

The Oklahoma Center for the Advancement of Science and Technology (OCAST)

FY 2014 – 2020 Strategic Plan

“A Smart Investment in Oklahoma’s Science and Technology Future”

December 2013



1. Executive Summary

The Oklahoma Center for the Advancement of Science and Technology (OCAST) was established in 1987 by the Oklahoma Legislature for the purpose of diversifying and growing the state's economy through technology development, technology transfer and technology commercialization. Since 1987, OCAST has funded over 2,400 basic and applied research projects that total over \$240 million which, in turn, have produced a leverage or return on investment (ROI) of over \$5 billion—a cumulative ROI of 20:1. The agency takes great pride in being recognized as a best-in-class, results-driven, high-performing and efficient organization that benefits our state by increasing research activity and public/private collaborations leading to innovation, new businesses, job growth, higher wages and an improved quality of life for the citizens of our state and nation.

A strategic investment in science and technology will greatly benefit our state's total economic development efforts and position the state for sustainable growth in a dynamic technology environment. OCAST, through its network of partners and alliances, including strategic partnerships with the Oklahoma Manufacturing Alliance and i2E, is often described as "Oklahoma's Innovation Model." This model helps to build or enhance a culture of innovation and entrepreneurship that becomes the foundation for increasing the state's research and innovation agenda and capacity. The OCAST model is an integrated and seamless portfolio of programs and services designed to take researchers and clients efficiently through the concept-to-commercialization continuum. When researchers make discoveries and translate their research to the marketplace, the state benefits not only in terms of new companies and jobs, but also in terms of retaining or attracting top talent and increasing our tax base.

The OCAST Strategic Plan FY 2014 – FY 2020 is the agency's blueprint for growth is a vital link to *OneOklahoma: A Strategic Plan for Science and Technology in Oklahoma, 2012* which was published in the spring of 2012 by Governor Mary Fallin's Science and Technology Council. The two plans are complementary and, together, are a path to innovation, job growth and increasing the state's ability to compete in the global knowledge economy.

C. Michael Carolina, Executive Director
Oklahoma Center for the Advancement of Science and Technology

2. Agency Overview

2.1 Vision Statement

The Oklahoma Center for the Advancement of Science and Technology (OCAST) aspires to continue to be broadly and consistently recognized as a model of excellence for technology-based economic development as measured by return on investment, innovation and entrepreneurial activity, job growth and total economic impact.

2.2 Mission Statement

To foster innovation in existing and developing businesses by:

- Supporting basic and applied research;
- Facilitating technology transfer between research laboratories and firms and farms;
- Providing seed capital for new innovative firms and their products; and
- Fostering enhanced competitiveness of Oklahoma companies and small and medium-sized manufacturing firms through productivity and modernization initiatives.

(O.S. Title 74 Section 5060.3)

2.3 Agency Core Values

Integrity – adherence to fairness, honesty and efficient stewardship of public resources

Service – activities designed to support the needs of clients and colleagues

Passion – commitment to the OCAST vision

Teamwork – organizing to achieve team goals

Merit – recognition and reward based on performance

Agility – responsiveness, resourcefulness and flexibility

Quality – focus on process, systems and services

Collaboration – coordinated effort to achieve individual and organizational goals

Leverage – effectiveness increased by inspiring others to act

2.4 Governing Board and Management Team

Oklahoma Science and Technology Research and Development (OSTRaD) Board Members

| | |
|------------------------------------|-------------------------------|
| Terry Salmon, Ed.D., Chair | Chelle Melton, DPh, Member |
| W. Hershel Lamirand, Vice Chair | Dayal Meshri, Ph.D., Member |
| Mark Ashton, J.D., Member | David Myers, Member |
| Don Betz, Ph.D., Member | Larry Parman, Member |
| David Boren, J.D., Member | Jim Reese, Member |
| Representative Elise Hall, Member | Karl Reid, Sc.D., Member |
| V. Burns Hargis, J.D., Member | Steve Rhines, J.D., Member |
| Rhonda Hooper, Member | Ed Shreve, Ph.D., Member |
| Glen D. Johnson, J.D., Member | Steadman Upham, Ph.D., Member |
| Senator Clark Jolley, J.D., Member | Sherri Wise, Member |
| Tim Mather, Ph.D., Member | |

Agency Management

| | |
|--|--|
| C. Michael Carolina, Executive Director | Dan Luton, Director, Programs Division |
| Diane Lewis, Director, Administration and Finance Division | Steve Paris, Public Information & Rural Outreach Manager |
| Michelle Wynn, Director, Government Relations | |

3. Market Research and Segmentation

3.1 Innovation Environment

As stated in the *OneOklahoma* plan, the state of Oklahoma benefits directly from a strong science and technology (S&T) base. Economic development in the United States over the past 50 years or more has illustrated that a commitment to S&T is the most important key to building a better economy and quality of life for our citizens. Oklahoma has been a leader in bold and innovative approaches to foster economic development, including unique incentives to support quality jobs, aerospace engineering and S&T investment. The collective efforts of the public and private sectors have led to Oklahoma being widely considered as one of the most business friendly states in the nation, standing strong with a robust expanding economy and relatively low unemployment.

However, Oklahoma has suffered some decline in recent years in S&T, as noted by different S&T indicators. Oklahoma can reverse this decline through strategic investment and planning and is well-positioned to realize growth in multiple S&T areas. This includes traditional core and S&T sectors such as energy, aerospace, agriculture and manufacturing as well as new, high-profile, emerging markets and technology sectors, such as biotechnology and unmanned aircraft systems.

Oklahoma's business environment continues to recognize the importance of expanding the state's economy through technology-based research and development and the commercialization of new products and services. Some examples of initiatives funded in more recent legislative sessions include:

- \$15 million in funding to support the construction of the Oklahoma Medical Research Foundation (OMRF) Research Tower;
- \$9.7 million for the Oklahoma Quick Action Closing Fund to locate high impact businesses or facilities in Oklahoma;
- \$130 million investment in higher education for facility construction and research projects;
- \$60 million in funding for the Harold Hamm Diabetes Center at the University of Oklahoma (OU) Health Sciences Center
- \$60 million for Oklahoma State University (OSU) sensor technology and infrastructure;
- \$20 million for telemedicine capability at the OSU Center for Health Sciences in Tulsa;
- \$20 million for workforce development through the Department of Commerce;
- \$10 million increase (FY 2007) to OCAST to expand existing programs and to create new programs.

New OCAST initiatives since FY 2007 include:

- 1) expansion of the Oklahoma Applied Research Support (OARS) program to include nanotechnology;
- 2) expanded research and development efforts to include plant science research;
- 3) implemented and grown the Oklahoma Seed Capital Revolving Fund; and
- 4) focused on assisting small businesses obtain federal research and development funding through the Oklahoma SBIR Collaborative Resources (OSCR) program.

3.2 Oklahoma's Technology Landscape

LINKAGE TO GOVERNOR'S SCIENCE AND TECHNOLOGY COUNCIL

In the Spring of 2012, Oklahoma Governor Mary Fallin's Science and Technology Council—an advisory group consisting of representatives from the private, public and academic sectors and led by Oklahoma Secretary of Science and Technology Dr. Stephen McKeever—published *OneOklahoma: A Strategic Plan for Science and Technology in Oklahoma, 2012*. The mission of the Science and Technology Council (STC) is to promote impactful actions toward, and sustainable results from, the application of science and technology for the benefit of the people and economy of Oklahoma. OCAST is an integral part of the *OneOklahoma* plan and OCAST's executive director, Michael Carolina, is a governor-appointed member of the STC. OCAST will play a major role in the implementation of the *OneOklahoma* plan and the missions of the two entities are strategically aligned. In addition, the strategic plans of the two entities are linked and complementary and have a common set of technology focus areas that are listed below.

Current Technologies

- Aerospace, including:
 - composite materials
 - maintenance, repair and overhaul (MRO) technologies
- Agriculture, including:
 - plant breeding and plant genetics
 - biomass for energy production
 - animal diseases and toxicology
- Biotechnology, including:
 - biomedical (drug development, treatment, equipment and device development)
 - health care (disease treatment, e.g., cancer, diabetes, ocular, etc.)

- Climate, including:
 - weather science
 - advanced radar technology
- Defense and security, including:
 - Chemical, Biological, Radiological, Nuclear and Explosives (CBRNE) sensors for detection and mitigation
 - Intelligence, Surveillance and Reconnaissance (ISR) technologies including sensors and database integration
- Energy, including:
 - oil and gas
 - bioenergy
 - wind power
 - conservation and sustainability
 - energy storage and power distribution

Emerging Technologies

- Natural gas, including:
 - vehicular fuel
 - aviation fuel
- Climate change studies, including:
 - socio-economic implications of climate change
 - effects on native species and crop development
- Unmanned aerial systems, including:
 - aerospace engineering
 - education and training
 - radar technology
 - communications
 - test and evaluation
- Cyber security, including:
 - secure code development
 - tracking and monitoring
 - secure communications and data storage
 - security of critical computer-controlled infrastructure, etc.

Oklahoma’s Wealth Generators (as identified in the Inspired Oklahoma Economic Development Initiative, published by the Oklahoma Department of Commerce, 2013)

The ODOC initiative promotes targeted groups of wealth-generating industries for business retention, expansion and recruitment. To determine which groups of industries would be priorities, the following datasets were considered:

- **Wealth Generation**
 - Sales Revenue
 - Export Share
 - Wages
 - External Wealth Generation
- **Growth Potential**
 - New Markets
 - Industry Trends
 - Number of Establishments
- **Competitive Advantage**
 - Location Quotient
 - Physical Assets

From this study, it was determined that the following five industries represent Oklahoma’s wealth generators:

- Aerospace and Defense
- Energy
- Agriculture and Biosciences
- Information Technology and Finance
- Transportation and Distribution

Implicit in the wealth generators is the cross-cutting role manufacturing—both traditional and advanced—plays in Oklahoma’s industrial base.

3.3 OCAST’s Role in the Innovation Economy

Support from Oklahoma governors and the legislature has provided the resources needed to continue to build sustainable economic development in Oklahoma. OCAST and its governing board recognize that in the innovation economy, it is critical that Oklahoma has strategies in place that strengthen the culture of innovation, increased technology capacity and forges stronger collaboration between the public and private sector. A more effective partnership between

government, industry and academia leads to new ideas, innovations and a more efficient path to commercial applications. OCAST’s strategy is to advance research, development and technology transfer to grow the state’s economy, to improve the state’s relative position in the national economy and to ensure Oklahoma’s competitiveness in the dynamic, knowledge and global economy. Technology focus areas include:

- Aerospace
- Agriculture
- Biotechnology
- Defense and Security
- Energy
- Weather and Climate

In addition to the technology focus areas, the OCAST Oklahoma Seed Capital Fund is also critical as Oklahoma entrepreneurs face a critical shortage of capital necessary to transform new technologies into successful new businesses. The Seed Capital Fund is managed under contract to i2E, OCAST’s non-profit strategic partner.

3.4 Differentiated Value

OCAST, through dedication and a commitment to excellence, has earned the status of being a trusted agent among Oklahoma’s business, academic and economic communities. OCAST serves in a unique role of being a catalyst for collaboration leading to broad economic gain and prosperity.

OCAST is uniquely positioned to serve as the bridge between research and business. Through its network of strategic partnerships, OCAST creates a continuum of services that enables and accelerates the transition of ideas from the laboratory to the market. Through its strategic partnership with the Oklahoma Manufacturing Alliance (OMA), OCAST helps bring manufacturing innovation to all areas of our state—urban and rural. Through its strategic partnership with i2E, OCAST helps bring access to organized capital commercialization expertise to accelerate the expansion of the state’s research and industrial base. It is through this continuum of services that OCAST is able to carry out its mission of fostering innovation throughout Oklahoma’s economy and generating a significant economic impact that is resultant of such an endeavor.

4. Programs and Services

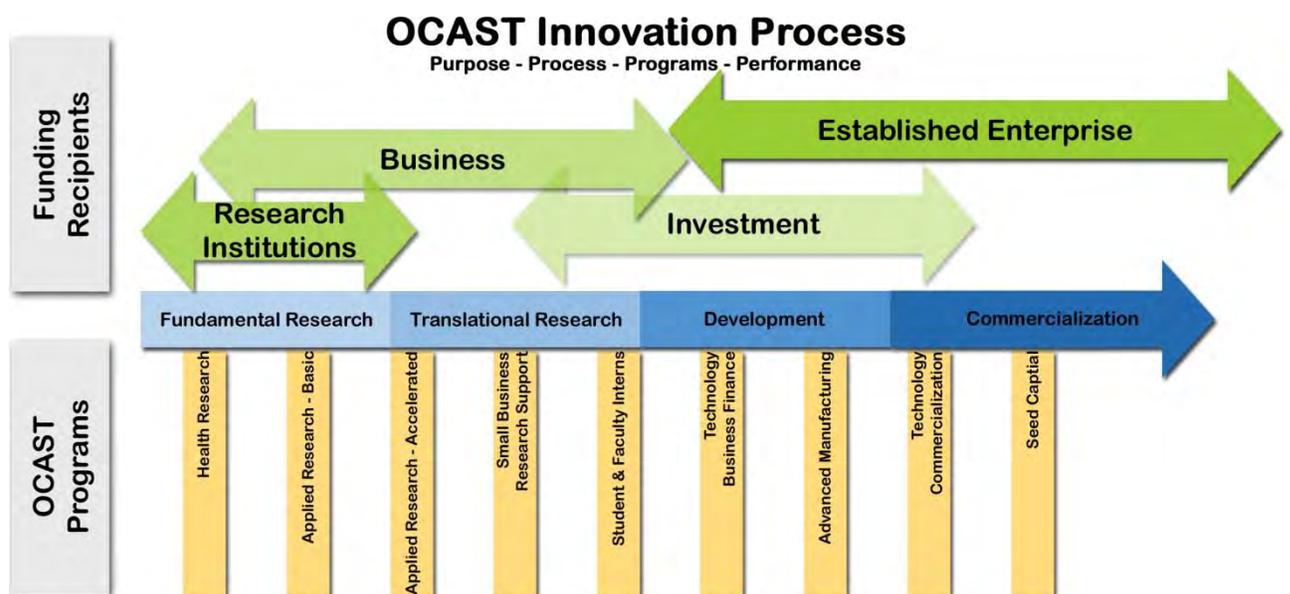
4.1 Programmatic Focus

OCAST's product suite consists of competitive funding programs, business support and funding of strategic partners including: i2E, the Oklahoma Manufacturing Alliance, and the New Product Development Center/Inventors Assistance Service.

OCAST programs create an integrated continuum of products and services that fuel a culture of innovation and entrepreneurship. The continuum covers the spectrum from concept to commercialization of basic research through commercialization assistance to launch new technologies and services. Through its programs, OCAST is helping Oklahoma researchers and entrepreneurs to:

- Create jobs and wealth
- Keep top students
- Attract and retain top research talent
- Compete more effectively for federal and private funding
- Compete in the global marketplace
- Attract venture capital
- Build sustainable economic development

These efforts will bolster Oklahoma's commitment to the creation of a more diversified economy that is steeped in science and technology, delivers high-paying quality jobs and engenders the quality of life demanded by Oklahoma's citizens.



4.2 Sustainability

OCAST is in its 27th year of existence, though it has continuously evolved to meet and exceed industry, technology and stakeholder demand. OCAST's FY 2014 – FY 2020 strategic plan lays the ground work for the continued sustainment of its efforts through:

- better alignment of programs and processes with those of its key strategic partners;
- increasing efficiency and maximizing resource utilization through the adoption of a continuous improvement program;
- continuously evolving to meet industry, technology and stakeholder demands;
- implementing pilot programs to explore the feasibility of fee-for-service and recoupment service delivery structures.

5. Agency Goals

5.1 Accelerate Technology Commercialization

Increase the number of OARS projects moving to commercialization by at least 50%

- Work with partner organizations, i2E, the New Product Development Center (NPDC) and the Oklahoma Manufacturing Alliance (OMA) to finalize, implement and refine the Proof of Concept Center. This will serve as the dynamic customer support model, coupling industry collaboration with strategic use of available resources to create multiple pathways for technology development. In addition, this will eliminate any service gaps or other impediments in the flow of R&D to commercialization.

5.2 Provide Exceptional Customer Service

Reduce award contract processing time by at least 25%

- Based on client feedback, implement and refine an integrated service delivery model that ensures a seamless customer experience and eliminates programmatic overlap. This will reduce internal process time, resulting in more rapid transfer of funds to OCAST award recipients.
- Implement Lean concepts across the organization and adopt a culture of continuous improvement leading to increased productivity and efficiency.

5.3 Increase Awareness

Increase communication activity by at least 25%

- Educate, inform and develop consensus among stakeholders to strategically position Oklahoma to compete successfully in a research and technology-based economy and initiate appropriate strategies
- Increase electronic/social media capability to reach all geographic areas of the state.
- Seek new opportunities to expand awareness in specific geographic regions of the state, increasing the level of media attention on the value of the agency to the region.

5.4 Ensure Transparency and Accountability

Ensure 100% compliance with all federal and state statutes, regulations and rules

- Ensure OCAST's position as a trusted agent through continuous improvement of accounting and reporting processes and procedures, resulting in a transparent and accountable agency
- Develop error-proof systems to ensure compliance with applicable statutes, laws, regulations and audit requirements.
- Fulfill legislative directive to inform and report OCAST's role in technology based economic development, its impact on Oklahoma's economy and the return-on-investment of tax payer funds to the legislature, key stakeholders and partners and the citizens of Oklahoma.

6. Performance Results

6.1 Expenditures

OCAST takes seriously its responsibility to be a good steward of taxpayer funds and is dedicated to ensuring accountability and transparency of its programs. OCAST, in its role as the state's technology-based economic development (TBED) agency, strategically invests funds in order to generate a significant return on investment (ROI) for Oklahoma. Over the past five years OCAST has generated a ROI of 24.6:1 on its investments while general administrative costs are less than 3.9% of the total budget.

OCAST Appropriations and Return on Investment - FY 2010 to FY 2014

| Fiscal Year | Total Funding | Direct TBED Investment | Return on Investment (dollars returned per one dollar invested) | % of Funding to General Administration |
|--------------------|----------------------|-------------------------------|--|---|
| FY 2014 | \$17,811,449 | \$17,124,139 | 22.4 | 3.86% |
| FY 2013 | \$17,811,449 | \$17,154,139 | 21.7 | 3.69% |
| FY 2012 | \$17,811,449 | \$17,124,109 | 25.5 | 3.86% |
| FY 2011 | \$19,152,096 | \$18,413,021 | 20.9 | 3.86% |
| FY 2010 | \$22,026,563 | \$21,176,563 | 32.6 | 3.86% |

6.2 Economic Impact

Cumulative Impact 1987-2013

| Program | OCAST Awards | Leveraged Private and Federal Funds and Business Financials | Leveraged Return (ROI) |
|-------------------------------------|----------------------|---|------------------------|
| Applied Research | \$83,756,143 | \$1,371,937,378 | 16.38 |
| Intern Partnership | \$1,364,630 | \$37,803,495 | 27.70 |
| Health Research | \$76,579,165 | \$379,389,253 | 4.95 |
| Inventors Assistance Service | \$2,633,385 | \$3,348,900 | 1.27 |
| Manufacturing Alliance | \$20,628,261 | \$2,213,538,895 | 107.31 |
| Nanotechnology Applications Project | \$5,647,370 | \$77,528,559 | 13.73 |
| Plant Science Research | \$3,677,289 | \$33,595,164 | 9.14 |
| Seed Capital | \$14,757,883 | \$106,694,649 | 7.23 |
| Small Business Research Assistance | \$4,724,463 | \$224,948,017 | 47.61 |
| Technology Business Finance | \$10,879,614 | \$339,067,608 | 31.17 |
| Technology Commercialization Center | \$24,997,408 | \$360,014,852 | 14.40 |
| Totals | \$249,645,611 | \$5,147,866,770 | 20.62 |

7. Five Year Funding Goals with Projected Return on Investment

7.1 Performance Based Growth Plan

Since its inception OCAST has taken seriously its role as a steward of taxpayer funds. As a result OCAST continues to maintain exceptionally low overhead costs, leading to over 95% of funding being applied directly to Oklahoma’s businesses, researchers and innovators. This allows OCAST funds to be leveraged into additional funding to further develop our technology based economy. Furthermore, since its inception, OCAST has had a cumulative return on investment (ROI) of 20:1, meaning that for every one dollar invested, Oklahoma receives twenty dollars in return.

Based on feedback from the business community, a long track record of generating a high rate of return, exemplifying the principles of accountability and transparency and succeeding in its mission to further Oklahoma’s technology based economy, OCAST has developed an incremental funding plan to further its directive. The table below illustrates OCAST’s five year incremental funding goals. Additionally, the table highlights the return on investment those dollars will generate, as well as the lost opportunity if funding levels were to remain static.

Performance Based Growth Plan FY 2015 through FY 2019

| Fiscal Year | Base Budget | Requested Budget | Budget Increase | ROI at Requested Funding | Lost Opportunity (ROI Difference Between Requested and Static Funding) |
|---------------------|-------------|------------------|-----------------|--------------------------|--|
| FY 2015 | \$17.8M | \$26.4M | \$8.6M | \$528M | (\$172M) |
| FY 2016 | \$26.4M | \$34.8M | \$8.4M | \$696M | (\$340M) |
| FY 2017 | \$34.8M | \$43.2M | \$8.4M | \$864M | (\$508M) |
| FY 2018 | \$43.2M | \$51.6M | \$8.4M | \$1,032M | (\$676M) |
| FY 2019 | \$51.6M | \$60.0M | \$8.4M | \$1,200M | (\$844M) |
| Total Impact | | | \$42.2M | \$4,320M | (\$2,540M) |