



NATIONAL SCIENCE FOUNDATION
INDUSTRY/UNIVERSITY COOPERATIVE RESEARCH CENTERS

FINAL Report

2018-2019 STRUCTURAL INFORMATION¹

- **TABLE 1:** GENERAL CENTER INFORMATION
- **TABLE 2:** OPERATING BUDGET: TOTAL FUNDING
- **TABLE 3:** CAPITAL AND IN-KIND SUPPORT
- **TABLE 4:** INDUSTRY MEMBERSHIP DESCRIPTORS
- **TABLE 5:** HUMAN RESOURCES
- **TABLE 6:** CENTER DIRECTOR DESCRIPTORS
- **TABLE 7:** CENTER OUTCOMES
- **TABLE 8:** ALUMNI CAREER OUTCOMES
- **TABLE 9:** INTELLECTUAL PROPERTY AND COMMERCIALIZATION EVENTS
- **APPENDIX:** FOOTNOTES: SPECIAL CONSIDERATIONS
(Footnotes appear on top of columns and/or at end of rows for each table and are described in the appendix on the last page).

L.C. McGowen, A.M. Stoica, O. Leonchuk, & J. Scott
DEPARTMENT OF PSYCHOLOGY
NORTH CAROLINA STATE UNIVERSITY

February, 2020

¹**NOTE:** FY2018-2019 data collected from 73/73 Center Director Surveys (100% response rate).

*IUCRC Evaluation Project
North Carolina State University
Psychology Department, Box 7650
Raleigh, NC 27695-7650*

Phone: 919.515.3237

Fax: 919.515.1716

E-mail: iucrc@ncsu.edu

Webpage: <http://www.ncsu.edu/iucrc>

Table 1: 2018-2019 GENERAL CENTER INFORMATION (Sorted Chronologically)**

Yr Started:	Center Name	University Name: Director	Partner University 1 Director	Partner University 2 Director	Partner University 3 Director	Partner University 4 Director
Active						
2001*	Identification Technology Research	Clarkson Univ. Schuckers	West Virginia Univ. Valenti	Univ. of Buffalo Govindaraju		
2002*	Excellence in Logistics and Distribution	Univ. of Arkansas Rossetti	Univ. of Missouri, Columbia Noble			
2002*	Lasers & Plasmas in Advanced Manufacturing	Univ. of Virginia Gupta	Southern Methodist Univ. Kovacevic	Univ. of Illinois, Urbana Champaign Ruzic		
2003*	E-Design ^a	Pennsylvania State Univ. Terpenney	Univ. of Massachusetts Krishnamurty	Univ. of Buffalo, SUNY Lewis	Brigham Young Univ. Salmon	Wayne State Univ. Kim
2005	Child Injury Prevention Studies	Children's Hospital of Philadelphia Winston	Ohio State Univ. Bolte			
2007	Advanced Forestry Systems ^b	Univ. of Maine Weiskittel	Univ. of Washington Turnblom	Univ. of Georgia Montes	Univ. of Idaho Coleman	North Carolina State Univ. Cook
2007	Smart Vehicle Concepts	Ohio State Univ. Dapino				
2008	Advanced Knowledge Enablement	Florida International Univ. Rishe	Florida Atlantic Univ. Furht	Dubna International Univ. (Russia) Cheremisina	Univ. of Greenwich (England) MacKinnon	
2008	Cloud & Autonomic Computing	Texas Tech. Sill	Univ. of Arizona Hariri			
2008	Health Organization Transformation ^c	Texas A&M Health Science Center Kash (Ferris)	Georgia Institute of Tech. Lee	Pennsylvania State Univ. Tucker	Univ. of Alabama, Birmingham Weech-Maldonado (Borkowski)	Florida Atlantic Univ. Agarwal
2008	Particulate and Surfactant Systems	Univ. of Florida Moudgil	Columbia Univ. Somasundaran	Dharmasinh Desai Univ. (India) Mukherjee		
2009	Electromagnetic Compatibility	Missouri Univ. of Science & Tech. Fan	Univ. of Houston Chen	Univ. of Hawaii Iskander		
2009	Embedded Systems	Arizona State Univ. Vrudhula	Southern Illinois Univ., Carbondale Tragoudas			
2009	Grid-Connected Advanced Power Electronic Systems	Univ. of Arkansas Mantooth	Univ. of South Carolina Dougal	Univ. of Wisconsin, Milwaukee Nasiri		
2009	Integration of Composites into Infrastructure	West Virginia Univ. GangaRao	North Carolina State Univ. Seracino	Univ. of Miami Nanni	Univ. of Texas, Arlington Puppala	
2009	Net-Centric and Cloud Software and Systems	Univ. of North Texas Kavi	Univ. of Texas, Dallas Bastani	Arizona State Univ. Spanias		
2009	Research in Intelligent Storage	Univ. of Minnesota Du	Texas A&M Reddy	Temple Univ. Kant		
2009	Water and Environmental Technology	Temple Univ. Suri	Univ. of Arizona Pepper	Arizona State Univ. Abbaszadegan		
2010	Ceramics Composites and Optical Materials Center	Rutgers Univ. Haber	Clemson Univ. Brown			
2010	Energy Harvesting Materials and Systems	Virginia Tech. Zuo	Columbia Univ. Yin			

IUCRC Structure Database, FY 2018-2019

*Report sorted by Status. Organized by Year Started. Starting in 2013-2014 report, centers' Year Funded changed to Year Started. * = Last year funded by NSF.

#International site data not included in this report unless otherwise footnoted.

a) Additional universities for E-Design are Oregon State Univ. (Stone) and Iowa State Univ. (Kremer).

b) Additional universities for Advanced Forestry Systems are Auburn Univ. (Enebak), Purdue Univ. (Jacobs), and Oregon State Univ. (Howe).

c) Additional universities for Health Organization Transformation are Univ. of Louisville (Johnson) and Univ. of Washington (Mastrangelo).

<i>Yr Started:</i>	<i>Center Name</i>	<i>University Name: Director</i>	<i>Partner University 1 Director</i>	<i>Partner University 2 Director</i>	<i>Partner University 3 Director</i>	<i>Partner University 4 Director</i>
2010	Manufacturing and Materials Joining Innovation Center	Ohio State Univ. Ramirez	Lehigh Univ. DuPont	Colorado School of Mines Rockett	Univ. of Tennessee at Knoxville Rawn	Univ. of Waterloo (Canada) Zhou
2010	Membrane Science, Engineering & Technology Center	Univ. of Arkansas Wickramasinghe	Univ. of Colorado, Boulder Ding	New Jersey Institute of Technology Sirkar		
2010	Pharmaceutical Development	Georgia Institute of Tech. Bommarius	Univ. of Kentucky Munson			
2010	Resource Recovery and Recycling	Worcester Polytechnic Institute Mishra	Colorado School of Mines Anderson	KU Leuven (Belgium) Blanpain	Univ. of Tokyo (Japan) Fujita	
2010	Security and Software Engineering Research Center	Ball State Univ. Wu	Virginia Tech. Clancy	Georgetown Univ. Frieder	Univ. of Texas, Dallas Wong	University of Oulu (Finland) Frantti
2010	Surveillance Research	Wright State Univ. Rigling	Ohio State Univ. Potter			
2010	Water Equipment and Policy	Univ. Wisconsin, Milwaukee Qu	Marquette Univ. Zitomer			
2010	Wood-Based Composites	Virginia Tech. Frazier	Oregon State Univ. Kamke			
2011	Advanced Non-Ferrous Structural Alloys	Colorado School of Mines Clarke (Kaufman)	Iowa State Univ. Collins			
2011	Energy-Smart Electronic Systems	Binghamton Univ., State Univ. of New York Sammakia	Villanova Univ. Wemhoff	Univ. of Texas, Arlington Agonafer		
2011	Metamaterials	Univ. of North Carolina, Charlotte Aggarwal	Clarkson Univ. Crouse			
2011	Next Generation Photovoltaics	Univ. of Texas, Austin Korgel	Colorado State Univ. Sampath	Texas A&M Balog (Harvey)		
2012	Tire Research	Virginia Tech. Taheri	Univ. of Akron Batur			
2012	Visual and Decision Informatics ^d	Univ. of Louisiana, Lafayette Raghavan	Drexel Univ. Hu	Stony Brook Univ. Kaufman	Univ. of Virginia Beling	Univ. of North Carolina, Charlotte Hadzikadic
2012*	Sustainably Integrated Buildings and Sites	Univ. of North Carolina, Charlotte Cox				
2013	Arthropod Management Technologies	Univ. of Florida Bonning	Univ. of Kentucky Palli			
2013	Broadband Wireless Access and Applications	Univ. of Arizona Krunz	Virginia Tech. Park	Univ. of Notre Dame Laneman	Univ. of Mississippi Viswanathan	Catholic Univ. of America Liu
2013	Configuration Analytics and Automation	Univ. of North Carolina, Charlotte ^e Al-Shaer	George Mason Univ. Jajodia	Colorado State Univ. Ray		
2013	Cyber-Physical Systems for the Hospital Operating Room	Houston Methodist Garbey	Univ. of Florida Bercceli			
2013	Freeform Optics	Univ. of Rochester Rolland	Univ. of North Carolina, Charlotte Suleski			
2013	Research in Storage Systems	Univ. of California, Santa-Cruz Miller				
2013	Science Center for Marine Fisheries	Univ. of Southern Mississippi Powell	College of William Mary Virginia Institute Mann			

IUCRC Structure Database, FY 2018-2019

*Report sorted by Status. Organized by Year Started. Starting in 2013-2014 report, centers' Year Funded changed to Year Started. * = Last year funded by NSF.

#International site data not included in this report unless otherwise footnoted.

d) Additional universities for Visual and Decision Informatics are Tampere Univ. (Finland)

e) For Configuration Analytics, no data were submitted by this site.

Yr Started:	Center Name	University Name: Director	Partner University 1 Director	Partner University 2 Director	Partner University 3 Director	Partner University 4 Director
2013	Spatiotemporal Thinking, Computing and Application	George Mason Univ. Yang	Harvard Univ. Ur	Univ. of California, Santa Barbara Clarke		
2013	Unmanned Aircraft Systems	Brigham Young Univ. McLain	Univ. of Colorado Frew	Virginia Tech. Woolsey	Univ. of Michigan, Ann Arbor Atkins	
2013	Wheat Genetics	Kansas State Univ. Poland	Colorado State Univ. Byrne			
2014	Advanced Design and Man of Integrated Microfluidics	Univ. of California, Irvine Lee	Univ. of Illinois, Chicago Papautsky			
2014	Bioplastics and Biocomposites	North Dakota State Univ. Webster	Washington State Univ. Yadama	Iowa State Univ. Cochran	Univ. of Georgia Locklin	
2014	Dielectrics and Piezoelectrics	North Carolina State Univ. Dickey	Pennsylvania State Univ. Trolier-McKinstry			
2014	Disruptive Musculoskeletal Innovations	Univ. of California, San Francisco Lotz	Univ. of Toledo Goel	Ohio State Univ. Marras		
2014	iPerform - I/UCRC for Assistive Technologies to Enhance Human Performance	Univ. of Texas, Arlington Makedon	Univ. of Texas, Dallas Daescu			
2014	Multi-functional Integrated System Technology	Univ. of Florida Nishida	Univ. of Central Florida Yuan	Univ. of Virginia Ghosh		
2014	Novel High-Voltage/Temperature Materials and Structures	Univ. of Denver Kumosa	Univ. of Illinois, Urbana Champaign Jasiuk	Michigan Technological Univ. Odegard	Univ. of Connecticut Cao	
2014	Robots and Sensors for the Human Well-being	Univ. of Minnesota, Twin Cities Morellas	Univ. of Pennsylvania Xiao	Univ. of Denver Andrews	Univ. of North Carolina, Charlotte Voyles	Purdue Univ. Danilidis
2014	Wind Energy Science, Technology and Research	Univ. of Massachusetts, Lowell Niezrecki	Univ. of Texas, Dallas Rotea			
2015	Atomically Thin Multifunctional Coatings	Pennsylvania State Univ. Terrones	Rice Univ. Lou			
2015	Fiber-Wireless Integration and Networking	Georgia Institute of Tech. Chang	Auburn Univ. Mao			
2015	Rational Catalyst Synthesis	Univ. of South Carolina, Columbia Regalbuto	Virginia Commonwealth Univ. Gupton			
2016	Advanced Electronics through Machine Learning	Univ. of Illinois, Urbana Champaign Rosenbaum	Georgia Institute of Tech. Swaminathan	North Carolina State Univ. Franzon		
2016	Advanced Mammalian Biomanufacturing Innovation Center	John Hopkins Univ. Betenbaugh	Clemson Univ. Harcum	Univ. of Delaware Lee	Univ. of Massachusetts Lowell-Yoon	Univ. of Maryland Bentley
2016	Advanced Research in Drying	Worcester Polytechnic Institute Yagoobi	Univ. of Illinois, Urbana Champaign Feng			
2016	Computational Biotechnology and Genomic Medicine	Univ. of Illinois, Urbana Champaign Iyer	Mayo Clinic Wang			
2016	Efficient Vehicles and Sustainable Transportation Systems	Univ. of Louisville Prater	Univ. of Alabama, Tuscaloosa Hong	Arizona State Univ. Yu	Univ. of Texas, Austin Matthews	
2017	Advanced Research in Forensic Science	Florida International Univ. Almirall	Univ. of South Alabama Chambers			
2017	Building Reliable Advances and Innovation in Neurotechnology	Arizona State Univ. Santello	Univ. of Houston Contreras-Vidal			

IUCRC Structure Database, FY 2018-2019

* Report sorted by Status. Organized by Year Started. Starting in 2013-2014 report, centers' Year Funded changed to Year Started. * = Last year funded by NSF.
#International site data not included in this report unless otherwise footnoted.

<i>Yr Started:</i>	<i>Center Name</i>	<i>University Name: Director</i>	<i>Partner University 1 Director</i>	<i>Partner University 2 Director</i>	<i>Partner University 3 Director</i>	<i>Partner University 4 Director</i>
2017	Space, High-Performance, and Resilient Computing	Univ. of Pittsburgh George	Univ. of Florida Lam	Brigham Young Univ. Wirthlin	Virginia Tech. Feng	
2018	Accelerated Real Time Analytics	Univ. of Maryland, Baltimore County Yesha (Joshi)	North Carolina State Univ. Chirkova	Rutgers Univ., Newark Atluri	Rutgers Univ., New Brunswick Metaxas	
2018	Advanced Subsurface Earth Resource Models	Colorado School of Mines Wendlandt	Virginia Tech Chung			
2018	Alternative Sustainable and Intelligent Computing	Duke Univ. Chen	Syracuse Univ. Qiu	Univ. of Notre Dame Shi		
2018	Big Learning	Univ. of Florida Li	Carnegie Mellon Univ. Salakhutdinov	Univ. of Missouri, Kansas City Li	Univ. of Oregon, Eugene Dou	
2018	Geomechanics and Mitigation of Geohazards	California Institute of Technology Avouac				
2018	High Pressure Plasma Energy, Agriculture, and Biomedical Technologies	Drexel Univ. Fridman	George Washington Univ. Keidar	Univ. of Michigan Foster		
2018	Power Management Integration	Dartmouth College Sullivan				
2018	Science of Heterogeneous Additive Printing of 3D Materials	Univ. of Massachusetts Mead	Univ. of Connecticut Ma	Georgia Institute of Technology Qi		
New/Recompeted						
2019	Bioanalytic Metrology	Univ. of Notre Dame Bohn	Univ. of Indiana Baker	Purdue Univ. Simpson		
2019	Hardware and Embedded Systems Security and Trust*	Univ. of Cincinnati Emmert	Northeastern Univ. Fei	Univ. of Texas, Dallas Makris	Univ. of Virginia Lambert	Univ. of California, Davis Homayoun
2019	Wind Hazard and Infrastructure Performance	Florida International Univ. Mehta (Zisis)	Texas Tech. Zuo			

IUCRC Structure Database, FY 2018-2019

* Report sorted by Status. Organized by Year Started. Starting in 2013-2014 report, centers' Year Funded changed to Year Started. * = Last year funded by NSF.
#International site data not included in this report unless otherwise footnoted.
e) Additional universities for Hardware and Embedded Systems Security and Trust are Univ. of Connecticut (Chandy)

Table 2: 2018-2019 OPERATING BUDGET AND TOTAL FUNDING

Center Name	Total ⁴ Funding	NSF/⁵ IUCRC	Other ⁶ NSF	Member ⁷ Fees	Add'l ⁸ Industry	State ⁹	Other¹⁰ Federal	Non- ¹¹ Federal
Accelerated Real Time Analytics	\$3,560,136	\$843,666	\$1,076,000	\$568,470	\$0	\$0	\$1,072,000	\$0
Advanced Design and Man of Integr	\$1,162,368	\$280,375	\$0	\$300,000	\$0	\$0	\$0	\$581,993
Advanced Electronics through Mach	\$1,066,000	\$466,000	\$0	\$600,000	\$0	\$0	\$0	\$0
Advanced Forestry Systems ^a	\$2,893,701	\$356,000	\$0	\$1,854,547	\$236,098	\$339,056	\$20,000	\$88,000
Advanced Knowledge Enablement ^b	\$396,000	\$61,000	\$0	\$245,000	\$90,000	\$0	\$0	\$0
Advanced Mammalian Biomanufact	\$2,040,000	\$750,000	\$0	\$1,150,000	\$140,000	\$0	\$0	\$0
Advanced Non-Ferrous Structural Al	\$1,821,350	\$216,000	\$0	\$425,000	\$75,000	\$0	\$1,105,350	\$0
Advanced Research in Drying	\$970,134	\$300,000	\$0	\$350,000	\$0	\$0	\$320,134	\$0
Advanced Research in Forensic Sci	\$800,000	\$320,000	\$0	\$480,000	\$0	\$0	\$0	\$0
Advanced Subsurface Earth Resour	\$540,000	\$315,000	\$0	\$225,000	\$0	\$0	\$0	\$0
Alternative Sustainable and Intellige	\$1,276,210	\$449,999	\$0	\$825,000	\$1,211	\$0	\$0	\$0
Arthropod Management Technologi	\$1,062,000	\$270,000	\$0	\$745,000	\$0	\$47,000	\$0	\$0
Atomically Thin Multifunctional Coat	\$612,605	\$264,605	\$0	\$348,000	\$0	\$0	\$0	\$0
Big Learning	\$1,561,780	\$536,780	\$0	\$1,025,000	\$0	\$0	\$0	\$0
Bioplastics and Biocomposites	\$1,185,988	\$521,074	\$94,914	\$555,000	\$0	\$15,000	\$0	\$0
Broadband Wireless Access and Ap	\$1,110,754	\$440,754	\$0	\$670,000	\$0	\$0	\$0	\$0
Building Reliable Advances and Inn	\$931,957	\$324,500	\$142,457	\$400,000	\$0	\$65,000	\$0	\$0
Ceramics Composites and Optical	\$625,856	\$133,250	\$0	\$492,606	\$0	\$0	\$0	\$0
Child Injury Prevention Studies	\$1,447,710	\$324,749	\$582,211	\$540,750	\$0	\$0	\$0	\$0
Cloud & Autonomic Computing	\$579,000	\$99,000	\$0	\$480,000	\$0	\$0	\$0	\$0
Computational Biotechnology and G	\$550,000	\$300,000	\$0	\$250,000	\$0	\$0	\$0	\$0
Configuration Analytics and Automa	\$625,884	\$265,884	\$0	\$350,000	\$10,000	\$0	\$0	\$0
Cyber-Physical Systems for the Hos	\$559,487	\$259,487	\$0	\$300,000	\$0	\$0	\$0	\$0
Dielectrics and Piezoelectrics	\$1,170,209	\$205,100	\$0	\$844,200	\$0	\$0	\$120,909	\$0
Disruptive Musculoskeletal Innovati	\$898,097	\$318,097	\$0	\$580,000	\$0	\$0	\$0	\$0
E-Design ^c	\$1,139,467	\$188,998	\$0	\$891,098	\$0	\$59,371	\$0	\$0
Efficient Vehicles and Sustainable T ^d	\$950,000	\$450,000	\$0	\$500,000	\$0	\$0	\$0	\$0
Electromagnetic Compatibility	\$4,753,124	\$436,800	\$640,000	\$1,716,000	\$521,000	\$0	\$1,439,324	\$0
Embedded Systems	\$953,695	\$147,175	\$0	\$806,520	\$0	\$0	\$0	\$0
Energy Harvesting Materials and Sy	\$1,415,000	\$371,000	\$0	\$1,044,000	\$0	\$0	\$0	\$0
Energy-Smart Electronic Systems	\$1,102,500	\$300,000	\$0	\$442,500	\$180,000	\$80,000	\$100,000	\$0
Excellence in Logistics and Distribut ^e	\$200,000	\$10,000	\$0	\$190,000	\$0	\$0	\$0	\$0
Fiber-Wireless Integration and Netw	\$831,000	\$281,000	\$0	\$550,000	\$0	\$0	\$0	\$0
Freeform Optics	\$1,462,081	\$310,000	\$100,000	\$720,000	\$305,781	\$0	\$0	\$26,300
Geomechanics and Mitigation of Ge	\$348,568	\$150,000	\$20,599	\$150,000	\$0	\$0	\$0	\$27,969
Grid-Connected Advanced Power El	\$1,102,260	\$457,260	\$0	\$645,000	\$0	\$0	\$0	\$0
Health Organization Transformation ^f	\$2,115,755	\$607,755	\$8,000	\$1,500,000	\$0	\$0	\$0	\$0
High Pressure Plasma Energy, Agri	\$932,000	\$532,000	\$0	\$400,000	\$0	\$0	\$0	\$0
Identification Technology Research	\$3,487,805	\$341,000	\$258,657	\$870,000	\$0	\$107,400	\$1,737,415	\$173,333
Integration of Composites into Infr	\$1,299,124	\$362,975	\$0	\$936,149	\$0	\$0	\$0	\$0
iPerform - I/IUCRC for Assistive Tec	\$331,000	\$81,000	\$0	\$250,000	\$0	\$0	\$0	\$0
Lasers & Plasmas in Advanced Man	\$250,260	\$10,000	\$0	\$185,000	\$55,260	\$0	\$0	\$0
Manufacturing and Materials Joining	\$2,858,709	\$495,609	\$0	\$2,308,100	\$55,000	\$0	\$0	\$0
Membrane Science, Engineering &	\$1,389,272	\$406,772	\$0	\$982,500	\$0	\$0	\$0	\$0
Metamaterials	\$648,299	\$255,799	\$0	\$362,500	\$30,000	\$0	\$0	\$0

*Report sorted Alphabetically by Center

IUCRC Structure Database, FY 2018-2019

**Centers in gray were on no-cost extension, they did not receive any additional NSF IUCRC funding during the reporting period.

a) For Advanced Forestry Systems, North Carolina State University, Purdue University and Oregon State University were on no-cost extension

b) For Advanced Knowledge Enablement, Florida International University was on no-cost extension.

c) For eDesign, Wayne State was on no-cost extension.

d) Efficient Vehicles and Sustainable Transportation Systems did not report income data for Arizona State University.

e) For Excellence in Logistics and Distribution, University of Missouri was on no-cost extension.

f) For Health Organization Transformation, Florida Atlantic University was on no-cost extension.

<i>Center Name</i>	<i>Total⁴ Funding</i>	<i>NSF/⁵ IUCRC</i>	<i>Other⁶ NSF</i>	<i>Member⁷ Fees</i>	<i>Add'l⁸ Industry</i>	<i>State⁹</i>	<i>Other¹⁰ Federal</i>	<i>Non-¹¹ Federal</i>
Multi-functional Integrated System T	\$1,495,800	\$400,000	\$0	\$1,090,800	\$5,000	\$0	\$0	\$0
Net-Centric and Cloud Software and	\$776,688	\$161,040	\$0	\$415,648	\$0	\$0	\$0	\$200,000
Next Generation Photovoltaics	\$1,403,000	\$433,000	\$250,000	\$720,000	\$0	\$0	\$0	\$0
Novel High-Voltage/Temperature M	\$915,000	\$515,000	\$0	\$400,000	\$0	\$0	\$0	\$0
Particulate and Surfactant Systems	\$436,346	\$73,720	\$0	\$260,000	\$95,000	\$0	\$7,626	\$0
Pharmaceutical Development	\$305,000	\$93,000	\$0	\$200,000	\$10,000	\$2,000	\$0	\$0
Power Management Integration	\$168,750	\$150,000	\$0	\$18,750	\$0	\$0	\$0	\$0
Rational Catalyst Synthesis	\$486,000	\$166,000	\$0	\$320,000	\$0	\$0	\$0	\$0
Research in Intelligent Storage	\$1,044,000	\$444,000	\$0	\$600,000	\$0	\$0	\$0	\$0
Research in Storage Systems	\$480,000	\$0	\$80,000	\$400,000	\$0	\$0	\$0	\$0
Resource Recovery and Recycling	\$817,998	\$207,998	\$0	\$600,000	\$10,000	\$0	\$0	\$0
Robots and Sensors for the Human	\$961,920	\$341,920	\$0	\$620,000	\$0	\$0	\$0	\$0
Science Center for Marine Fisheries	\$516,000	\$34,000	\$0	\$400,000	\$3,000	\$15,000	\$60,000	\$4,000
Science of Heterogeneous Additive	\$810,000	\$450,000	\$0	\$360,000	\$0	\$0	\$0	\$0
Security and Software Engineering ^f	\$1,841,164	\$390,000	\$0	\$1,451,164	\$0	\$0	\$0	\$0
Smart Vehicle Concepts	\$684,412	\$58,000	\$0	\$626,412	\$0	\$0	\$0	\$0
Space, High-Performance, and Resi	\$2,674,898	\$643,777	\$0	\$2,001,121	\$30,000	\$0	\$0	\$0
Spatiotemporal Thinking, Computin	\$1,588,231	\$350,000	\$274,000	\$754,231	\$0	\$0	\$210,000	\$0
Surveillance Research	\$691,000	\$161,000	\$0	\$530,000	\$0	\$0	\$0	\$0
Sustainably Integrated Buildings an	\$200,000	\$0	\$0	\$200,000	\$0	\$0	\$0	\$0
Tire Research	\$795,301	\$135,301	\$0	\$660,000	\$0	\$0	\$0	\$0
Unmanned Aircraft Systems	\$2,039,571	\$370,000	\$0	\$917,017	\$752,554	\$0	\$0	\$0
Visual and Decision Informatics	\$1,425,590	\$585,132	\$55,000	\$710,000	\$49,726	\$25,732	\$0	\$0
Water and Environmental Technolo	\$1,037,000	\$180,000	\$20,000	\$560,000	\$25,000	\$0	\$252,000	\$0
Water Equipment and Policy	\$824,721	\$162,000	\$0	\$622,732	\$39,989	\$0	\$0	\$0
Wheat Genetics	\$800,500	\$190,500	\$0	\$500,000	\$0	\$110,000	\$0	\$0
Wind Energy Science, Technology	\$608,249	\$178,949	\$0	\$429,300	\$0	\$0	\$0	\$0
Wood-Based Composites	\$1,029,252	\$265,847	\$66,667	\$579,302	\$0	\$117,436	\$0	\$0
Grand Mean	\$1,148,953	\$294,612	\$56,418	\$636,978	\$44,104	\$13,466	\$88,284	\$15,090
Grand Sum	\$83,873,535	\$21,506,647	\$4,118,505	\$46,499,417	\$3,219,619	\$982,995	\$6,444,758	\$1,101,595

* Report sorted Alphabetically by Center

Table 3: 2018-2019 CAPITAL AND IN-KIND SUPPORT

<i>Center Name</i>	<i>Capital and In-Kind Support</i> ¹²							<i>Admin</i> ¹³ <i>Budget</i>
	<i>Total Funding</i>	<i>Total Cap In-Kind</i>	<i>Equip-ment</i>	<i>Facilities</i>	<i>Personnel</i>	<i>Software</i>	<i>Other Support</i>	
Accelerated Real Time Analytics	\$3,560,136	\$170,000	\$65,000	\$55,000	\$15,000	\$35,000	\$0	11
Advanced Design and Man of Integrated Mi	\$1,162,368	\$100,000	\$0	\$0	\$0	\$50,000	\$50,000	20
Advanced Electronics through Machine Le	\$1,066,000	\$0	\$0	\$0	\$0	\$0	\$0	17
Advanced Forestry Systems	\$2,893,701	\$261,993	\$68,000	\$78,929	\$71,000	\$11,000	\$33,064	25
Advanced Knowledge Enablement	\$396,000	\$537,000	\$357,000	\$0	\$160,000	\$20,000	\$0	5
Advanced Mammalian Biomanufacturing In	\$2,040,000	\$0	\$0	\$0	\$0	\$0	\$0	22
Advanced Non-Ferrous Structural Alloys	\$1,821,350	\$0	\$0	\$0	\$0	\$0	\$0	15
Advanced Research in Drying	\$970,134	\$0	\$0	\$0	\$0	\$0	\$0	28
Advanced Research in Forensic Science	\$800,000	\$74,000	\$55,000	\$0	\$10,000	\$9,000	\$0	10
Advanced Subsurface Earth Resource Mod	\$540,000	\$125,000	\$0	\$0	\$25,000	\$0	\$100,000	17
Alternative Sustainable and Intelligent Com	\$1,276,210	\$0	\$0	\$0	\$0	\$0	\$0	9
Arthropod Management Technologies	\$1,062,000	\$0	\$0	\$0	\$0	\$0	\$0	13
Atomically Thin Multifunctional Coatings	\$612,605	\$0	\$0	\$0	\$0	\$0	\$0	25
Big Learning	\$1,561,780	\$100,000	\$100,000	\$0	\$0	\$0	\$0	10
Bioplastics and Biocomposites	\$1,185,988	\$23,000	\$23,000	\$0	\$0	\$0	\$0	7
Broadband Wireless Access and Applicatio	\$1,110,754	\$0	\$0	\$0	\$0	\$0	\$0	15
Building Reliable Advances and Innovation	\$931,957	\$42,107	\$27,107	\$15,000	\$0	\$0	\$0	25
Ceramics Composites and Optical Material	\$625,856	\$50,000	\$50,000	\$0	\$0	\$0	\$0	25
Child Injury Prevention Studies	\$1,447,710	\$482,029	\$25,170	\$82,000	\$37,449	\$0	\$337,410	10
Cloud & Autonomic Computing	\$579,000	\$0	\$0	\$0	\$0	\$0	\$0	10
Computational Biotechnology and Genomic	\$550,000	\$0	\$0	\$0	\$0	\$0	\$0	25
Configuration Analytics and Automation	\$625,884	\$0	\$0	\$0	\$0	\$0	\$0	5
Cyber-Physical Systems for the Hospital O	\$559,487	\$0	\$0	\$0	\$0	\$0	\$0	12
Dielectrics and Piezoelectrics	\$1,170,209	\$24,100	\$24,100	\$0	\$0	\$0	\$0	10
Disruptive Musculoskeletal Innovations	\$898,097	\$448,849	\$0	\$131,301	\$317,548	\$0	\$0	10
E-Design	\$1,139,467	\$65,900	\$0	\$0	\$0	\$65,900	\$0	55
Efficient Vehicles and Sustainable Transpo	\$950,000	\$0	\$0	\$0	\$0	\$0	\$0	24
Electromagnetic Compatibility	\$4,753,124	\$0	\$0	\$0	\$0	\$0	\$0	7
Embedded Systems	\$953,695	\$0	\$0	\$0	\$0	\$0	\$0	5
Energy Harvesting Materials and Systems	\$1,415,000	\$0	\$0	\$0	\$0	\$0	\$0	16
Energy-Smart Electronic Systems	\$1,102,500	\$147,000	\$120,000	\$0	\$0	\$25,000	\$2,000	16
Excellence in Logistics and Distribution	\$200,000	\$0	\$0	\$0	\$0	\$0	\$0	15
Fiber-Wireless Integration and Networking	\$831,000	\$0	\$0	\$0	\$0	\$0	\$0	10
Freeform Optics	\$1,462,081	\$72,000	\$0	\$0	\$0	\$0	\$72,000	7
Geomechanics and Mitigation of Geohazar	\$348,568	\$400,000	\$400,000	\$0	\$0	\$0	\$0	6
Grid-Connected Advanced Power Electroni	\$1,102,260	\$0	\$0	\$0	\$0	\$0	\$0	10
Health Organization Transformation	\$2,115,755	\$200,000	\$0	\$100,000	\$100,000	\$0	\$0	15
High Pressure Plasma Energy, Agriculture,	\$932,000	\$0	\$0	\$0	\$0	\$0	\$0	20.4
Identification Technology Research	\$3,487,805	\$0	\$0	\$0	\$0	\$0	\$0	10
Integration of Composites into Infrastructur	\$1,299,124	\$0	\$0	\$0	\$0	\$0	\$0	4
iPerform - I/UCRC for Assistive Technologi	\$331,000	\$0	\$0	\$0	\$0	\$0	\$0	15
Lasers & Plasmas in Advanced Manufactur	\$250,260	\$55,000	\$25,000	\$0	\$30,000	\$0	\$0	10
Manufacturing and Materials Joining Innov	\$2,858,709	\$2,086,442	\$439,031	\$25,000	\$10,000	\$86,343	\$1,526,068	6
Membrane Science, Engineering & Techno	\$1,389,272	\$0	\$0	\$0	\$0	\$0	\$0	10
Metamaterials	\$648,299	\$40,000	\$40,000	\$0	\$0	\$0	\$0	18
Multi-functional Integrated System Technol	\$1,495,800	\$0	\$0	\$0	\$0	\$0	\$0	13
Net-Centric and Cloud Software and Syste	\$776,688	\$0	\$0	\$0	\$0	\$0	\$0	13
Next Generation Photovoltaics	\$1,403,000	\$50,000	\$0	\$50,000	\$0	\$0	\$0	7
Novel High-Voltage/Temperature Materials	\$915,000	\$150,000	\$0	\$50,000	\$100,000	\$0	\$0	10

* Report sorted Alphabetically by Center

IUCRC Structure Database, FY 2018-2019

Capital and In-Kind Support ¹²

<i>Center Name</i>	<i>Total Funding</i>	<i>Total Cap In-Kind</i>	<i>Equip-ment</i>	<i>Facilities</i>	<i>Personnel</i>	<i>Software</i>	<i>Other Support</i>	<i>Admin¹³ Budget</i>
Particulate and Surfactant Systems	\$436,346	\$0	\$0	\$0	\$0	\$0	\$0	14
Pharmaceutical Development	\$305,000	\$15,000	\$0	\$0	\$5,000	\$0	\$10,000	18
Power Management Integration	\$168,750	\$0	\$0	\$0	\$0	\$0	\$0	73
Rational Catalyst Synthesis	\$486,000	\$0	\$0	\$0	\$0	\$0	\$0	15
Research in Intelligent Storage	\$1,044,000	\$0	\$0	\$0	\$0	\$0	\$0	10
Research in Storage Systems	\$480,000	\$0	\$0	\$0	\$0	\$0	\$0	12
Resource Recovery and Recycling	\$817,998	\$0	\$0	\$0	\$0	\$0	\$0	10
Robots and Sensors for the Human Well-b	\$961,920	\$374,846	\$324,846	\$0	\$35,000	\$15,000	\$0	5
Science Center for Marine Fisheries	\$516,000	\$205,673	\$40,000	\$44,000	\$115,673	\$6,000	\$0	20
Science of Heterogeneous Additive Printin	\$810,000	\$0	\$0	\$0	\$0	\$0	\$0	12
Security and Software Engineering Resear	\$1,841,164	\$1,300,783	\$0	\$18,000	\$307,552	\$290,000	\$685,231	15
Smart Vehicle Concepts	\$684,412	\$0	\$0	\$0	\$0	\$0	\$0	9
Space, High-Performance, and Resilient C	\$2,674,898	\$697,000	\$217,000	\$60,000	\$140,000	\$280,000	\$0	10
Spatiotemporal Thinking, Computing and A	\$1,588,231	\$150,000	\$50,000	\$0	\$100,000	\$0	\$0	15
Surveillance Research	\$691,000	\$34,000	\$0	\$0	\$0	\$0	\$34,000	5
Sustainably Integrated Buildings and Sites	\$200,000	\$0	\$0	\$0	\$0	\$0	\$0	10
Tire Research	\$795,301	\$40,000	\$40,000	\$0	\$0	\$0	\$0	9
Unmanned Aircraft Systems	\$2,039,571	\$0	\$0	\$0	\$0	\$0	\$0	14
Visual and Decision Informatics	\$1,425,590	\$0	\$0	\$0	\$0	\$0	\$0	21
Water and Environmental Technology	\$1,037,000	\$0	\$0	\$0	\$0	\$0	\$0	10
Water Equipment and Policy	\$824,721	\$8,545	\$0	\$0	\$0	\$0	\$8,545	15
Wheat Genetics	\$800,500	\$0	\$0	\$0	\$0	\$0	\$0	10
Wind Energy Science, Technology and Re	\$608,249	\$0	\$0	\$0	\$0	\$0	\$0	12
Wood-Based Composites	\$1,029,252	\$630,216	\$51,377	\$77,684	\$501,155	\$0	\$0	34
Grand Mean	\$1,148,953	\$125,486	\$34,817	\$10,780	\$28,498	\$12,236	\$39,155	14.81
Grand Sum	\$83,873,535	\$9,160,483	\$2,541,631	\$786,914	\$2,080,377	\$893,243	\$2,858,318	N/A

* Report sorted Alphabetically by Center

Table 4: 2018-2019 INDUSTRY MEMBERSHIP DESCRIPTORS

Center Name	2018-2019 MEMBERSHIPS			LIFETIME MEMBERSHIPS ¹⁴			ANNUAL FEES ¹⁵			
	Current	Starting	New	Left	Starting	New	Left	Primary	Secondary	Tertiary
Accelerated Real Time Analytics	11	11	0	0	11	11	0	\$50,000	\$25,000	
Advanced Design and Man of Integrate	9	10	1	2	13	19	10	\$50,000		
Advanced Electronics through Machine	12	14	0	2	12	14	2	\$50,000		
Advanced Forestry Systems ^a	87	86	3	2	68	237	145	\$25,000	\$5,000	
Advanced Knowledge Enablement	42	39	3	0	10	94	55	\$50,000	\$5,000	
Advanced Mammalian Biomanufacturin	23	17	6	0	16	23	0	\$50,000		
Advanced Non-Ferrous Structural Alloy	11	11	1	1	9	21	10	\$51,000	\$17,000	
Advanced Research in Drying	7	6	1	0	9	10	2	\$50,000	\$5,000	
Advanced Research in Forensic Scienc	17	17	3	3	17	20	3	\$25,000	\$5,000	
Advanced Subsurface Earth Resource	7	7	0	0	7	7	0	\$50,000	\$25,000	
Alternative Sustainable and Intelligent	14	14	0	0	14	14	0	\$50,000	\$50,000	
Arthropod Management Technologies	14	11	3	0	7	15	1	\$55,000	\$30,000	
Atomically Thin Multifunctional Coating	8	10	0	2	12	15	7	\$43,500	\$21,750	
Big Learning	26	26	0	0	26	26	0	\$50,000	\$25,000	
Bioplastics and Biocomposites	24	18	8	2	31	43	19	\$30,000	\$15,000	
Broadband Wireless Access and Applic	19	17	3	1	16	39	20	\$50,000		
Building Reliable Advances and Innova	10	11	2	3	11	13	3	\$50,000	\$25,000	
Ceramics Composites and Optical Mate	10	13	0	3	19	33	24	\$40,000	\$15,000	
Child Injury Prevention Studies	13	18	0	5	8	30	16	\$65,000	\$25,000	\$15,000
Cloud & Autonomic Computing	9	9	3	3	13	55	34	\$50,000	\$30,000	
Computational Biotechnology and Gen	5	7	3	5	7	10	5	\$50,000		
Configuration Analytics and Automation	9	10	1	2	7	15	7	\$50,000		
Cyber-Physical Systems for the Hospita	6	6	0	0	6	10	4	\$50,000		
Dielectrics and Piezoelectrics	28	27	2	1	24	32	5	\$37,800	\$12,600	
Disruptive Musculoskeletal Innovations	15	11	6	2	7	21	6	\$40,000	\$20,000	
E-Design	23	23	5	5	9	97	82	\$30,000	\$10,000	
Efficient Vehicles and Sustainable Tran	17	18	1	2	18	20	3	\$50,000		
Electromagnetic Compatibility	31	23	8	0	15	86	45	\$70,000	\$35,000	
Embedded Systems	16	21	1	6	7	36	20	\$50,000	\$25,000	\$5,000
Energy Harvesting Materials and Syste	11	13	3	5	11	35	24	\$40,000	\$20,000	
Energy-Smart Electronic Systems	14	18	1	5	15	38	26	\$50,000	\$25,000	
Excellence in Logistics and Distribution	3	6	2	5	29	100	131	\$60,000	\$30,000	\$5,000
Fiber-Wireless Integration and Networki	11	9	4	2	9	17	4	\$100,000	\$50,000	\$25,000
Freeform Optics	18	18	3	3	7	29	11	\$48,000	\$24,000	
Geomechanics and Mitigation of Geoha	10	10	0	0	10	10	0	\$50,000		
Grid-Connected Advanced Power Elect	18	18	3	3	17	41	23	\$40,000	\$5,000	
Health Organization Transformation	28	28	6	6	10	65	36	\$50,000	\$25,000	
High Pressure Plasma Energy, Agricult	9	9	0	0	9	9	0	\$50,000		
Identification Technology Research	24	18	8	2	8	74	56	\$40,000	\$10,000	
Integration of Composites into Infrastru	31	34	7	10	15	80	49	\$50,000	\$40,000	\$15,000
iPerform - I/UCRC for Assistive Technol	6	5	1	0	8	13	2	\$50,000	\$20,000	
Lasers & Plasmas in Advanced Manufa	9	16	0	7	9	58	51	\$35,000	\$10,000	
Manufacturing and Materials Joining In	51	48	11	8	25	89	38	\$55,000	\$27,500	\$11,000
Membrane Science, Engineering & Tec	20	16	6	2	8	31	11	\$60,000		
Metamaterials	8	11	0	3	8	20	12	\$45,000	\$25,000	
Multi-functional Integrated System Tech	20	16	4	0	10	25	5	\$50,000	\$25,000	
Net-Centric and Cloud Software and Sy	15	23	1	9	12	58	43	\$35,000	\$10,000	

* Report sorted Alphabetically by Center

a) Advanced Forestry Systems did not provide membership data for sites on no cost extension.

IUCRC Structure Database, FY 2018-2019

<i>Center Name</i>	<i>2018-2019 MEMBERSHIPS</i>			<i>LIFETIME MEMBERSHIPS¹⁴</i>			<i>ANNUAL FEES¹⁵</i>			
	<i>Current</i>	<i>Starting</i>	<i>New</i>	<i>Left</i>	<i>Starting</i>	<i>New</i>	<i>Left</i>	<i>Primary</i>	<i>Secondary</i>	<i>Tertiary</i>
Next Generation Photovoltaics	20	17	5	2	6	41	21	\$50,000		
Novel High-Voltage/Temperature Mater	11	18	0	7	13	24	12	\$40,000	\$20,000	
Particulate and Surfactant Systems	7	9	1	3	43	70	62	\$35,000	\$15,000	
Pharmaceutical Development	5	7	0	2	4	19	13	\$50,000	\$25,000	
Power Management Integration	2	2	0	0	2	2	0	\$50,000	\$25,000	
Rational Catalyst Synthesis	10	10	2	2	7	12	2	\$40,000	\$20,000	
Research in Intelligent Storage	12	15	1	4	8	42	30	\$50,000	\$15,000	
Research in Storage Systems	8	10	1	3	10	22	14	\$50,000	\$15,000	
Resource Recovery and Recycling	17	16	1	0	14	45	28	\$40,000		
Robots and Sensors for the Human We	12	23	3	14	15	38	24	\$35,000	\$10,000	
Science Center for Marine Fisheries	13	13	0	0	9	14	1	\$50,000	\$25,000	
Science of Heterogeneous Additive Pri	10	10	0	0	10	10	0	\$50,000	\$15,000	\$5,000
Security and Software Engineering Res	23	20	11	8	20	71	48	\$40,000	\$5,000	
Smart Vehicle Concepts	14	19	0	5	14	46	32	\$59,400	\$14,000	\$10,000
Space, High-Performance, and Resilien	41	37	9	5	35	44	5	\$40,000		
Spatiotemporal Thinking, Computing an	12	11	4	3	10	35	21	\$50,000	\$25,000	\$5,000
Surveillance Research	12	10	2	0	8	18	6	\$50,000	\$25,000	
Sustainably Integrated Buildings and Si	4	5	1	2	4	13	9	\$50,000	\$25,000	\$15,000
Tire Research	20	18	4	2	18	24	14	\$40,000	\$20,000	
Unmanned Aircraft Systems	29	27	3	1	9	39	10	\$44,000		
Visual and Decision Informatics	19	19	5	5	17	42	23	\$40,000	\$10,000	
Water and Environmental Technology	32	31	3	2	33	74	42	\$30,000	\$10,000	\$3,000
Water Equipment and Policy ^a	16	18	1	3	6	25	9	\$50,000	\$10,000	\$12,049
Wheat Genetics	10	10	0	0	12	13	3	\$50,000	\$20,000	
Wind Energy Science, Technology and	12	9	3	0	10	17	5	\$42,400	\$15,900	\$5,000
Wood-Based Composites	16	16	1	1	8	24	8	\$35,000		
Grand Mean	16.66	16.81	2.53	2.68	13.62	36.74	20.44	\$46,960	\$20,131	\$8,737
Grand Sum	1216	1227	185	196	994	2682	1492			

* Report sorted Alphabetically by Center

IUCRC Structure Database, FY 2018-2019

a) Water Equipment and Policy has two different tertiary membership programs that feature different fee structures: \$10,000 for public utilities and \$12,049 for trade associations.

Table 5: 2018-2019 HUMAN RESOURCES

Center Name	RESEARCHERS			STUDENTS			
	Faculty¹⁶ Scientists	Research Staff	Post Docs	Admin- istrative	PhD	Masters	Under- graduate
Accelerated Real Time Analytics	18	4	3	3	17	15	8
Advanced Design and Man of Integrated Microfluidics	9	0	2	2	12	3	2
Advanced Electronics through Machine Learning	18	0	2	1	23	1	2
Advanced Forestry Systems	16	9	2	6	5	7	9
Advanced Knowledge Enablement	14	0	0	1	7	7	10
Advanced Mammalian Biomanufacturing Innovation Cente	20	4	2	2	29	15	7
Advanced Non-Ferrous Structural Alloys	9	5	4	1	12	3	11
Advanced Research in Drying	13	1	1	2	6	2	2
Advanced Research in Forensic Science	24	1	2	4	8	4	10
Advanced Subsurface Earth Resource Models	12	0	0	2	5	2	3
Alternative Sustainable and Intelligent Computing	10	1	1	2	8	2	0
Arthropod Management Technologies	18	7	10	2	2	1	2
Atomically Thin Multifunctional Coatings	6	0	2	3	11	0	5
Big Learning	21	0	1	2	20	8	0
Bioplastics and Biocomposites	34	7	5	6	10	1	12
Broadband Wireless Access and Applications	19	0	1	2	12	4	1
Building Reliable Advances and Innovation in Neurotechn	12	1	3	1	13	2	31
Ceramics Composites and Optical Materials Center	9	1	0	3	8	2	2
Child Injury Prevention Studies	8	3	0	7	2	2	12
Cloud & Autonomic Computing	8	2	0	0	7	3	5
Computational Biotechnology and Genomic Medicine	19	3	3	2	10	5	4
Configuration Analytics and Automation	9	0	1	0	5	2	4
Cyber-Physical Systems for the Hospital Operating Room	2	1	0	0	2	2	0
Dielectrics and Piezoelectrics	14	0	4	2	13	1	3
Disruptive Musculoskeletal Innovations	16	21	4	8	5	10	10
E-Design	22	0	4	1	16	9	10
Efficient Vehicles and Sustainable Transportation Systems	24	0	1	0	13	5	3
Electromagnetic Compatibility	18	1	10	4	47	20	4
Embedded Systems	16	1	0	1	14	12	2
Energy Harvesting Materials and Systems	13	3	10	2	12	2	6
Energy-Smart Electronic Systems	8	0	2	2	16	8	2
Excellence in Logistics and Distribution	8	3	3	3	16	0	0
Fiber-Wireless Integration and Networking	8	3	3	3	16	0	0
Freeform Optics	18	5	0	5	26	11	13
Geomechanics and Mitigation of Geohazards	9	1	3	0	1	5	0
Grid-Connected Advanced Power Electronic Systems	13	2	3	7	17	4	7
Health Organization Transformation	37	1	3	2	18	17	14
High Pressure Plasma Energy, Agriculture, and Biomedica	11	0	0	2	4	3	6
Identification Technology Research	23	1	2	1	30	14	23
Integration of Composites into Infrastructure	15	9	3	2	20	22	12
iPerform - I/UCRC for Assistive Technologies to Enhance	2	0	0	0	6	3	2
Lasers & Plasmas in Advanced Manufacturing	3	0	1	0	2	0	10
Manufacturing and Materials Joining Innovation Center	24	3	2	5	23	28	47
Membrane Science, Engineering & Technology Center	25	0	5	3	21	1	0
Metamaterials	14	0	1	3	12	1	4
Multi-functional Integrated System Technology	29	4	6	1	35	7	27
Net-Centric and Cloud Software and Systems	19	0	0	1	24	0	3

*Reports sorted Alphabetically by Center.

<i>Center Name</i>	RESEARCHERS				STUDENTS			
	<i>Faculty¹⁶ Scientists</i>	<i>Research Staff</i>	<i>Post Docs</i>	<i>Admin-istrative</i>	<i>PhD</i>	<i>Masters</i>	<i>Under-graduate</i>	
Next Generation Photovoltaics	11	2	2	2	13	1	15	
Novel High-Voltage/Temperature Materials and Structures	11	1	6	0	16	3	2	
Particulate and Surfactant Systems	3	5	0	2	6	0	0	
Pharmaceutical Development	7	2	0	1	0	0	10	
Power Management Integration	3	0	0	1	1	0	0	
Rational Catalyst Synthesis	13	2	6	2	13	0	11	
Research in Intelligent Storage	7	0	1	0	18	1	0	
Research in Storage Systems	5	0	0	1	8	3	6	
Resource Recovery and Recycling	13	2	6	6	7	0	2	
Robots and Sensors for the Human Well-being	19	3	1	2	13	6	6	
Science Center for Marine Fisheries	7	6	1	2	4	4	3	
Science of Heterogeneous Additive Printing of 3D Material	13	1	4	2	8	2	0	
Security and Software Engineering Research Center	35	1	0	2	15	12	19	
Smart Vehicle Concepts	10	2	5	1	21	14	11	
Space, High-Performance, and Resilient Computing	14	1	1	4	26	29	38	
Spatiotemporal Thinking, Computing and Application	11	7	2	3	8	2	8	
Surveillance Research	14	1	0	1	7	9	10	
Sustainably Integrated Buildings and Sites	3	1	0	0	6	2	8	
Tire Research	16	0	0	1	11	6	0	
Unmanned Aircraft Systems	29	0	0	5	26	14	26	
Visual and Decision Informatics	26	2	0	10	31	13	11	
Water and Environmental Technology	11	4	2	5	6	3	3	
Water Equipment and Policy	15	0	3	0	6	6	1	
Wheat Genetics	8	4	1	1	2	2	19	
Wind Energy Science, Technology and Research	19	0	0	3	14	2	5	
Wood-Based Composites	16	0	0	3	11	8	4	
	Grand Mean	14.47	2.15	2.14	2.39	12.85	5.73	7.78
	Grand Sum	1056	155	156	172	938	418	568

*Reports sorted Alphabetically by Center.

Table 6: 2018-2019 CENTER DIRECTOR DESCRIPTOR

<i>Center Name</i>	<i>TIME ALLOCATION</i> ¹⁷				
	<i>Center Administration</i>	<i>Other Administration</i>	<i>Research</i>	<i>Teaching</i>	<i>Other</i>
Accelerated Real Time Analytics	25	10	45	15	5
Advanced Design and Man of Integrated Microfluidics	10	35	40	10	5
Advanced Electronics through Machine Learning	20	0	35	20	25
Advanced Forestry Systems	25	0	15	50	10
Advanced Knowledge Enablement	10	10	40	30	20
Advanced Mammalian Biomanufacturing Innovation Cente	20	0	50	30	0
Advanced Non-Ferrous Structural Alloys	15	15	40	20	10
Advanced Research in Drying	15	40	25	15	5
Advanced Research in Forensic Science	15	5	50	25	5
Advanced Subsurface Earth Resource Models	70	10	10	10	0
Alternative Sustainable and Intelligent Computing	30	5	35	25	5
Arthropod Management Technologies	35	10	45	0	10
Atomically Thin Multifunctional Coatings	10	10	40	20	20
Big Learning	10	5	50	30	5
Bioplastics and Biocomposites	10	23	32	22	13
Broadband Wireless Access and Applications	15	50	20	10	5
Building Reliable Advances and Innovation in Neurotechn	25	35	30	10	0
Ceramics Composites and Optical Materials Center	15	35	30	10	10
Child Injury Prevention Studies	10	30	50	0	10
Cloud & Autonomic Computing	5	80	10	0	5
Computational Biotechnology and Genomic Medicine	15	5	30	20	30
Configuration Analytics and Automation	30	0	70	0	0
Cyber-Physical Systems for the Hospital Operating Room	10	10	70	10	0
Dielectrics and Piezoelectrics	20	10	50	18	2
Disruptive Musculoskeletal Innovations	7	23	40	20	10
E-Design	5	60	15	15	5
Efficient Vehicles and Sustainable Transportation System	13	0	37	40	10
Electromagnetic Compatibility	20	10	40	20	10
Embedded Systems	15	15	40	15	15
Energy Harvesting Materials and Systems	10	24	36	30	0
Energy-Smart Electronic Systems	10	55	35	0	0
Excellence in Logistics and Distribution	10	10	30	40	10
Fiber-Wireless Integration and Networking	25	25	25	10	15
Freeform Optics	30	5	40	20	5
Geomechanics and Mitigation of Geohazards	4	0	21	75	0
Grid-Connected Advanced Power Electronic Systems	15	35	30	10	10
Health Organization Transformation	20	5	40	30	5
High Pressure Plasma Energy, Agriculture, and Biomedic	10	10	40	40	0
Identification Technology Research	25	0	40	25	10
Integration of Composites into Infrastructure	13	6	45	30	6
iPerform - I/UCRC for Assistive Technologies to Enhance	25	5	30	30	10
Lasers & Plasmas in Advanced Manufacturing	10	5	40	30	15
Manufacturing and Materials Joining Innovation Center	15	20	45	15	5
Membrane Science, Engineering & Technology Center	10	5	50	30	5
Metamaterials	10	30	35	15	10
Multi-functional Integrated System Technology	30	55	5	5	5
Net-Centric and Cloud Software and Systems	15	10	45	30	0
Next Generation Photovoltaics	10	10	50	30	0

* Report sorted Alphabetically by Center

*Includes only primary center director

TIME ALLOCATION ¹⁷

<i>Center Name</i>	<i>Center Administration</i>	<i>Other Administration</i>	<i>Research</i>	<i>Teaching</i>	<i>Other</i>
Novel High-Voltage/Temperature Materials and Structures	20	5	30	45	0
Particulate and Surfactant Systems	19	4	44	30	3
Pharmaceutical Development	10	30	30	20	10
Power Management Integration	14	0	36	40	10
Rational Catalyst Synthesis	30	10	30	20	10
Research in Intelligent Storage	15	5	40	30	10
Research in Storage Systems	15	20	20	25	20
Resource Recovery and Recycling	15	15	40	20	10
Robots and Sensors for the Human Well-being	15	15	60	0	10
Science Center for Marine Fisheries	35	5	45	10	5
Science of Heterogeneous Additive Printing of 3D Material	15	20	40	17	8
Security and Software Engineering Research Center	50	0	25	25	0
Smart Vehicle Concepts	25	0	40	20	15
Space, High-Performance, and Resilient Computing	20	40	25	15	0
Spatiotemporal Thinking, Computing and Application	5	15	20	50	10
Surveillance Research	15	25	25	25	10
Sustainably Integrated Buildings and Sites	20	0	45	30	5
Tire Research	15	10	55	20	0
Unmanned Aircraft Systems	15	15	30	30	10
Visual and Decision Informatics	25	5	45	0	25
Water and Environmental Technology	20	25	25	25	5
Water Equipment and Policy	20	5	45	25	5
Wheat Genetics	20	10	60	5	5
Wind Energy Science, Technology and Research	25	40	20	10	5
Wood-Based Composites	5	10	50	30	5
Grand Mean	17.88	16.23	36.86	21.53	7.63

Table 7: 2018-2019 CENTER OUTCOMES

Center Name:	STUDENTS RECEIVING DEGREE ¹⁸			STUDENTS HIRED BY MEMBERS ¹⁹			PROJECTS ²⁰	PUBLICATIONS ²¹		
	BS Grad	MS Grad	PhD Grad	BS Hired*	MS Hired*	PhD Hired*		w/ Ctr Research	w/ IAB Members	Present.
Accelerated Real Time Analytics	7	13	7	3	5	0	18	32	11	16
Advanced Design and Man of Integrated	0	2	4	0	0	0	11	11	1	35
Advanced Electronics through Machine Le	0	0	1	0	0	0	19	37	10	27
Advanced Forestry Systems	4	3	2	0	0	0	9	35	0	62
Advanced Knowledge Enablement	13	15	4	2	6	2	12	23	3	14
Advanced Mammalian Biomanufacturing I	0	8	7	0	0	3	22	8	1	18
Advanced Non-Ferrous Structural Alloys	4	1	1	1	0	0	5	26	6	31
Advanced Research in Drying	0	0	3	0	0	0	8	0	0	2
Advanced Research in Forensic Science	5	7	4	1	2	2	17	2	0	19
Advanced Subsurface Earth Resource Mo	0	1	0	0	0	0	4	0	0	2
Alternative Sustainable and Intelligent Co	0	0	1	0	0	0	16	8	4	33
Arthropod Management Technologies	0	1	1	0	0	0	8	7	0	25
Atomically Thin Multifunctional Coatings	2	0	3	0	0	1	6	17	0	59
Big Learning	0	4	0	0	1	0	20	14	4	16
Bioplastics and Biocomposites	1	1	3	0	0	1	9	7	0	13
Broadband Wireless Access and Applicati	5	5	3	2	1	0	13	26	6	17
Building Reliable Advances and Innovatio	0	2	1	0	0	0	8	15	0	17
Ceramics Composites and Optical Materia	0	3	7	0	0	4	11	9	0	8
Child Injury Prevention Studies	3	3	0	0	1	0	14	13	0	22
Cloud & Autonomic Computing	6	5	3	1	1	0	8	28	5	26
Computational Biotechnology and Genomi	0	0	3	0	0	1	5	6	0	4
Configuration Analytics and Automation	3	1	3	0	0	2	8	14	2	20
Cyber-Physical Systems for the Hospital	0	1	2	0	0	0	8	8	0	7
Dielectrics and Piezoelectrics	2	0	2	0	0	0	15	26	6	70
Disruptive Musculoskeletal Innovations	2	2	2	0	0	0	14	5	2	14
E-Design	6	8	5	2	1	0	22	52	6	65
Efficient Vehicles and Sustainable Transp	0	7	6	0	0	1	16	8	2	10
Electromagnetic Compatibility	1	12	6	0	6	2	29	52	21	14
Embedded Systems	0	0	1	0	0	0	15	16	4	42
Energy Harvesting Materials and Systems	0	0	4	0	0	0	20	17	5	53
Energy-Smart Electronic Systems	3	18	8	0	0	0	13	23	13	112
Excellence in Logistics and Distribution	3	0	0	1	0	0	3	1	0	3
Fiber-Wireless Integration and Networking	0	0	1	0	0	0	9	26	10	27
Freeform Optics	4	5	2	2	1	1	23	12	2	10
Geomechanics and Mitigation of Geohaza	0	0	0	0	0	0	8	0	0	0
Grid-Connected Advanced Power Electron	1	6	4	0	0	2	11	19	0	45
Health Organization Transformation	14	5	4	1	2	1	28	28	11	88
High Pressure Plasma Energy, Agriculture	3	0	0	1	0	0	9	6	3	8
Identification Technology Research	2	9	6	0	0	1	22	45	1	55
Integration of Composites into Infrastructu	1	7	5	0	1	1	16	42	13	50
iPerform - I/UCRC for Assistive Technolog	5	1	2	0	0	0	4	20	3	6
Lasers & Plasmas in Advanced Manufactu	1	1	3	0	0	0	6	8	0	1
Manufacturing and Materials Joining Innov	5	8	3	0	1	1	34	40	13	83
Membrane Science, Engineering & Techn	3	2	6	0	1	2	20	36	9	53
Metamaterials	0	1	1	0	0	1	15	3	2	14
Multi-functional Integrated System Techno	8	2	2	0	0	0	21	23	8	15
Net-Centric and Cloud Software and Syste	4	4	8	4	1	3	13	22	5	30

* Report sorted by Alphabetically by Center

* See Table 8 for additional alumni career outcomes.

Center Name:	STUDENTS RECEIVING DEGREE ¹⁸			STUDENTS HIRED BY MEMBERS ¹⁹			PROJECTS ²⁰	PUBLICATIONS ²¹		
	BS Grad	MS Grad	PhD Grad	BS Hired*	MS Hired*	PhD Hired*		w/ Ctr Research	w/ IAB Members	Present.
Next Generation Photovoltaics	1	3	4	0	1	0	16	19	2	16
Novel High-Voltage/Temperature Material	0	2	8	0	1	0	16	21	0	18
Particulate and Surfactant Systems	0	0	2	0	0	0	8	5	0	33
Pharmaceutical Development	1	0	2	0	0	1	11	10	0	29
Power Management Integration	0	0	0	0	0	0	1	0	0	0
Rational Catalyst Synthesis	1	0	5	0	0	0	8	4	0	7
Research in Intelligent Storage	0	0	7	0	0	2	15	21	5	12
Research in Storage Systems	5	3	1	1	2	0	8	8	1	12
Resource Recovery and Recycling	0	0	2	0	0	0	11	2	2	14
Robots and Sensors for the Human Well-b	4	4	4	0	0	0	14	23	3	37
Science Center for Marine Fisheries	0	2	1	0	2	0	19	10	0	22
Science of Heterogeneous Additive Printin	0	0	0	0	0	0	7	0	0	0
Security and Software Engineering Resea	0	5	0	0	3	0	27	17	4	63
Smart Vehicle Concepts	2	7	3	0	1	0	17	48	1	40
Space, High-Performance, and Resilient C	23	23	4	0	5	4	11	23	3	51
Spatiotemporal Thinking, Computing and	0	1	3	0	0	0	10	22	5	30
Surveillance Research	7	9	2	1	1	0	14	7	0	32
Sustainably Integrated Buildings and Sites	2	2	1	0	0	0	1	5	0	5
Tire Research	2	2	2	0	0	0	17	6	0	7
Unmanned Aircraft Systems	5	8	3	0	1	0	25	34	3	43
Visual and Decision Informatics	2	12	12	0	0	0	21	27	6	22
Water and Environmental Technology	0	1	0	0	1	0	21	12	0	31
Water Equipment and Policy	4	7	3	0	0	0	12	23	2	39
Wheat Genetics	2	1	2	0	0	0	6	4	0	5
Wind Energy Science, Technology and Re	9	1	3	0	0	0	12	12	1	17
Wood-Based Composites	2	2	2	0	1	2	18	16	0	5
Grand Mean	2.64	3.68	3.01	0.32	0.68	0.56	13.58	17.19	3.15	26.73
Grand Sum	193	269	220	23	50	41	991	1255	230	1951

* Report sorted by Alphabetically by Center

* See Table 8 for additional alumni career outcomes.

Table 8: 2018-2019 ALUMNI CAREER OUTCOMES

Table 8a: Centers Reporting One or More Alumni Career Outcome Last Fiscal Year

Alumni Outcome	# of Centers	% of Centers
Hired by Industry Members	37	51%
Hired by Governmental Members	9	12%
Hired by Non-Member Industry	55	75%
Hired by Non-Member Governmental Agency	12	16%
Faculty Positions	14	19%
Postdoc Positions	30	41%
Continuing Education	41	56%
Unknown/Not Reported	33	45%

Table 8b: Total Number and Means of Alumni Career Outcomes Last Fiscal Year

Alumni Outcome	Total for All Centers	Mean for All Centers
Hired by Industry Members	99	1.36
Hired by Government Members	15	0.21
Hired by Non-Member Industry	201	2.75
Hired by Non-Member Governmental Agency	35	0.48
Faculty Positions	17	0.23
Postdoc Positions	42	0.58
Continuing Education	125	1.71
Unknown/Not Reported	146	2.00

**Table 9: 2018-2019 INTELLECTUAL PROPERTY
AND COMMERCIALIZATION EVENTS**

Table 9a: Centers Reporting One or More Intellectual Property and Commercialization Event Last Fiscal Year

Intellectual Property Event	# of Centers	% of Centers
Invention Disclosures	33	46%
Patent Applications	29	40%
Patents Granted/Derived	13	18%
Licensing Agreements	7	10%
Royalties Realized	2	3%
Software Copyrights	9	13%
Spinoff Companies Formed	8	11%

Table 9b: Total Number and Means of Intellectual Property and Commercialization Events Last Fiscal Year

Intellectual Property Event	Total for All Centers	Mean for All Centers
Invention Disclosures	84	1.17
Patent Applications	63	0.86
Patents Granted/Derived	24	0.33
Licensing Agreements	23	0.32
Royalties Realized	3	0.04
Software Copyrights	20	0.28
Spinoff Companies Formed	9	0.13

APPENDIX

FOOTNOTES AND SPECIAL CONSIDERATIONS

Footnotes appear on top of columns and/or at end of rows for each Table and are described in this Appendix.

- 1) All averages and sums exclude missing data. With the exception of percentages, data from multi-university centers has been aggregated across universities; percentages represent averages for the reporting universities.
- 2) This report includes only data on Centers which were actively funded or under a no cost extension in the NSF IUCRC Program during the 2017-2018 fiscal year.
- 3) On Table 1, "YEAR FUNDED" indicates the year NSF gave the center the operating grant under which it was originally established as an IUCRC.
- 4) On Table 2, "TOTAL FUNDING" refers to the total cash income coming into the Center from the sources listed.
- 5) On Table 2, "NSF IUCRC" refers to the total funding provided by the IUCRC program, including operating grant, supplements, evaluator support, etc.
- 6) "OTHER NSF" refers to funding for the Center provided by other NSF groups or divisions. Neither of these categories includes money transferred through NSF from other Federal Agencies (MIPRs).
- 7) On Table 2, "MEMBER FEES" refers to the total funding collected by a center from membership fees, including MIPRs covering membership support.
- 8) On Table 2, "ADDITIONAL INDUSTRY" refers to additional member funding (e.g., enhancements, donations, etc.) which is applied to the Center as a whole (e.g., income that results in outcomes shared equally by all Center members). This includes additional support provided by members through MIPRs that is above and beyond the membership fee paid.
- 9) On Table 2, "STATE TOTAL" refers to the funding provided by state government and/or an agency or program funded by state government.
- 10) On Table 2, "OTHER FEDERAL AGENCY" refers to funding for the Center provided by other Federal funding sources, but does NOT include funding from NSF.
- 11) On Table 2, "OTHER NON-FEDERAL AGENCY" refers to funding for the Center provided by other non-Federal funding sources, foundations, etc.
- 12) On Table 3, "CAPITAL AND IN-KIND CONTRIBUTIONS" refers to in-kind donations, and capital support for items of value over \$25,000 and includes equipment, facilities, personnel, and software.
- 13) On Table 3, "ADMIN. BUDGET (%)" refers to the estimated percentage of the primary site's direct operating budget allocated to administration (e.g., administrative salaries, travel, telephone).
- 14) On Table 4, "LIFETIME MEMBERSHIPS" are calculated at the membership level, not the organization level. Lifetime "starting" is the sum of all original memberships. Lifetime "new" is the sum of all original memberships plus all reported new memberships. Lifetime "Left" is the sum of all terminated memberships. Members who leave and then rejoin a center are counted for every addition and every departure.
- 15) On Table 4, "FEES" are broken down into primary, secondary, and tertiary (the latter two may represent variable membership fees).
- 16) On Table 5, "FACULTY SCIENTISTS" includes the Center Director(s) and Faculty Researchers.
- 17) On Table 6, "TIME ALLOCATION" refers to allocation of the primary site director's full-time equivalent for budgetary purposes.
- 18) On Table 7, "STUDENTS RECEIVING DEGREE" refers to the number of Center trained Ph.D./M.D.'s, M.S.'s, and B.A./B.S.'s that received a degree during the reporting period.
- 19) On Table 7, "STUDENTS HIRED BY MEMBERS" refers to the number of Ph.D./M.D.'s, M.S.'s, and B.A./B.S.'s that were hired by industry and government members during the reporting period. Additional alumni career outcomes are reported in Table 8.
- 20) On Table 7, "PROJECTS" refers to the number of research projects funded by a) IAB member fees, b) NSF IUCRC support, or c) any other support that would not have been obtained without the existence of the Center AND the results of which are shared with ALL center members. Does NOT include project that are not shared with all Center's members. Does NOT include projects carried out by Center affiliated researchers which are unrelated to the Center AND/OR the results of which are not shared with Center members.
- 21) On Table 7, "PUBLICATIONS" refers to the publications in the open literature the Center researchers produced based on Center research including publications reported that have a Center member as an author.

Additional Notes: Starting with FY2016 we are no longer capturing university contributions nor other cash support. Because we are no longer capturing these funding sources, the total funding for the center is not comparable to reports produced prior to FY2016.