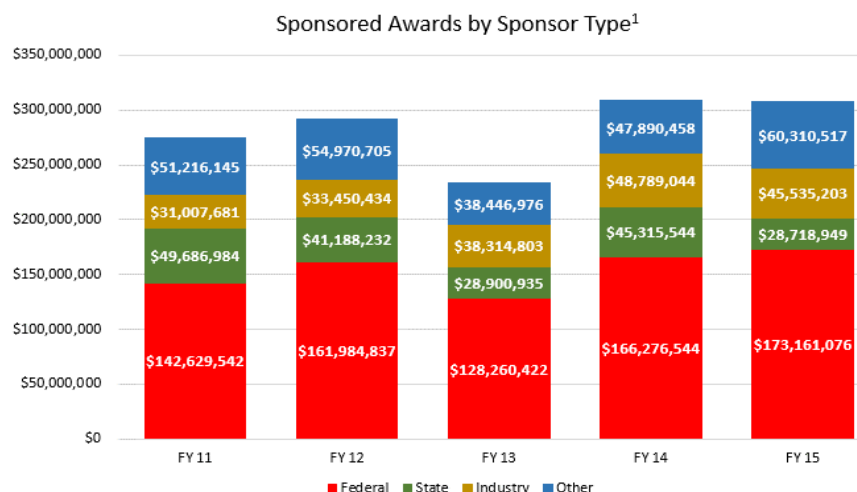


## NC State University Office of Research, Innovation, and Economic Development

### Annual Summary Report for Fiscal 2014-2015

**Overview.** Fiscal 2014-15 was another banner year for research at NC State in many respects. All indicators are that new records will be set in research expenditures and achievements, innovations, and national recognition. Total university research expenditures are expected to exceed \$450 million. Direct



research, innovation and economic development income represent about one quarter of the NC State's annual budget. We submitted more grants than any other year, and our yield is about 30% and growing. The most recent NSF comparative

data show that, among public universities without medical schools, NC State ranks fifth in the country by expenditures for industry-sponsored research and 10th in total research expenditures<sup>2</sup>.

All units reporting to the Office of Research, Innovation, and Economic Development (ORIED)<sup>3</sup> play an important and active role in furthering NC State strategic goals and implementation plan. Examples of our strategic focus include:

<sup>1</sup> From NC State RADAR data, multi-year awards by direct sponsor.

<sup>2</sup> [http://ncesdata.nsf.gov/datatables/herd/2013/html/HERD2013\\_DST\\_18.html](http://ncesdata.nsf.gov/datatables/herd/2013/html/HERD2013_DST_18.html)

<sup>3</sup> <http://research.ncsu.edu>: **Integrated Support Services Center (ISSC)** – tracking and publication of NC State research and ranking statistics, and post-award management support for NC State units that do not have their own contracts and grants groups; **Research Development Office (RDO)** – center, institute, and laboratory support, shared infrastructure, strategic planning for research opportunities; **Proposal Development Unit (PDU)** large grant proposal development support and faculty training; **Centennial Campus Partnership Office (CCPO)** – management of Centennial Campus and economic partnerships through its economic development office and strategic alliances; **Sponsored Programs & Regulatory Compliance Services (SPARCS)** – support for a wide range of negotiation, pre-award and compliance activities vital for a leading research institution and staff research administration training; **Office of Technology Transfer (OTT)** – supporting essential activities such as licensing, managing innovation disclosures, patent processing, start-up support, and intellectual property related negotiations, protection and advancement; **Federal Affairs Office (FAO)** – develops and expands relationships with our

a) Enhancement of successes of our students through support for educational innovation and diversity grants and initiatives, collaborations with the Graduate School, protection of rights of students conducting research and Centennial Campus partnerships that provide internships and other high-impact experiences for students;

b) Enhancement of scholarship and research through technology transfer, pre- and post-proposal infrastructure and research compliance, promotion of and reporting on NC State's innovative research and economic development activities, support for and encouragement of shared research infrastructure (centers, institutes and laboratories), promote NC State to federal research agency decision makers and leaders to assist faculty in planning to complete for important research opportunities, support for large grant proposal development, investments in cost-share and grant matching and collaboration with the Provost's office investments into faculty retention and startups;

c) Enhancement of interdisciplinary scholarships through seed funding, support of and leadership in interdisciplinary centers and institutes, proposal development, and, in collaboration with the Provost's office and college administration, support of the Chancellor's Faculty Excellence cluster hiring, retention and research activities;

d) Enhancement of organizational excellence, in diversity, processes and operating procedures of ORIED's units, as well as of centers and institutes reporting to it, by creating a culture of constant improvement through strategic realignments, diversity awareness, data-driven decision making, additional resources for oversight of centers and institutes, development of additional compliance programs, online training for NC State researchers and staff, better information systems, e-Disclosure facilities and informative dashboards; and

e) Enhancement of NC State's local and global engagement through focused strategic partnerships at research and industrial level, including participation on the International Operations Council, development of master research agreements, local and global licensing of NC State research and development products,

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Congressional delegation, leads or assists in responding to congressional and federal agency inquiries, and hosts key visitors to federal agencies and congressional visitors to campus.

attraction of new Centennial Campus partners, and operation of an industry alliances group to seek industry partners for strategic research strengths. More details, including specific success stories, are available on our site and our metrics dashboards<sup>4</sup> and in our semi-annual *results* magazine<sup>5</sup>.

**Innovation and Economic Impact.** In January 2015, a University of North Carolina system-wide study<sup>6</sup> reported NC State's annual economic impact is at least \$6.5 billion in added state income. A significant portion – about \$1.6 billion – comes from NC State research spending and startup activities, and equivalent to over 22,500 jobs. Our economic partnership office was equally successful in playing an active role in catalyzing and securing investments in many counties through partnerships with economic development agencies across the state and more than 50 new and expanding industry clients, resulting in 12 announcements representing almost 1,500 jobs and more than \$100 million in investment.

Innovation and technology transfer escalated, closing out the fiscal year with a record-breaking 12 startups; female entrepreneurs lead five of these startups. The 2013 AUTM survey<sup>7</sup> ranked NC State tenth for Licenses and Options Executed (11). Among universities without medical schools, NC State consistently ranks among the Top 10 in technology transfer: Second in licenses and options executed, seventh in invention disclosures, seventh in startups formed, and ninth in U.S. patents issued. In FY 2014, 258 disclosures were submitted to the Office of Technology Transfer (OTT), 186 patents filed, 82 patents issued and 145 commercialization agreements signed. At the end of the fiscal year, cumulative totals include 866 patents issued, 311 pending and over 500 products assisted from invention to market.

Equally prolific were Centennial Campus Partnership Office (CCPO) activities - 15 new partners opened offices on Centennial Campus and nine partners graduated from Centennial Campus, moving elsewhere to create jobs throughout the region. This brings the current number of Centennial Campus

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<sup>4</sup> <http://research.ncsu.edu>, <http://research.ncsu.edu/sparcs/about-us/statistics/>, [http://research.ncsu.edu/ott-dashboard\\_public/ott\\_dashboard\\_public.html](http://research.ncsu.edu/ott-dashboard_public/ott_dashboard_public.html)

<sup>5</sup> <http://research.ncsu.edu/results/>

<sup>6</sup> <https://www.ncsu.edu/about/stats-and-strengths/driving-the-economy/>

<sup>7</sup> Licensing Activity Survey conducted by the Association of University Technology Manager (AUTM).

partners to 70. The CCPO (which celebrated its 30<sup>th</sup> anniversary in FY 2015), was instrumental in standing up PowerAmerica<sup>8</sup>. At \$140 million, this is the largest grant NC State has received to date.

As part of our activities we run very successful and very active strategic investment, incentive and seed programs. In the last year we have invested well over \$3 million into research cost-sharing, shared equipment, faculty retention and training. Our seed programs have yielded results above expectations.

The Chancellor's Innovation Fund<sup>9</sup>, which provides targeted funding to support the development of technologies with commercial potential, is approaching its fifth year with notable milestones: \$1.8 million awarded in 28 awards eight startup companies launched, nine license and option agreements, \$4.9 million in sponsored research funding to support further development (SBIRs, SPAs with industry, etc.) and \$926,000 in licensing revenue. This year, OTT facilitated the expansion of the final selection committee to include leaders from industry and the entrepreneurial and investment communities. Collectively, these individuals represent over \$100 million in angel and venture capital funds. To leverage the connections and expertise of the CIF selection committee members, OTT began scheduling periodic meetings with the committee members and PIs. Further plans are to develop an e-letter to showcase project progress throughout the year.

The Richard L. and Marlene V. Daugherty Centennial Campus Endowment for Entrepreneurship awarded \$35,000 (\$3,500 each) to five promising new university spinoffs to assist with startup costs. The companies vary widely in technology and scope of business, including “smart” bandages, web-based tourism marketing, educational mobile apps for husbandry, extraction of impurities from combustion products, aroma therapy garments, improving wireless charging times, new imaging approaches for targeting cancer tumors, an app to improve collegiate student outcomes, web-based office ergonomics data management and nontoxic insect repellent.

OTT's VIP portal was developed with the goal of matching entrepreneurial talent and investors with NC State startup companies. Launched in FY15 to a select group of leaders from the regional

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<sup>8</sup> <https://www.ncsu.edu/power/>, <http://www.poweramericainstitute.com/>

<sup>9</sup> <http://research.ncsu.edu/ott/for-inventors/chancellors-innovation-fund/>

entrepreneurial and investment communities in order to gain feedback, VIP has allowed us to match the skills and interests of external partners for partnering with our startups, as well as provide a mechanism for engagement with the entrepreneurial and investment community. The goal is to become completely transparent about the startup opportunities emerging from NC State and to generate excitement and recruit talent and investors early.

OTT also formalized the services offered by its venture development initiative. The resulting PackStart Program is open to all newly created NC State startup companies with the goal of helping them succeed. The services offered include business plan development support, strategic guidance, logo and website development, connections to strategic partners and funding opportunities, grant writing support and pitch presentation coaching.

**Research and Infrastructure.** Positive impacts of our centers, institutes, laboratories and initiatives also continued to grow<sup>10</sup>. They account for about quarter of NC State's research expenditures. Building on the activities and successes of our Institute for Advanced Analytics<sup>11</sup> (IAA), the more than \$60-million Laboratory for Analytic Sciences<sup>12</sup> (LAS), and the Data-Driven Sciences cluster funded by the Chancellor's Faculty Excellence Program<sup>13</sup>, Vice Chancellor Terri Lomax announced a university-wide Data Science Initiative (DSI)<sup>14</sup> in December 2014, marking a new era of nationally recognized leadership and enablement in analytics and data sciences. IAA, which has tripled its enrollment since its inception in 2007, is moving into a new, larger home in the new Alliance Building on Centennial Campus. PowerAmerica<sup>15</sup>, announced by President Obama in January 2014, now has a new Director, a new Chief Operating Officer, and also new headquarters, in the Venture Place on Centennial Campus. In May 2015, the National Science Foundation (NSF) reaffirmed continuation of funding for both of NC State's

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<sup>10</sup> <http://research.ncsu.edu/centers>

<sup>11</sup> <http://analytics.ncsu.edu/>

<sup>12</sup> <http://ncsu-las.org/>

<sup>13</sup> <http://workthatmatters.ncsu.edu/data-driven-science/>

<sup>14</sup> <http://research.ncsu.edu/dsi>

<sup>15</sup> <http://www.poweramericainstitute.com/>

Engineering Research Centers (ERCs) – Future Renewable Electric Energy Delivery and Management (FREEDM) Systems Center<sup>16</sup> and Center for Advanced Self-Powered Systems of Integrated Sensors and Technologies (ASSIST)<sup>17</sup>. NC State remains the only university in the nation that currently leads two ERCs, a rare distinction.

ORIED sponsors two internal seed funding programs. The annual Faculty Research and Professional Development (FRPD) program<sup>18</sup> is a partnership between ORIED, which contributes \$120,000 from sponsored project F&A funds, and the ten academic colleges, which are required to contribute a minimum 25% match. FY2015 awards (selected in spring 2014) included \$74,000 in college matches that funded 37 projects. The FY2016 cycle (selected in spring 2015) funded 39 of 60 proposals submitted, with the colleges committing in excess of \$200,000 in matching funds.

Funding opportunities for interdisciplinary research has increased significantly in recent years. The Research Innovation Seed Funding (RISF) program<sup>19</sup>, created to promote collaborations at NC State completed its fifth fiscal year cycle (two calls for proposal per year) of providing support for multidisciplinary teams to pursue projects that are high-risk/high-reward. To date, the RISF program, jointly funded by ORIED and the Kenan Institute for Engineering, Technology & Science at NC State (KIETS), has spent over \$1 million to jumpstart innovative interdisciplinary projects aligning with the university's strategic research areas. The reported return on 52 awarded projects (from over 250 submissions) to date includes external follow-up funding of \$3.3 million, ten workshops held, four summer courses developed, and over 60 participating students supported. In FY 2015, ORIED committed \$230,000 to support 14 projects.

The Proposal Development Unit (PDU) which provides pre-award support for large-scale, multidisciplinary research projects and graduate fellowships, assisted in 33 proposals submitted to federal, state and local agencies, including NSF (10), DOE (7), DOD (3), NIH (2), USDA (1), and FAA (1),

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<sup>16</sup> <http://www.freedm.ncsu.edu/>

<sup>17</sup> <http://assist.ncsu.edu/>

<sup>18</sup> <http://research.ncsu.edu/rdo/funding/internal-funding/frpd/>

<sup>19</sup> <http://research.ncsu.edu/rdo/funding/internal-funding/risf/>

representing 103 PIs/Co-PIs and over 300 other faculty and staff for a total of over \$200 million in funds requested. To date, five of these proposals have been awarded. Typical yield for PDU submissions is about 10% above that for non-PDU submissions for proposals over \$1 million. In addition, the PDU and Research Development Office (RDO) assisted in the submission of six final proposals for the UNC General Administration's Research Opportunities Initiative (ROI)<sup>20</sup>, funded by the NC General Assembly's "Game-Changing Research (16011)" bill to provided research seed funding across UNCS system institutions in six priority areas. NC State was the lead institution on two awards, and sub-recipient on two others.

The PDU followed up on its faculty development workshop series (FY 2013) and faculty development video series (FY 2014), by hosting a webinar in FY 2015 on NSF CAREER proposals with more than 75 faculty participating. The PDU also started quarterly newsletter in FY 2014 to provide information of interest to faculty and staff regarding trends in federal funding and to summarize the unit's ongoing activities. A proposal development blog is also being developed as a means of sharing information to continually improve the NC State research endeavor.

NC State Office of Federal Affairs continues to support congressional and federal agency visits by NC State deans, department heads and other key faculty and administrators including the successful efforts to attract the Secretary of Transportation to visit NC State and the FAA's Center of Excellence in UAV research and development.

**Organization.** In December 2014, Dr. Terri Lomax joined RTI International after seven years as the vice chancellor for research, innovation and economic development at NC State. Dr. Mladen A. Vouk led the RIED team through the remainder of the fiscal year. Dr. Alan Rebar will take the helm as permanent vice chancellor in September 2015. In addition to usual staff turnover, ORIED experienced several departmental level reorganizations and consolidations. New positions created include assistant vice chancellor for ministration, assistant vice chancellor for infrastructure, centers and institutes, and a new manager for research planning and reporting. Service capacity was increased in the Integrated Support Services Center

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<sup>20</sup> <http://www.northcarolina.edu/?q=node/1943>

(ISSC) and PDU – including a new PDU director. Key positions to be filled in FY 2015-16 include associate vice chancellor for research development and ORIED communications director.

We are in the process of refreshing our web presence to reflect the new University Communications brand platform. Development for a next generation of Sponsored Programs & Regulatory Compliances Services (SPARCS) support software. We also are providing additional continuing education opportunities for ORIED leadership and staff.

While housing ORIED units (ISSC, OTT, CCPO, and RDO) the Springboard Innovation Hub on Centennial Campus is also home to campus-located staff of the Small Business and Technology Development Center (SBTDC). The facility, located in the Poulton Innovation Center, continues to be a starting point for many new ventures, having provided temporary working space for LAS and PowerAmerica staff. CCPO launched the Industry Liaisons Working Group, a gathering of individuals representing centers, departments, institutes, etc. throughout NC State University in order to coordinate the University's interface with industry and to offer ORIED resources to these individuals that they don't have within their individual organizations.

With the goal of streamlining regulatory processes that affect research, SPARCS implemented an internally-developed IRB electronic application system; currently implementing a vendor solution for IACUC operations. A full-time compliance administrator was hired to work directly with faculty, department heads and deans to advise and help develop conflict of interest management plans. Partnering with the Office of General Counsel, SPARCS developed and implemented conflicts of interest (COI) training for administrative leaders and, with the Office of Information Technology, defined the institutional requirements for a university-wide learning management system to facilitate our faculty's ability to complete and monitor training requirements. Other SPARCS organizational improvements include completing an internal assessment of current business practices to improve services to researchers, implementing new sub-recipient assessment/monitoring requirements in compliance with the revised OMB Uniform Guidance, participating in newly formed Industry Partners Steering Group connecting disparate university offices responsible for increasing and managing relationships with industry including industry



funding, and continuing to reduce length of negotiations for industry-funded sponsored project agreements by utilizing more flexible licensing terms/provisions.