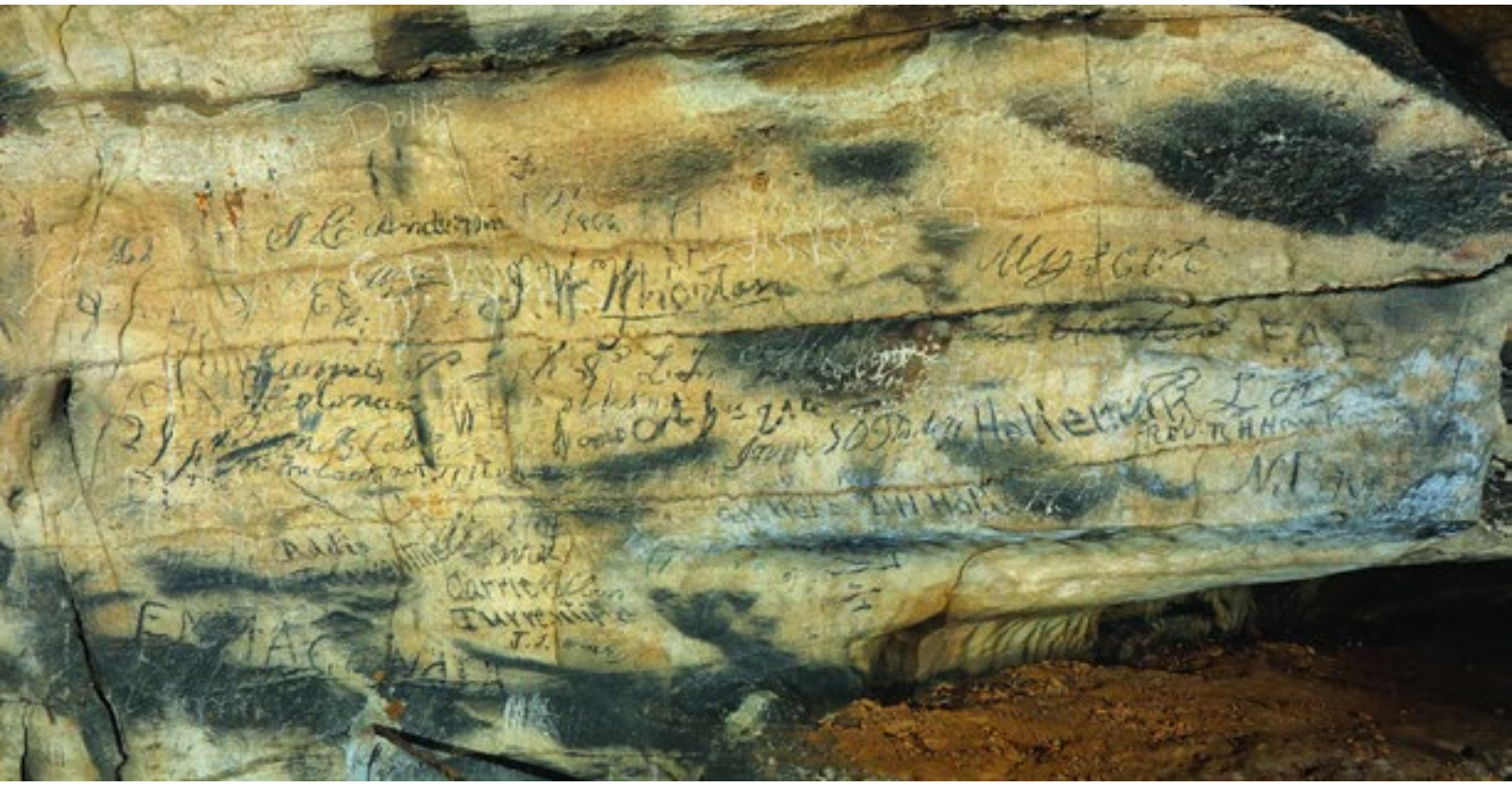
University of Tennessee
Office of Research & Engagement

Quarterly Research Activity Report
Q4 FY19

Cumulative for July 1, 2018 – June 30, 2019



Jan Simek, president emeritus of the University of Tennessee System and Distinguished Professor of Science in UT's Department of Anthropology, was part of a research team that worked to understand the nature and meaning of Cherokee inscriptions in Manitou Cave, Alabama. The inscriptions revealed evidence of secluded ceremonial activities at a time of crisis for the Cherokee, who were displaced from their ancestral lands and sent westward on the Trail of Tears in the 1830s.

THE UNIVERSITY OF
TENNESSEE
KNOXVILLE

OFFICE OF RESEARCH &
ENGAGEMENT

Message from the Interim Vice Chancellor for Research

The University of Tennessee research community had much to celebrate in fiscal year 2019, including seven National Science Foundation CAREER awards. The preliminary data for the fourth quarter of FY19 shows that the amount expended on research has remained the same year-over-year. We will continue to recognize and celebrate the research excellence of our talented faculty.

Proposal Submissions

Researchers at the University of Tennessee and the UT Space Institute submitted fewer proposals in fiscal year (FY) 2019 than in FY18. This 4% decrease in proposals submitted partially contributed to a 10% decrease in the dollar amount requested compared to last fiscal year.

Four colleges exhibited growth in proposals submitted and total dollar value requested in FY19. The College of Social Work submitted more proposals in FY19 than in the previous 10 fiscal years, resulting in a 76% increase in total amount requested over FY18. Similar dollar value increases were recorded for the College of Education, Health and Human Science with a 77% increase, and the College of Communication and Information with a 76% increase. The College of Law also increased their total requested amount to $298,946, the most it has requested in the last eight fiscal years.

Tickle College of Engineering requested the largest share—38%—of the total amount requested by UT. TCE was followed by the College of Arts and Sciences and UT Research Centers and Institutes requesting 26% and 15% of the total proposal amount respectively.

Awards Received

UT researchers received $140 million in external award obligations in FY19. This amount represents a 12% decrease when compared to FY18 and a 9% decrease when compared to the five-year average award amount received FY15-FY19. The overall 12% decrease in the FY19 award amount received was due to the 32%, or $7 million, drop in funds received from private profit funders and a 53%, or $12 million, drop in funds received from Tennessee local and state government. The award amount received from federal agencies remained stable compared to FY18 at $95 million. Award amount received from private non-profit sponsors increased by 57%, or $3 million.

Consistent with previous years, federal agencies continued to be the largest source of total award dollars, bringing in 68% of all obligations for FY19. Federal agencies were followed by private profit with 10%, Tennessee government with 7%, higher education institutions with 7%, and private non-profit with 6% of total award dollars.

Of the $95 million received from federal agencies, the largest award amount came from the Department of Energy at $49 million. It is worth noting that this is the largest award amount received from DOE in a given fiscal year. DOE was followed by funding from the NSF, which contributed $19.9 million to the total award amount received. It is critical to note that NSF funding has continued to decline with FY19 being the smallest award amount received from NSF in the last 10 fiscal years, a 3% decrease from FY18, and 24% and 40% decrease from the five and 10 year averages respectively.

In terms of the award amount composition by college, center, or institute, TCE represents 42%—the largest portion—of the total award amount in FY19. The next two units were A&S and RCI with 20% and 14% respectively. Nursing saw the largest growth among the colleges, with a 282% increase in FY19 compared to FY18. Social Work, EHHS, and RCI also increased funding in FY19 of 16% , 13%, and 13% respectively.

Expenditures

The current estimate of the FY19 total research expenditures indicates that they remained stable when compared to FY18. Most colleges and units saw slight to significant increases with the exception of RCIs (20% decrease) and Social Work (8% decrease). TCE accounted for 38% of expenditures, followed by A&S with 30%.

Federal research expenditures for FY19 were estimated at $119 million, increasing by 1% compared to FY18. Examining FREs further, the research expenditures funded by the Department of Defense were at their highest in FY19, or $13 million, compared to the previous five fiscal years. Along with DOD, UT expended 23% more in expenditures funded by the National Aeronautics and Space Administration compared to FY18. Of the $119 million in estimated FREs, expenditures funded by DOE represented 48% of the total FREs.

Notable Achievements

Researchers **Hollie Raynor**, professor of nutrition, and **Scott Crouter**, associate professor of exercise physiology, were awarded $2.8 million from the National Institutes of Health (NIH) to examine a potential precision medical treatment for obesity. In their project, “Translating basic habituation research to childhood obesity treatment,” Raynor and Crouter will explore if a behavior phenotype of slower habituation rates to food, can be utilized to identify people who benefit most from a limited variety prescription of food to treat obesity.

Mark Dean, Fisher Distinguished Professor; **James Plank,** professor; and **Garrett Rose,** associate professor in the Department of Electrical Engineering and Computer Science, received $1.5 million from the Air Force Research Laboratory for the project entitled "Design Approaches for Efficient Reconfigurable Neuromorphic Systems." This project seeks to develop and explore approaches to apply reconfigurable computing fabrics specifically tailored for neuromorphic computing.

Lisa Lindley, associate professor of nursing, secured $1.5 million from the National Institute of Nursing Research for her project "Effectiveness of concurrent care to improve pediatric and family outcomes at end of life." Lindley's project aims to create a nationally represented data set providing insight on children and adolescents with serious illnesses opting in to life-prolonging therapies while enrolled in hospice care or standard pediatric hospice care.

Seven UT faculty members received NSF Faculty Early Career Development (CAREER) awards in FY19. Four of the seven were from A&S and three from TCE:

- **Steven Abel**, assistant professor of chemical and biomolecular engineering, "Modeling the Physical Regulation of Immune Cell Activation"—$510,242
- **Tessa Burch-Smith**, assistant professor of biochemistry and cellular and molecular biology, "The role of chloroplast signaling in regulating plasmodesmata"—$818,867
- **Steven Johnston**, assistant professor of physics, "Advancing theory of Resonant Inelastic X-ray Scattering for materials in- and out-of-equilibrium"—$436,898
- **Jian Liu**, assistant professor of physics, "Engineering artificial oxide layers with hidden spin symmetry for drivable 2D quantum magnetism"—$708,299
- **Eric Wade**, assistant professor in the Department of Mechanical, Aerospace, and Biomedical Engineering, "A Closed-Loop Control Framework for the Treatment of Chronic Stroke"—$547,202
- **Sarah Werner**, assistant professor of microbiology, "Defining colonization mechanisms and functions of Streptomyces strains in root microbiomes"—$699,380
- **Mariya Zhuravleva**, assistant professor of materials science and engineering," Opening the Door to Emerging Functional Multicomponent Oxides via a Novel Crystal Growth Approach"—$601,369

Robert Nobles
Interim Vice Chancellor for Research

PROPOSALS, AWARDS, & R&D EXPENDITURES: FY19 Q1-Q4 vs FY18 Q1-Q4 *(Table 1)*

College/Center/Institute	Proposals Submitted				Awards Received				Estimated Total R&D Expenditures (HERD[1])	
	No.	% No. Incr. Over FY 18	Amount Requested	% $ Incr. Over FY 18	No.[3]	% No. Incr. Over FY 18	Amount Received	% $ Incr. Over FY 18	Amount Expended	% $ Incr. Over FY 18
College of Architecture & Design	5	-17%	$143,235	-61%	4	-33%	$223,473	-24%	$1,410,901	1%
College of Arts & Sciences	441	-10%	$143,056,533	0%	338	-12%	$27,783,528	-18%	$68,450,818	1%
Haslam College of Business	23	-23%	$2,514,665	-50%	21	-28%	$2,896,281	-23%	$13,916,258	9%
College of Communication & Information	26	8%	$8,837,581	76%	13	-19%	$1,738,002	-1%	$4,139,718	9%
College of Education, Health, & Human Sciences	103	24%	$48,320,373	77%	52	24%	$9,430,982	13%	$9,083,905	1%
Tickle College of Engineering	675	-1%	$205,816,419	-15%	583	0.5%	$58,491,600	-14%	$85,380,205	3.5%
College of Law	3	200%	$298,946	2235%	1	-50%	$12,802	0%	$2,509,781	6%
College of Nursing	26	0%	$10,227,460	-36%	18	157%	$2,987,857	282%	$2,284,884	41%
College of Social Work	50	35%	$29,484,816	76%	30	3.4%	$6,868,933	16%	$5,285,007	-8%
Research Centers & Institutes	274	-12%	$84,057,259	-40%	330	-12%	$19,163,343	13%	$27,486,663	-20%
UT Space Institute	54	-7%	$13,267,056	-1%	38	-2.6%	$3,629,140	-28%	$1,855,059	20%
Other[2]	14	-26%	$1,897,975	5%	35	9.4%	$6,676,785	-50%	$5,598,711	14%
Total	**1,694**	**-4%**	**$547,922,318**	**-10%**	**1,463**	**-5%**	**$139,902,725**	**-12%**	**$227,401,910**	**0%**

Notes

1. *HERD – The Higher Education Research and Development Survey, successor to the Survey of Research and Development Expenditures at Universities and Colleges, is the primary source of information on R&D expenditures at U.S. colleges and universities.*

2. *R&D expenditure data is collected from the "NSF Research Survey Estimate" report provided by UT IRIS Data Warehouse. The "NSF Research Survey Estimate" report provides an estimate of the R&D expenditures for UT colleges and research centers and institutes. This report does not contain expenditure data from the UT Research Foundation, which is included in the official NSF HERD survey during the submission of the survey. The expenditures data provided in the Office of Research & Engagement quarterly research activity report should be treated as an estimate reflecting trends for UT colleges and research centers and institutes only.*

3. *Other – This field captures any research proposals, awards, and expenditures not included in the categories above.*

4. *The Number of Awards Received represents the cumulative number of funding award increments. One project may receive multiple funding awards.*

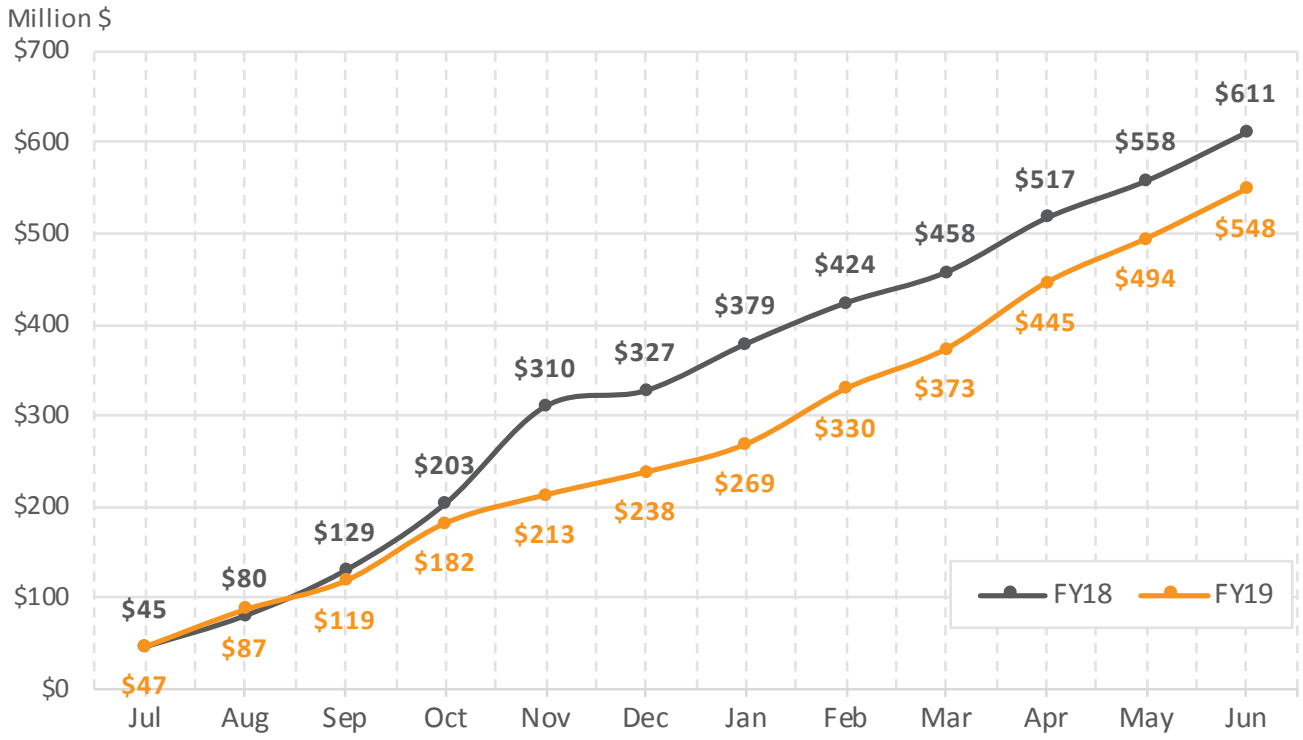
** N/C - Not Calculable*

TOP 10 NEW PROJECTS: FY19 Q1-Q4 *(Table 2)*

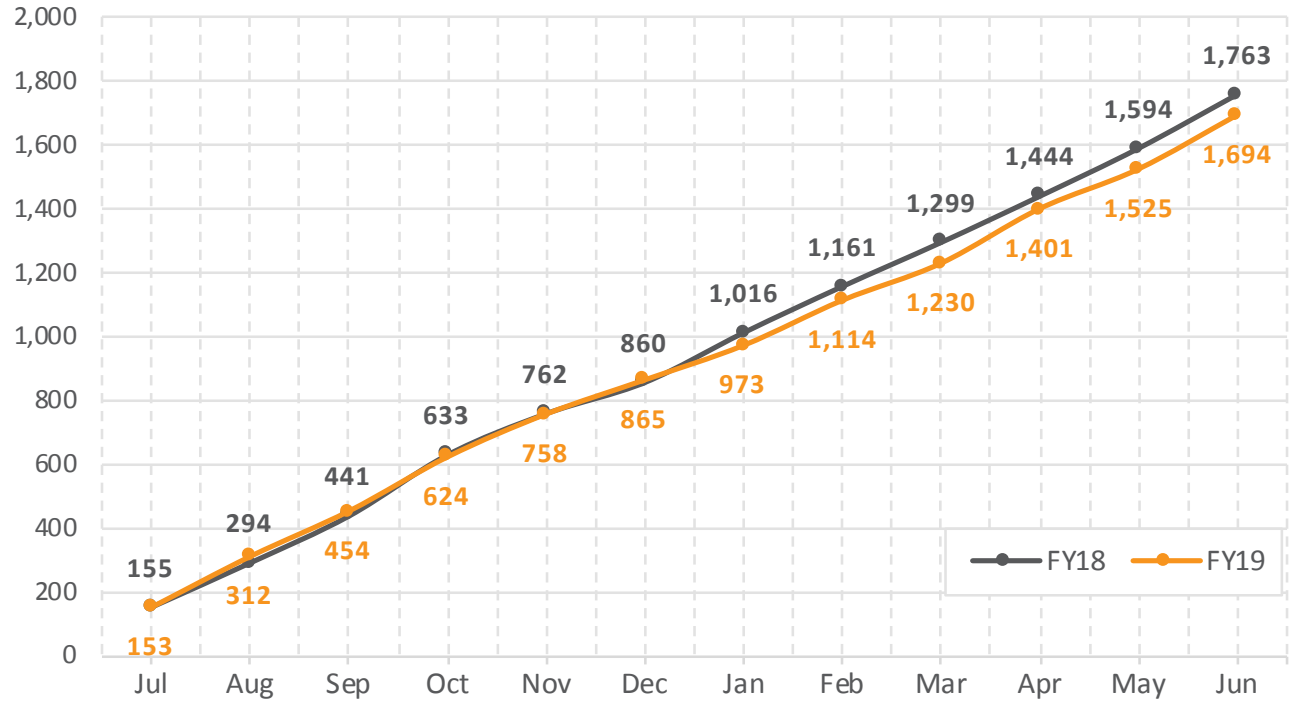
(by total anticipated dollar value)

Investigators (Primary PI First)	Award Admin Dept	PI Home Department	Project Title	Anticipated Amount	Sponsor	Activity Type	Project Begins	Project Ends
Raynor, Hollie; Crouter, Scott	Nutrition	Nutrition; Kinesiology, Recreation & Sport Studies	Translating basic habituation research to childhood obesity treatment	$2,757,353	NIH - National Institutes of Health	Basic Research	3/1/2019	3/31/2024
Blackwell, Michael; Bruce, Donald; Brown, Kathleen; Nugent, William; Daugherty, Linda	Office of Rsch & Public Service	Ctr for Behavioral Health Rsch; Boyd Ctr for Business & Economic Rsch ; Office of Rsch &; Public Service ; Public Health ; Social Work	AlignCare	$2,633,420	Maddie's Fund	Basic Research	7/26/2018	6/30/2021
Hillyer, Sarah	Ctr for Sport, Peace, & Society	Ctr for Sport, Peace, & Society	Better World: Empowering Global Change Agents through Sports	$2,580,000	DOS - US Department of State	Public Service	9/19/2018	12/31/2021
Rose, Garrett; Dean, Mark; Plank, James	Electrical Engr & Computer Science	Electrical Engr & Computer Science; College of Engr-Administration ; Electrical Engr & Computer Science	Design Approaches for Efficient Reconfigurable Neuromorphic Systems	$1,546,582	DOD - Air Force Research Laboratory	Basic Research	2/13/2019	2/12/2022
Lindley, Lisa	Nursing	Nursing	Effectiveness of concurrent care to improve pediatric and family outcomes at end of life	$1,526,304	NIH - National Institute of Nursing Research	Basic Research	8/1/2018	6/30/2022
Babu, Sudarsanam	Mechanical, Aerospace & Biomedical Engr	Mechanical, Aerospace & Biomedical Engr	Rationalization of Liquid/ Solid and Solid/ Solid Interphase Instabilities During Thermal-Mechanical Transients of Metal Additive Manufacturing	$1,500,000	DOD - Office of Naval Research	Basic Research	8/1/2018	5/31/2023
Zhang, Feng	UTSI MABE Program	UTSI MABE Program	Developing novel electrodes with ultralow catalyst loading for high-efficiency hydrogen production in proton exchange membrane electrolyzer cells	$1,399,997	DOE -The Office of Energy Efficiency and Renewable Energy	Basic Research	10/1/2018	11/30/2020
Lukosi, Eric	JIAM	Nuclear Engr	A State-of-the-Art Neutron Imaging Sensor for DOE User Facilities	$1,199,986	DOE - Office of Basic Energy Sciences	Applied Research	9/1/2018	8/31/2021
Schmisseur, John; Balas, Mark	UTSI MABE Program	UTSI MABE Program; UTSI MABE Program	ARDVARC: the Aero Response to Deformable Vehicle Architectures Research Collaboration supporting AFRL/ RQHX	$1,147,922	DOD - AEDC/ FMF / DOD - Air Force - AFRL - Air Force Research Laboratory	Applied Research	11/20/2018	11/19/2021
Mannik, Jaan; Mannik, Jaana	Physics	Physics; Physics	Coordination mechanisms between cell division and chromosome segregation in E. coli	$1,143,406	HHS - NIH - National Institutes of Health	Basic Research	9/1/2018	7/31/2022

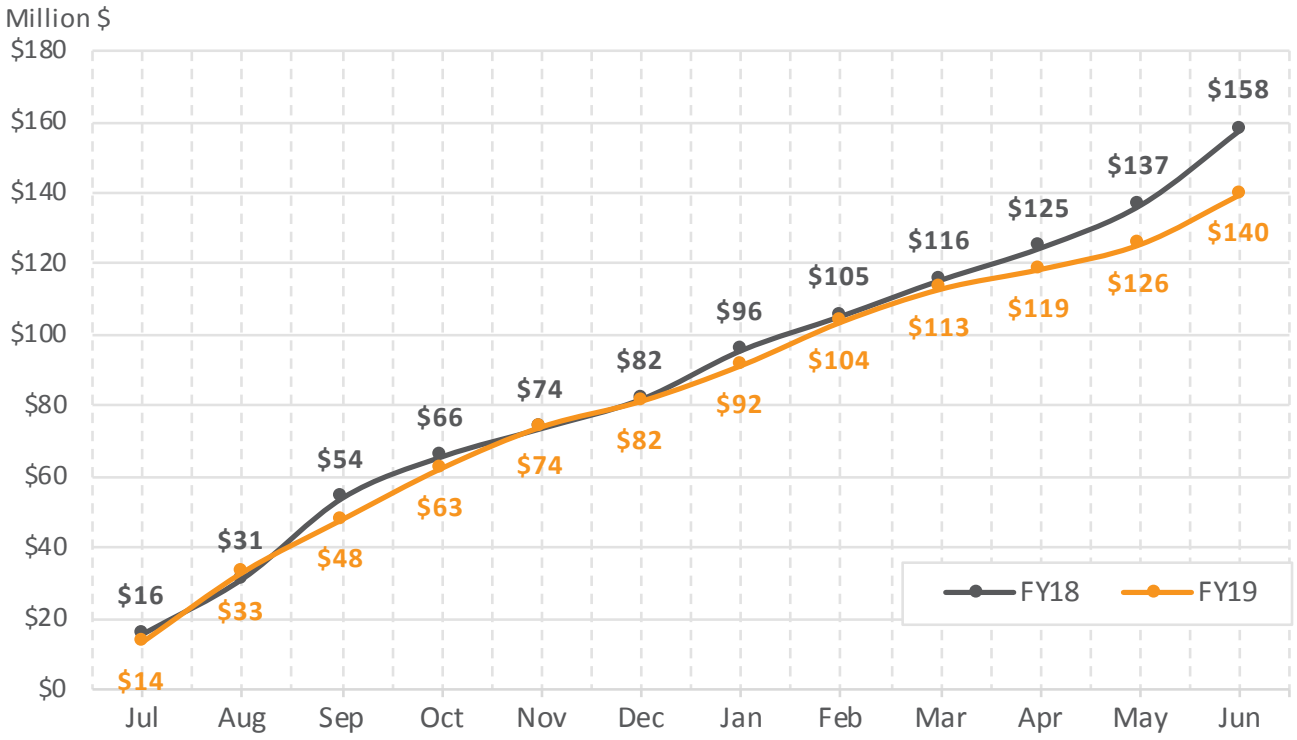
CUMULATIVE PROPOSAL AMOUNT: FY19 vs. FY18 *(Figure 1)*



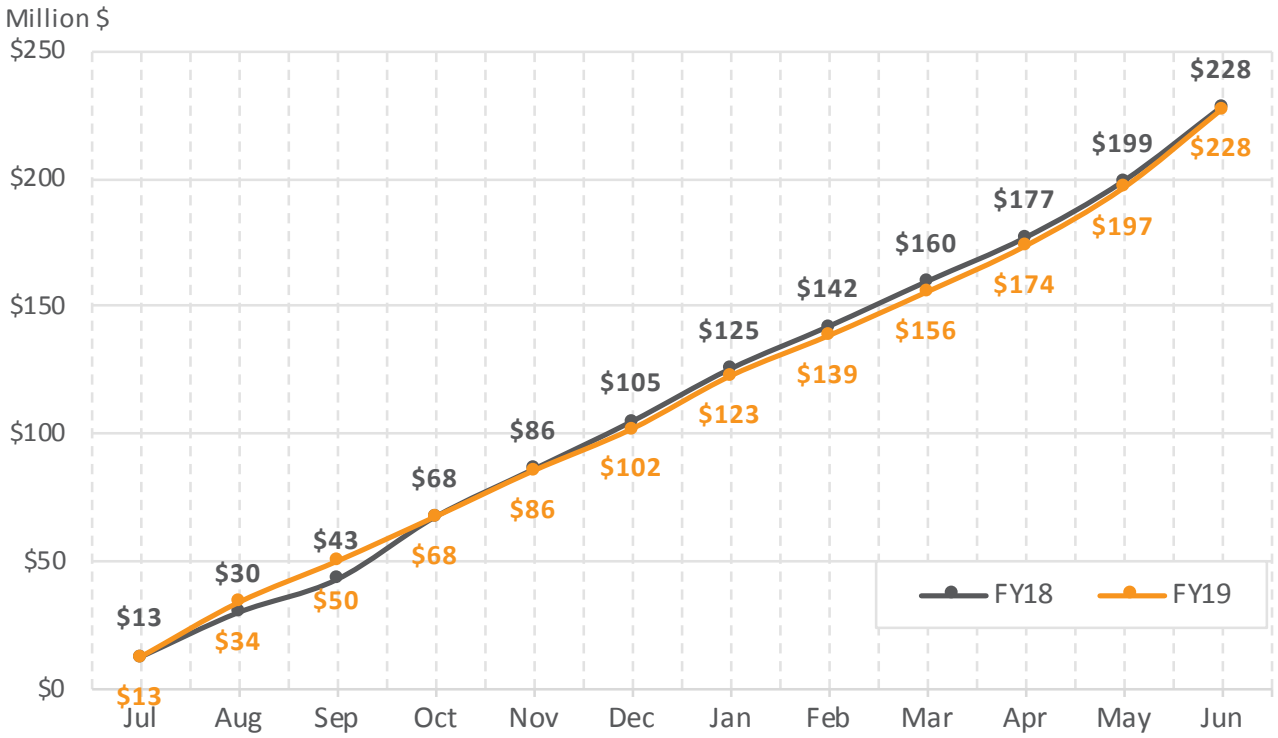
CUMULATIVE PROPOSAL COUNT: FY19 vs. FY18 *(Figure 2)*



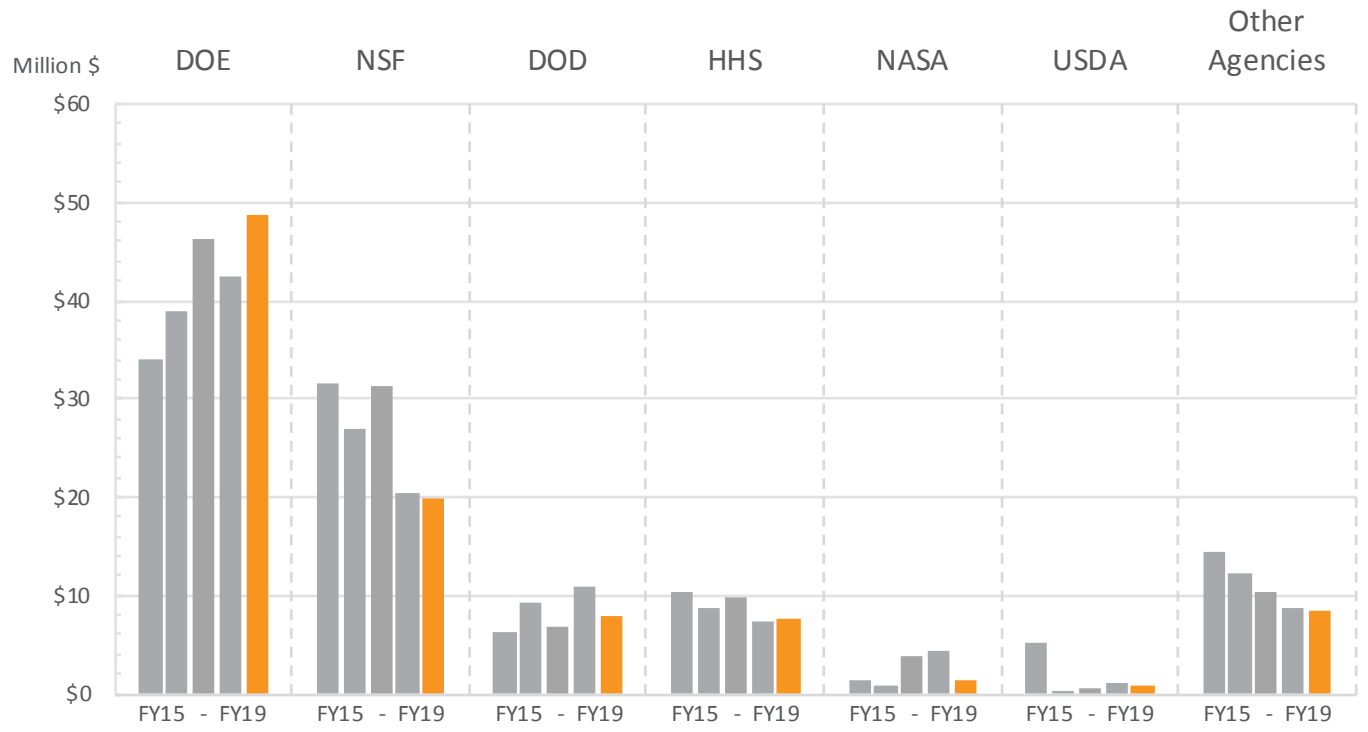
CUMULATIVE AWARD AMOUNT: FY19 vs. FY18 *(Figure 3)*



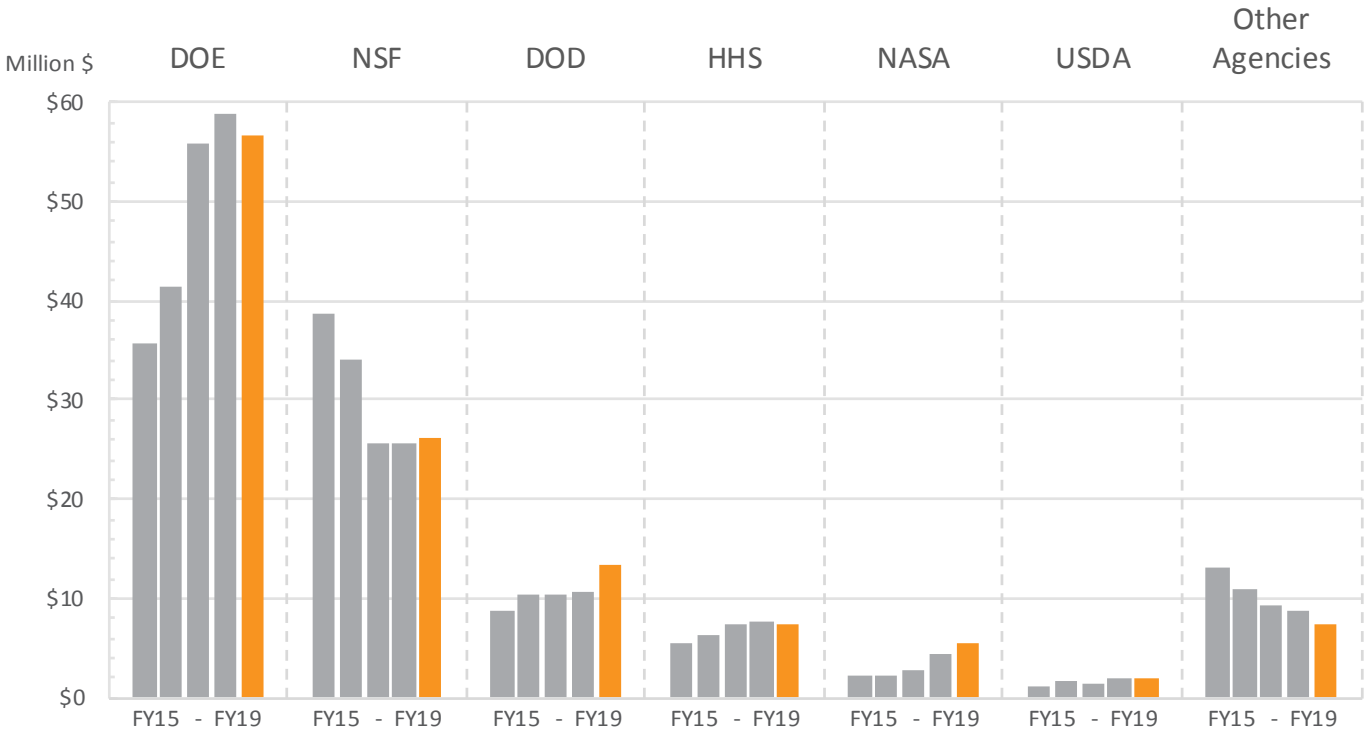
CUMULATIVE AMOUNT EXPENDED ON R&D: FY19 vs. FY18 *(Figure 4)*



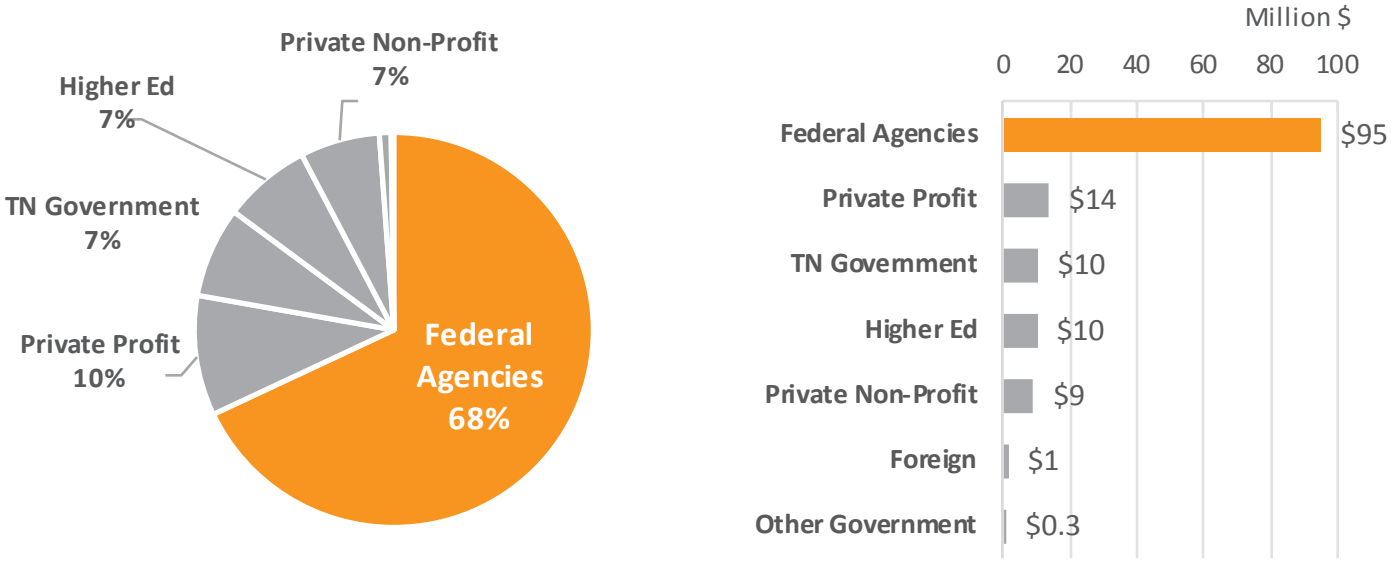
AWARDED DOLLARS BY FEDERAL AGENCY: FY15-FY19 Q1-Q4 *(Figure 5)*



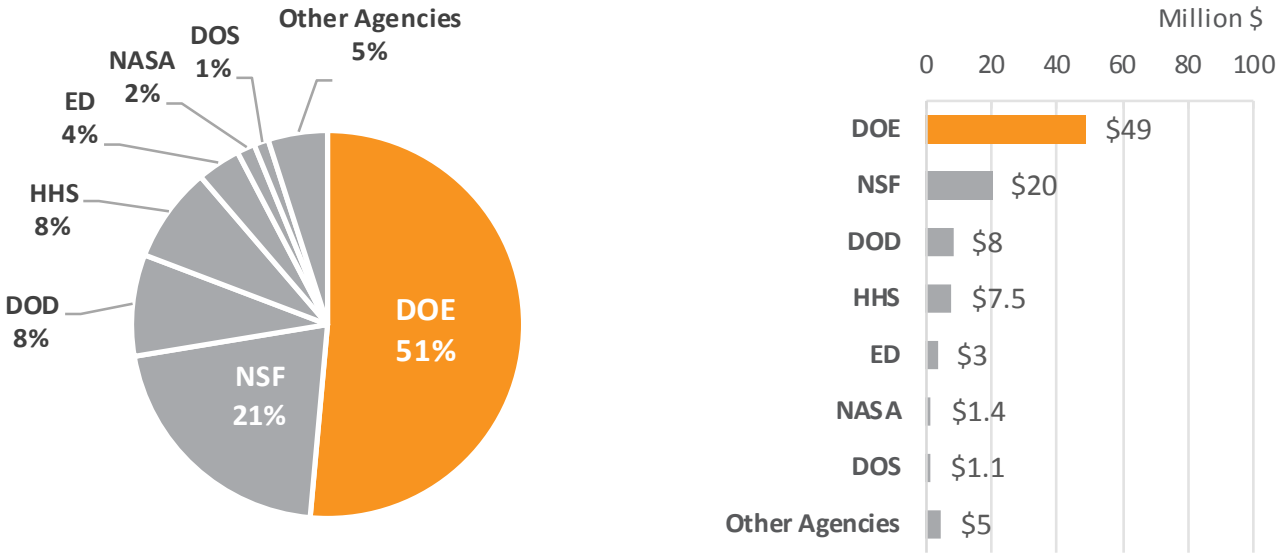
R&D EXPENDITURES BY FEDERAL AGENCY: FY15-FY19 Q1-Q4 *(Figure 6)*



AWARDED DOLLARS BY SOURCE: FY19 Q1-Q4 *(Figure 7)*

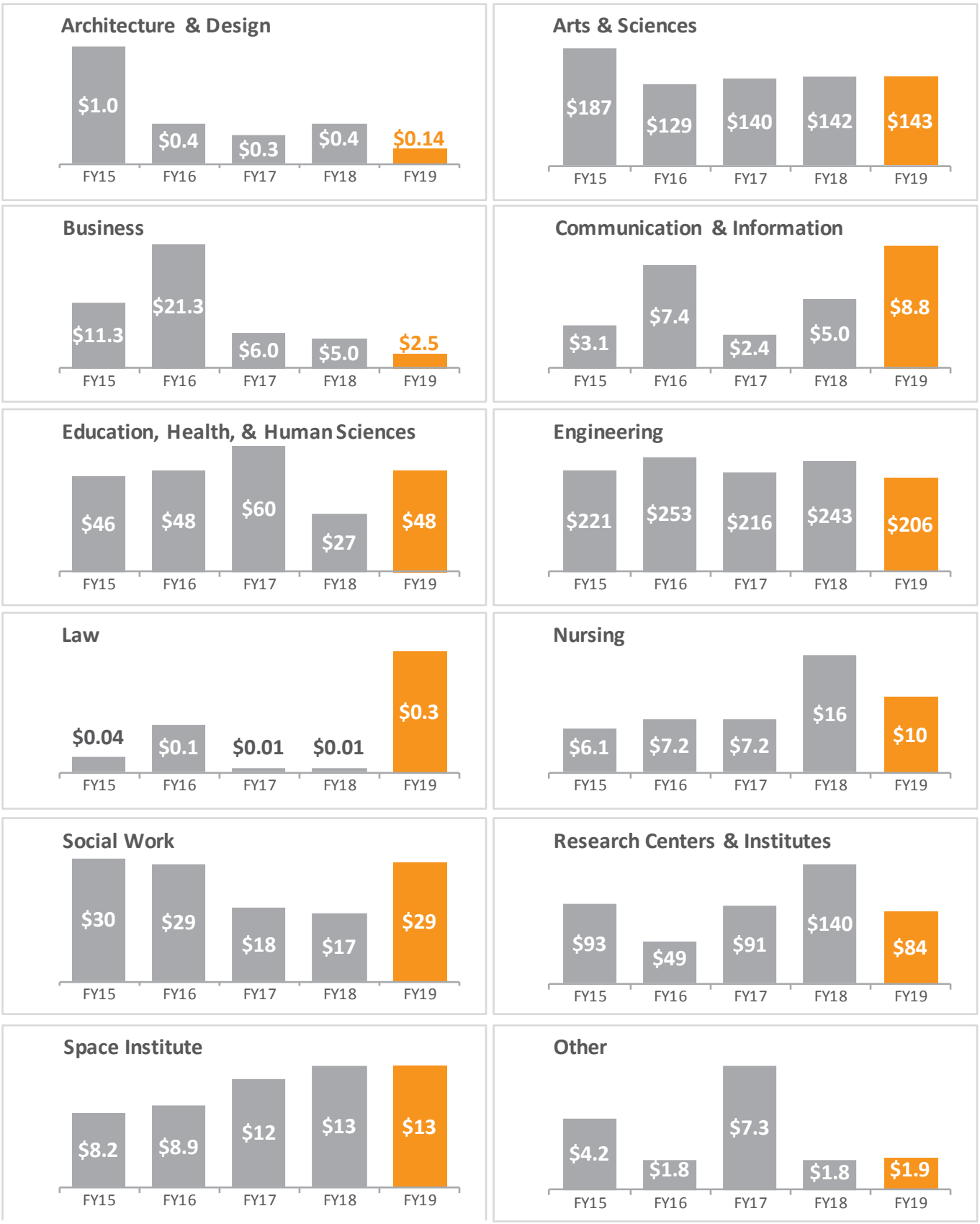


FEDERAL AWARDED DOLLARS BY AGENCY: FY19 Q1-Q4 *(Figure 8)*



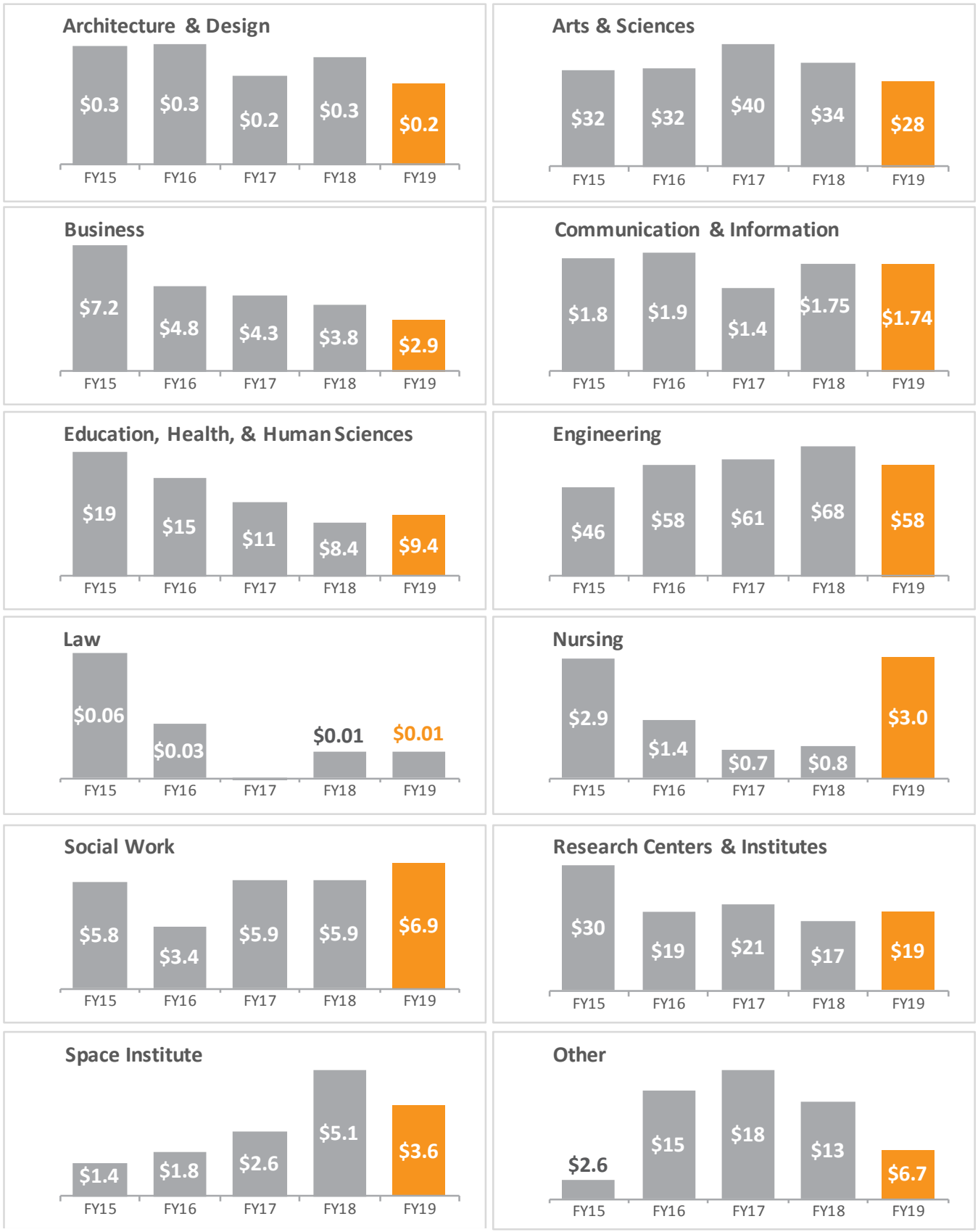
PROPOSED AMOUNT BY COLLEGE: FY15-FY19 Q1-Q4 *(Figure 9)*

(Dollars in Millions. Each chart has its own scale)



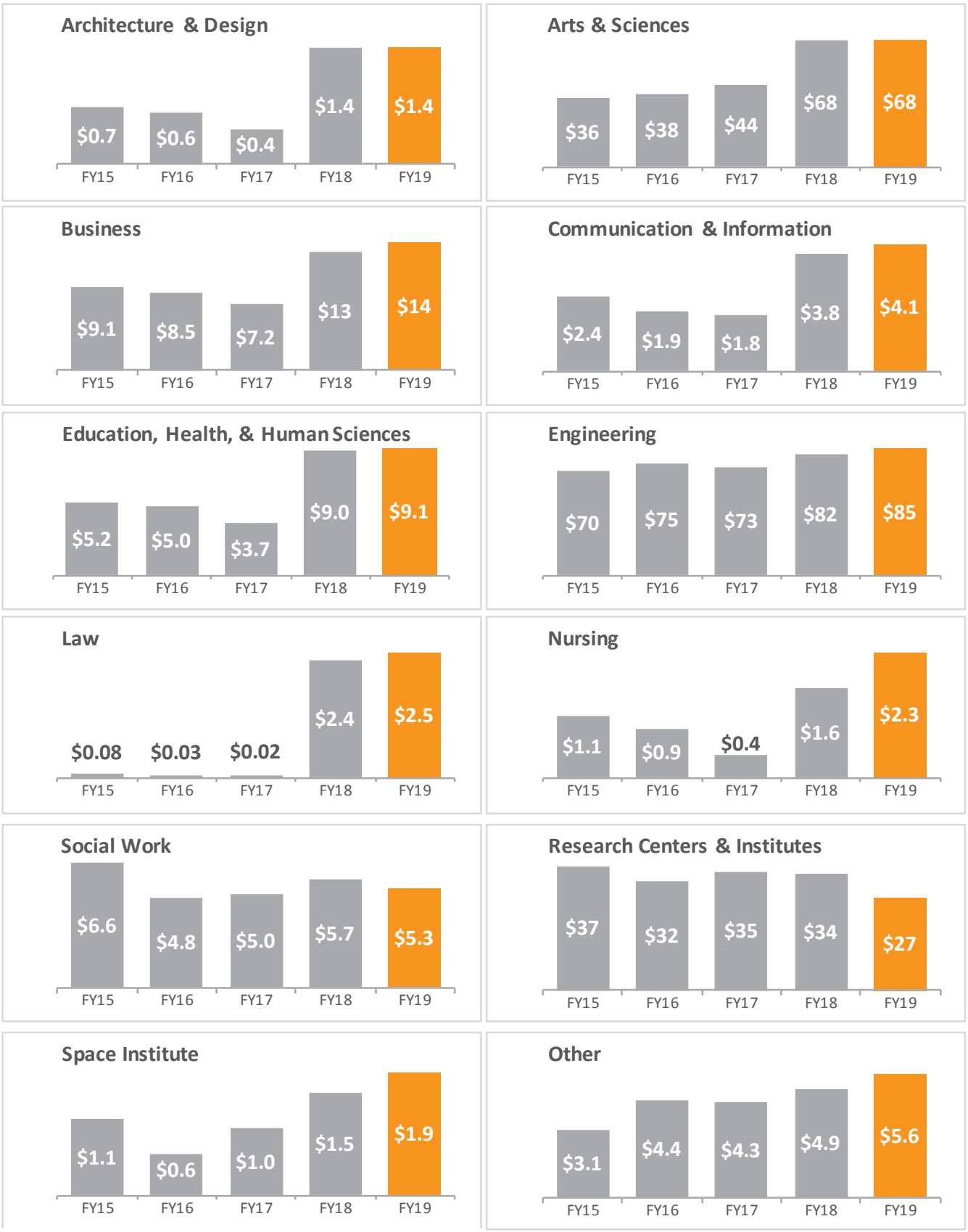
AWARDED AMOUNT BY COLLEGE: FY15-FY19 Q1-Q4 *(Figure 10)*

(Dollars in Millions. Each chart has its own scale)



AMOUNT EXPENDED ON R&D BY COLLEGE: FY15-FY19 Q1-Q4 *(Figure 11)*

(Dollars in Millions, Each chart has its own scale)



Data Notes

Each Quarterly Research Report is a cumulative fiscal year-to-date summary. Award, proposal, and expenditure data include UT Knoxville, UT Space Institute, and University Wide Administration. Data depicting colleges and research centers and institutes is presented to show trends within each unit.

Award and proposal data is collected from Cayuse SP (electronic system for routing of sponsored projects) and includes projects sponsored for Basic, Applied and Developmental research activities as well as for Public Service, Training, Instruction, Scholarship, and Fellowship activities.

To ensure consistency of the Office of Research and Engagement reports, all quarterly and annual report award selection is based on the UT Report Date (award effective date). The proposal selection is based on the Proposal Approval Date.

R&D expenditure data is collected from the "NSF Research Survey Estimate" report provided by UT IRIS Data Warehouse. The data for the "NSF Research Survey Estimate" report is collected and reported according to the NSF HERD Survey and covers three R&D activities - basic research, applied research, and development. These R&D activities can have the following sources of funds: U.S. federal government, state and local government, business, nonprofit organizations, institutional funds, and other sources such as funds from foreign entities and gifts designated by the donors for research. Please visit the following link to learn more about the survey and R&D definitions: https://www.nsf.gov/statistics/srvyherd/.

The "NSF Research Survey Estimate" report provides an estimate of the R&D expenditures for UT colleges and research centers and institutes. This report does not contain expenditure data from the UT Research Foundation, which is included in the official NSF HERD survey during the submission of the survey. The expenditures data provided in the Office of Research & Engagement quarterly research activity report should be treated as an estimate reflecting trends for UT colleges and research centers and institutes only.

There are occasionally variations in the numbers reported for each quarter as information is updated into Cayuse SP and IRIS on a daily basis. The data for this report were collected on September 10th, 2019. The annual report will represent the final amounts for that fiscal year.

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