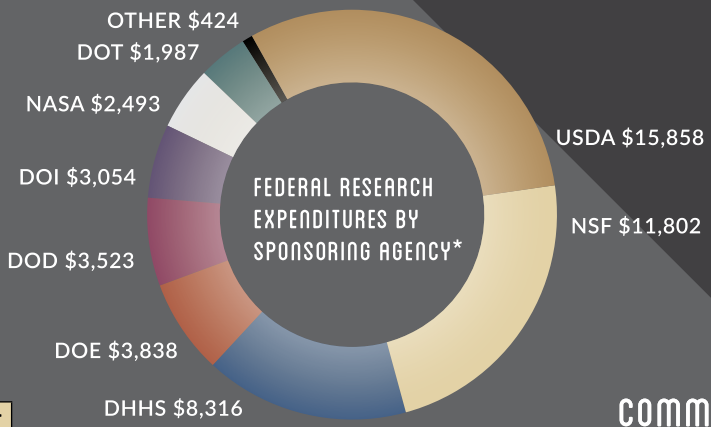
RESEARCH ACTIVITY AND EXPENDITURES

Expenditures as reported to the National Science Foundation's Higher Education Research and Development (HERD) Survey.

TOTAL RESEARCH EXPENDITURES*







SUMMARY OF SPONSORED RESEARCH ACTIVITY*

SPONSORED PROJECTS	NUMBER	AMOUNT
Proposals Submitted	912	$227,207
New Awards Received	433	$48,356
Other Actions	261	$33,638
TOTAL AWARDS	**694**	**$81,994**

TECHNOLOGY COMMERCIALIZATION

ACTIVITY	NUMBER
Invention Disclosures	17
Patent Applications	2
Issued Patents	3
Licenses	7

SPONSORED PROJECTS ACTIVITY BY COLLEGE*

SPONSORED PROJECTS	NUMBER OF AWARDS	AMOUNT OF AWARDS	NUMBER OF PROPOSALS	AMOUNT OF PROPOSALS	TOTAL EXPENSES
College of Agricultural & Life Sciences	225	$13,255	288	$54,616	$16,844
College of Letters, Arts & Social Sciences	25	$433	30	$1,768	$464
College of Art and Architecture	10	$669	20	$7,303	$1,454
College of Business & Economics	18	$2,971	21	$3,049	$93
College of Education	39	$11,663	41	$23,572	$11,097
College of Engineering	79	$8,392	129	$43,242	$7,546
College of Graduate Studies	2	$58	0	$0	$185
College of Law	3	$357	4	$469	$104
College of Natural Resources	126	$11,395	144	$26,191	$10,484
College of Science	74	$14,500	121	$39,781	$11,531
General Library	4	$101	6	$537	$72
Academic and Student Affairs	22	$1,006	8	$416	$939
University Outreach	22	$4,195	46	$14,155	$3,762
Office of Research & Economic Development	43	$12,897	53	$12,107	$11,571
WWAMI Med Educ/WI Reg Vet Medicine	2	$102	1	$1	$130
TOTAL	**694**	**$81,994**	**912**	**$227,207**	**$76,276**

*Dollars in thousands