

Center for Advanced Research Computing

Patrick Bridges

Director

2018 Annual Review Of Category 3 Research Centers/Institutes | [March 26, 2019](#)

Mission

To lead and grow the computational research community at UNM.

To fulfill our mission, we will:

- Provide access to high-end computing resources and associated infrastructure;
- Offer specialized expertise and technical support;
- Coordinate and collaborate with other UNM programs that support the community; and
- Grow the collaborative user community through education, workshops, and outreach events.

CY 2018 Goals And Status

- Sustainable funding models
 - **Grants and contracts:** Submitted two grant applications in 2018 for a total of \$963,209. One was funded, along with an application from late 2017. Including additional funding on EPSCoR and Anthropology awards, total 2018 new sponsored funding at CARC totaled \$1,255,826.
 - **Cost model:** Launched in early 2018 and has been well-received in the research community. A calculation tool on the website also allows researchers to easily determine budgetary needs for their grant applications.
- Revision of Computational Science and Engineering certificate
 - Received three applications for the CSE program, with 2 admitted for Spring 2019 and one admission deferred to later in 2019 at the student's request.
 - After meeting with stakeholders, a Form C curriculum revision was submitted to:
 - Support a wide range of computational science and engineering programs of study
 - Define a clear progression starting with MA471 for students focused on scientific computing
 - Allow for a new progression for students interested in big data
- Instituted CARC graduate internship program to train graduate students from across campus on best practices in using CARC systems to support their research
 - Supported students from Biology, Physics, Electrical Engineering, Mechanical Engineering
 - Seed funding from Graduate Studies, submitting NSF proposal in 2019 to grow program

Membership of Advisory Committee

Membership List

Patrick Bridges, Ph.D. - Director, CARC; Professor, Computer Science

Karl Benedict, Ph.D. - Associate Professor, Director of Research Data Services. College of University Libraries and Learning Sciences

Vince Calhoun, Ph.D. - Distinguished Professor, Electrical and Computer Engineering, Biology, Computer Science, Neurosciences, and Psychiatry; Executive Science Officer, The Mind Research Network

Jed Crandall, Ph.D. - Associate Professor, Computer Science

Jeremy Edwards, Ph.D. - Professor, Chemistry

Hua Guo, Ph.D. - Distinguished Professor, Department of Chemistry and Chemical Biology, and Department of Physics and Astronomy

Patricia Henning, Ph.D. - Associate Vice President for Research; Professor of Physics and Astronomy

Jane Lehr, Ph.D. - Professor, Electrical and Computer Engineering

Keith Lidke, Ph.D. - Associate Professor, Physics & Astronomy

Barbara McCrady, Ph.D. - Distinguished Professor, Psychology; Director, Center on Alcoholism, Substance Abuse, and Addictions (CASAA)

Monika Nitsche, Professor, Mathematics and Statistics

Brian Pietrewicz, M.B.A. - Interim Deputy CIO, Information Technologies

Andrea Polli, Ph.D. - Mesa Del Sol Endowed Chair of Digital Media Professor, Fine Arts and Engineering University of New Mexico Department of Art and Art History

Edl Schamiloglu, Ph.D. - Distinguished Professor, Electrical and Computer Engineering; Associate Dean for Research, School of Engineering

Gregory Taylor, Ph.D. - Director, Long Wavelength Array; Director, Center for Astrophysical Research and Technology; Professor, Department of Physics and Astronomy

Lee Taylor, Ph.D. - Associate Professor, Biology

Tom Turner, Ph.D. - Associate Dean for Research, Arts & Sciences and Professor, Biology

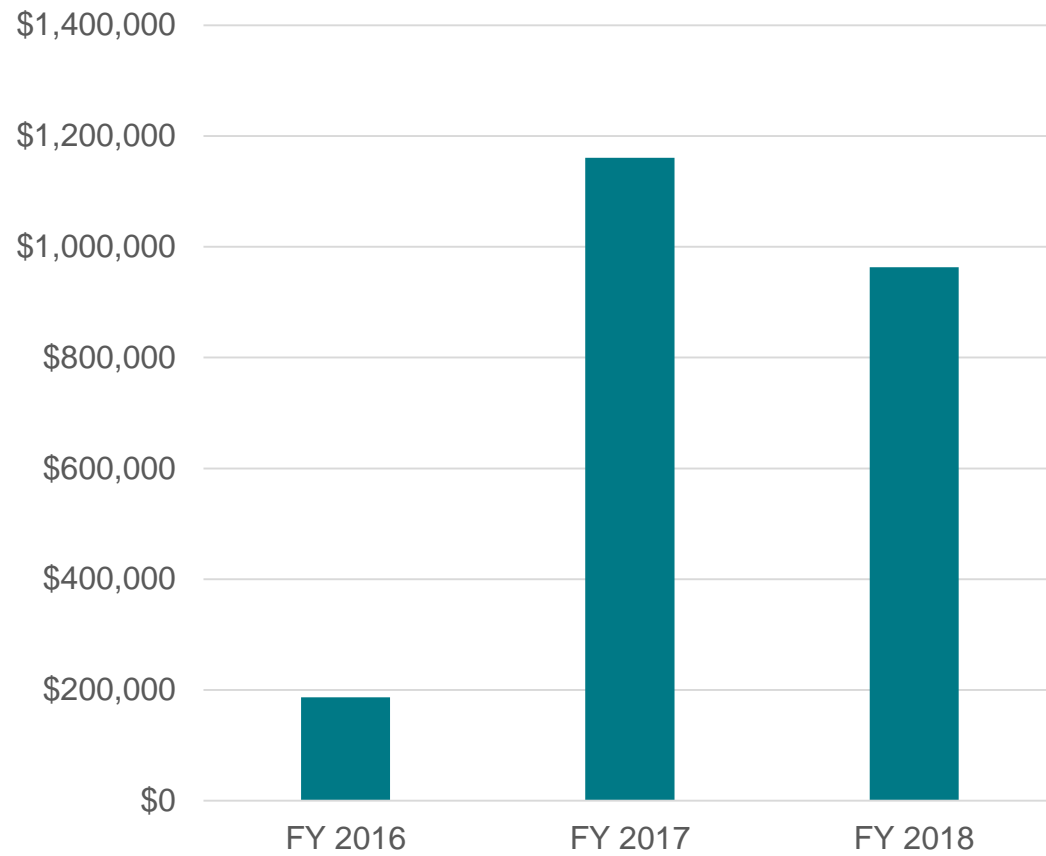
Date of CY2018 annual review: not held as of March 2019

CY 2018 Highlights

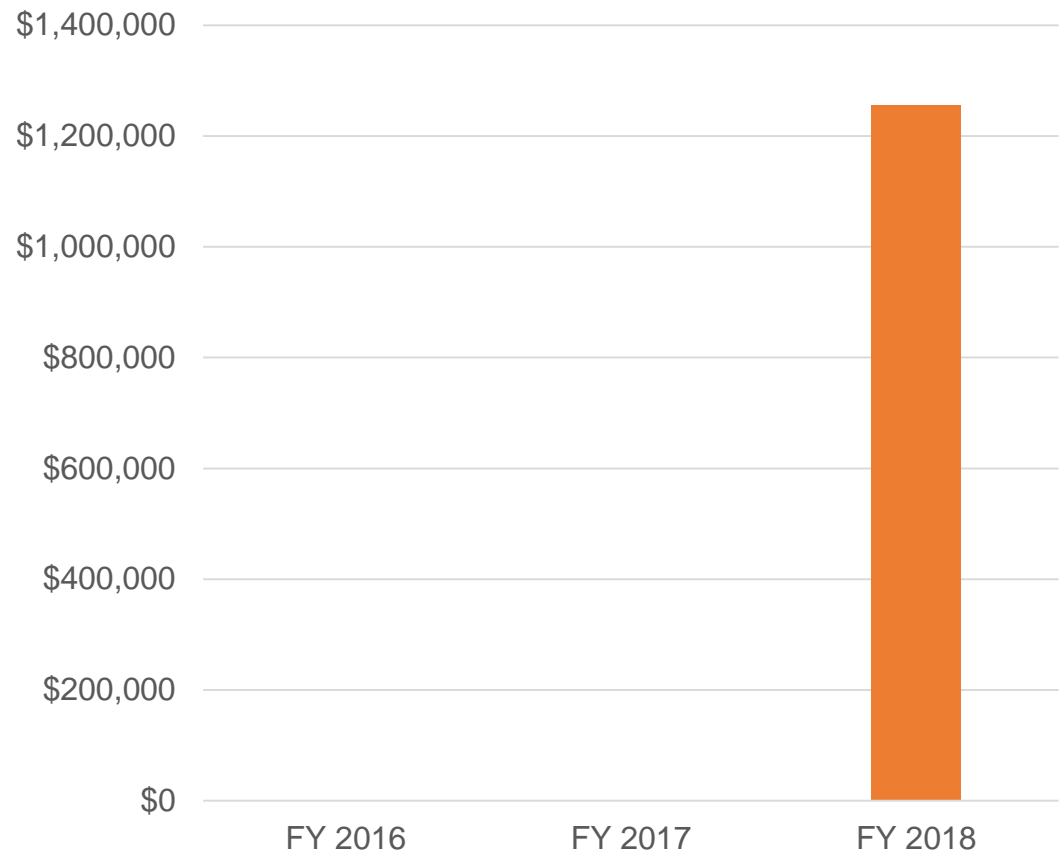
- After two years serving as Interim Director, Patrick Bridges was named director of the Center
- Implemented new storage system with University Libraries
- Hosted a table at UNM Day at the Roundhouse and delivered information packets to legislators' offices
- Hosted NM Supercomputing challenge student evaluations
- A featured research story on the CARC website on Heather Edgar's decedent database project was picked up by Forensics Magazine (online)
- Attended and displayed research at our booth at ACM/IEEE International Conference on Supercomputing

Proposals & Awards

Proposals



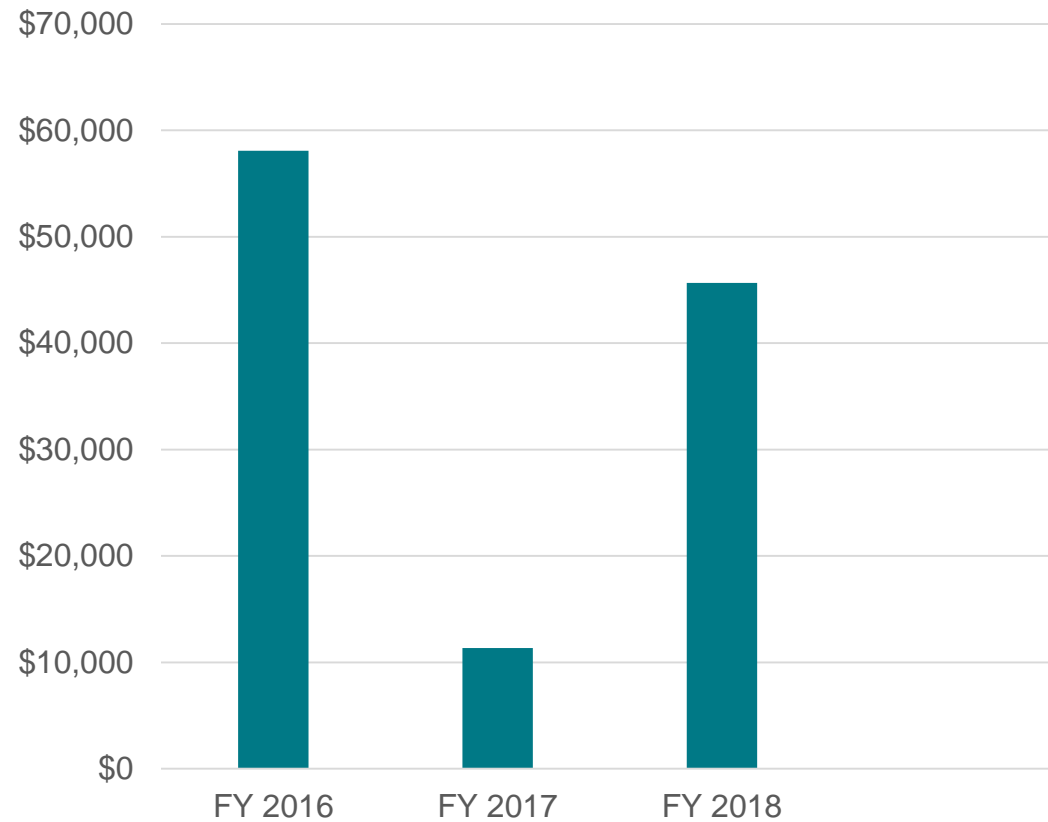
Awards



Research Expenditures and F&A

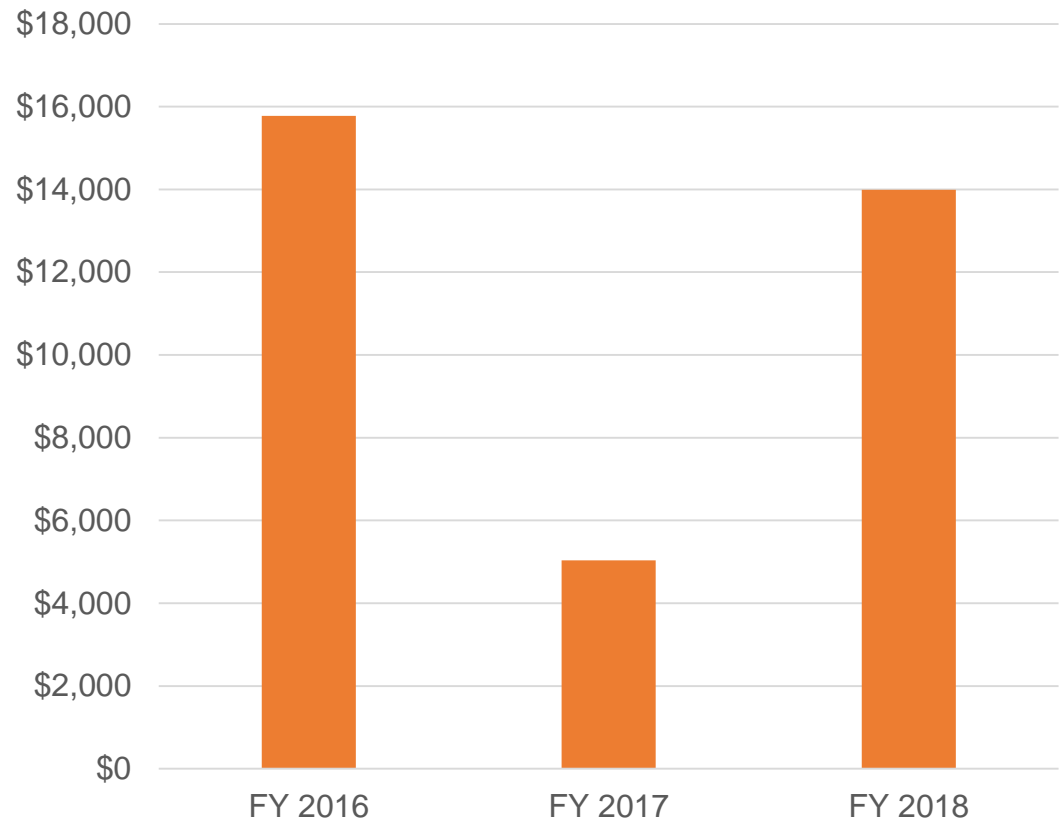
Expenditures

Total Research Expenditures for your Organization



F&A

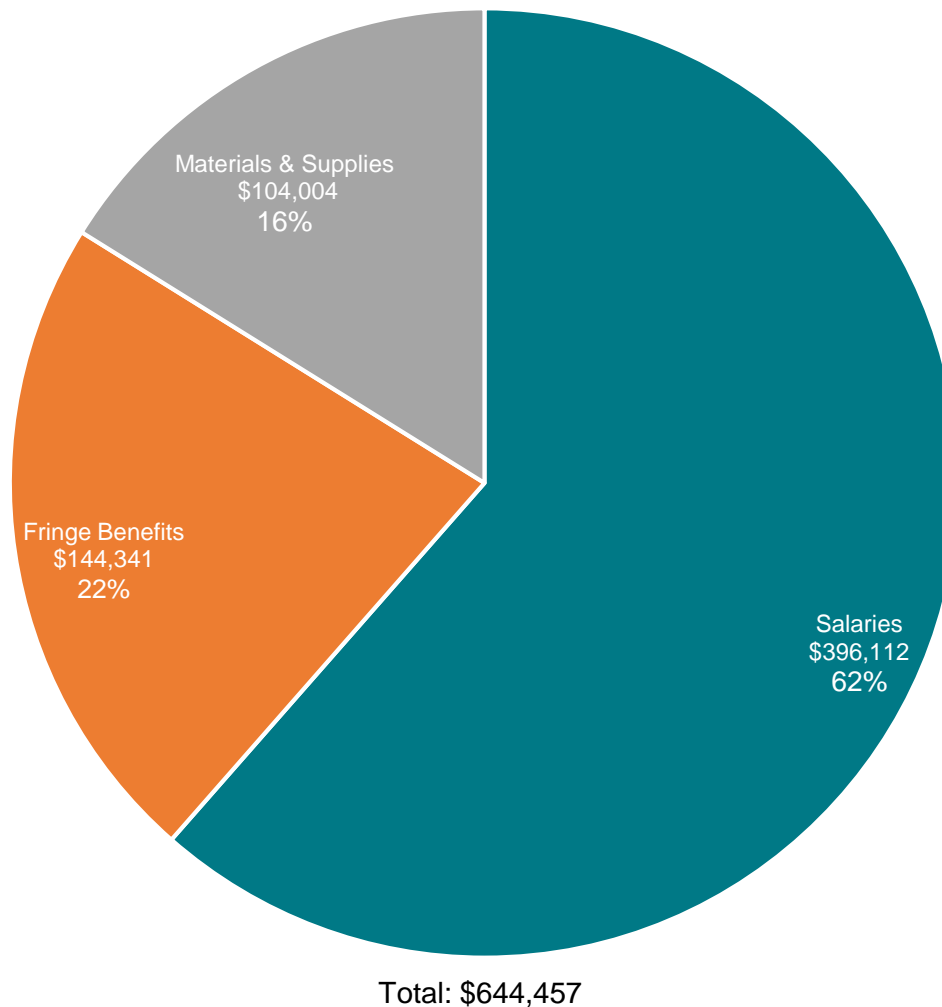
Total F&A for your Organization



FY 2018 Sources of Revenue

- Allocation \$668,000
- Reserves \$13,268.56

Center Expenditure Details



Research Center Impacts

- The Center is playing a major role in a project funded by the National Institutes of Justice, led by Heather Edgar. The project will create a national first database. De-identified whole body decedent CT scans, taken at the New Mexico Office of the Medical Investigator, will be added into a searchable database that will be available to researchers free of charge.
- With the addition of the 280-node/2240-core Wheeler capacity compute cluster in late 2017, we saw the amount of jobs finished and CPU hours provided more than doubled in 2018
 - 2017: 99, 679 Jobs Finished; 7.2M CPU Hours provided
 - 2018: 217,427 Jobs Finished; 15.4M CPU Hours provided

Return On Investment

- CARC supported 203 users and 75 PIs, with 217,427 jobs finished
- 33 publications in journals such as Nature Methods, Journal of Applied Physics, Financial Review, Chemical Physics, Computational Materials Science, Conservation Genetics, and Optica.
- Awards resulting in publications using CARC resources included funding from the National Science Foundation, National Institutes of Health, National Institute for Environmental Health Sciences, Institute for Space and Nuclear Power Studies, Department of Energy, and the European Research Council among others.

Support a broad range of computational research activities by the UNM community

Provide substantial computational resources to researchers free of charge

Expert user support staff

Graduate student ambassador training program

STRENGTHS

Aging systems and facilities

Understaffed to meet campus demand

Building with significant security, maintenance, and utilization challenges

Lack of support for research with specialized needs or that handle sensitive data

WEAKNESSES

Utilize CSE program to expand research computing expertise on campus

Computational science workforce demand

Research and Education Funding opportunities within NSF Harnessing the Data Revolution Big Idea calls

Increase collaboration with other computational units on campus (Libraries, IT)

External collaboration with Labs (SNL, LANL) and industry

OPPORTUNITIES

Staff loss to retirement, external competition

Major system or facilities failure

Decreasing price of cloud computing systems

THREATS



Looking Ahead To 2019

- Promote revised CSE program – outreach to affiliated faculty and departments, develop more specializations
- Develop collaborative research community through outreach, workshops and symposia
- Systems updates
 - An upgrade of CARC’s home directory storage systems will take place in April 2019, quotas will be implemented to avoid overuse
 - A new help ticket system will replace the old AIRS system
 - Resource monitoring tools have been implemented and are available online and displayed on a monitor in the CARC lobby
 - Jupyter notebooks, distributed MATLAB and debugging queues are forthcoming
- Significant grant/contract opportunities
 - Submitted NSF CyberTraining, NNSA MSIPP, HDR DSC grant proposals in early 2019
 - Starting to plan for future DOD DURIP and NSF MRI calls based on lessons being learned from NSF CICI funding
 - Multiple additional opportunities going forward: NSF IUSE:CUE, Potential Mid-scale Infrastructure Collaboration with RMACC, Network infrastructure opportunities with regional partners

Summary

- Made considerable progress on the immediate goals outlined in our strategic plan.
 - We completed a survey of users and have used that information to make decisions about new software and storage to be implemented in 2019.
 - User help documentation on our website has been completely overhauled to provide better resources to our community.
 - Engaged students and staff in departments to educate them to support their research and support CARC users
 - CSE certificate program requirements changed for a planned re-launch in Fall 2019.

- Engaged in major collaborative projects, strengthening cross-campus collaborations that increase center impact for the benefit of the UNM community.
 - Shared storage resource with University Libraries
 - Decedent Information Database with OMI and UNM Arts and Sciences,
 - Sponsored research with Libraries, IT, Psychology, and ECE on infrastructure for supporting research on sensitive data.