OCAST

Oklahoma Center for the Advancement of Science and Technology

2020 Impact Report

OKLAHOMA HEALTH RESEARCH

- The Oklahoma Health Research program funds basic research projects to improve human health
- $10,000 - $45,000 per year for up to three years

OKLAHOMA APPLIED RESEARCH SUPPORT

- Funds R&D in all fields from medicine, agriculture, energy, manufacturing and aviation/aerospace
- $10,000 - $45,000 per year for one or two years for proof-of-concept projects
- $10,000 - $300,000 over one to three years for accelerated projects
- Requires 1:1 match

HEALTH RESEARCH POSTDOCTORAL FELLOWSHIP INITIATIVE

- Encourages recent doctoral degree recipients to better prepare for scientific- and technical-based careers in research institutions or high-tech companies in Oklahoma with the goal of attracting/retaining high quality health research scientists
- Up to $75,000 per year for two years

INTERN PARTNERSHIPS

- Intern Partnerships support R&D projects that involve Oklahoma businesses and institutions of higher education by providing funds to support internship positions
- $10,000 - $30,000 per year for up to two years
- Requires 1:1 match

SMALL BUSINESS RESEARCH ASSISTANCE

- The federal Small Business Innovation Research (SBIR) program has complex application processes that can be challenging for small business owners and entrepreneurs
- OCAST's SBRA program improves the success rate of Oklahoma companies applying for the federal programs by providing proposal preparation and submission assistance

PLANT SCIENCE RESEARCH

- Awards funds for basic plant science for one or two years
- $10,000 - $50,000 per year for up to two years

EXECUTIVE DIRECTOR'S LETTER

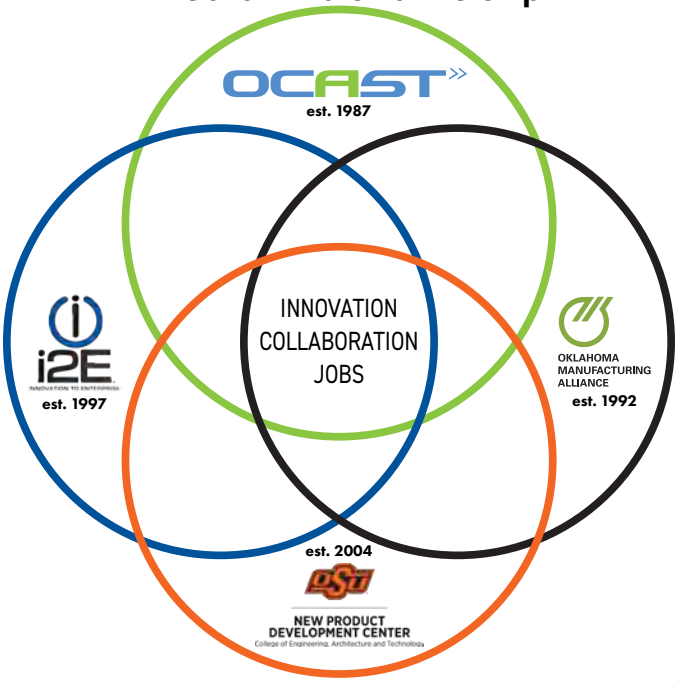
As we look back on 2019 and assess the contributions that our programs had in diversifying the state's economy and helping Oklahoma emerge as a top 10 competitive state, we clearly see how strategic our programs have become.

OCAST is the hub of the unique Oklahoma Innovation Model (OIM), a public-private partnership and collaboration to support scientific research, create new products and manufacturing processes, expand R&D and build successful startup companies across the state.

Along with the Oklahoma Manufacturing Alliance (OMA), i2E Inc., the New Product Development Center (NPDC) at OSU and Catalyst Programs at the Tom Love Innovation Hub at OU, our collective programs have generated a remarkable return of 22 to 1 over the 30-plus year history of OCAST.

THE OKLAHOMA INNOVATION MODEL

A Public-Private Partnership



C. Michael Carolina

That means that for every dollar we invested $22 dollars were returned to the state through wages, capital investments and revenue growth.

But it's more than numbers to us. It is people with the vision to create and grow innovative ventures. There are hundreds of examples across the state that have been supported by our team approach to building Oklahoma's economy.

- The New Product Development Center helped more than 100 inventors and companies in the state to realize nearly $8M in economic benefit generating a leverage ratio of 24:1.
- The dedicated work of the Oklahoma Manufacturing Alliance in 2019 helped Oklahoma manufacturers gain and retain 1,022 jobs, increase sales by more than $97M and save nearly $32M by increasing efficiency and reducing waste and conserving natural resources.
- Services and investment provided by i2E Inc. helped create 250 jobs with an annual payroll of $92M, raised $90M in equity and debt capital and had a $31M impact on gross sales.

We're proud of our team approach and invite you to read through our 2020 Impact Report to see the important contributions we are making to Oklahoma's economy.

In FY 2019, the State Auditor and Inspector's Office conducted a multi-year audit of OCAST resulting in "no reportable findings."

FY 2019 IMPACT RESULTS

800 Jobs created

Total payroll: **$24,415,177**

75 Patent applications

22 Patents granted

Value of patents: **$171,110,000**

Total financial impact: **$336,275,575**

Gross sales generated: **$91,772,873**

Average annual wage: **$66,209**

90 Student interns hired/ retained

20 Companies formed

Capital investments made: **$88,254,472**

Follow-on funds attracted: **$131,833,113**

TECHNOLOGY-BASED ECONOMIC DEVELOPMENT TIMELINE AND EVOLUTION

1983
- Oklahoma Council on Science and Technology created

1986
- Oklahoma Health Research program created

1987
- Economic Development Act established OCAST

1988
- State Question 611 established the Seed Capital program
- Small Business Research Assistance program created

1990
- Oklahoma Applied Research Support created

1992
- Industrial Extension System created (Oklahoma Manufacturing Alliance)

1997
- OMA initiated the Application Engineers program
- Intern Partnership program created

1998
- Technology Transfer Act allows OCAST to make investments
- Oklahoma Technology Commercialization Center (i2E) created
- SQ 680 and 681 passed allowing universities and researchers to own their technology
- Inventors Assistance Act transferred to OCAST

2002
- New Product Development Center (NPDC) created to serve Oklahoma Inventors Assistance Service

2006
- OCAST's Tulsa office opened to better serve northeast Oklahoma
- Seed capital fund launched with $5 million investment
- Plant Science Research program created

2015
- Oklahoma Innovation Model formalized

2016
- NPDC expands with new office in Tulsa to serve northeast Oklahoma

2018
- Postdoctoral Fellowship Initiative launched

MARTIN BIONICS - Oklahoma City

Creates bionic-inspired designs to advance the human experience

martinbionics.com

- Number of OCAST Awards: 9 - Applied, Nano, SBIR
- Number of Patents: 2
- Value of Patents: $20,000,000
- Grants Follow-on: $1,500,000
- Total Capital Investment: $1,000,000
- Total Gross Sales: $5,000,000
- Annual Payroll: $560,000

"We are excited to be named among the nation's leaders in research and development as an R&D 100 award winner. The added recognition will help us to reach a larger segment of the amputee population with limb loss experiencing socket discomfort from antiquated conventional sockets."

- Jay Martin, *Founder*

ADVANTAGE CONTROLS - Muskogee

Manufactures industrial water treatment equipment

advantagecontrols.com

- Number of OCAST Awards: 2 - Applied, Intern
- Annual Payroll: $3,500,000
- Annual Revenue: $20,000,000
- Number of Interns: 1
- Impact on Gross Sales: $2,000,000 annually estimated for new sensor

"Though our efforts to develop a direct-measurement phosphonate sensor didn't result in a marketable product, our OARS project experience helped shape the direction of alternate sensor development using established technologies. This new sensor is slated for release in the fall of 2020 and has the potential to increase annual revenues by 10 percent or more. We are thankful for the OCAST partnership that allowed us to dream big and pursue a potentially revolutionary technology, even though the results didn't turn out as expected."

- Jeff O'Neal, President

NEXTTHOUGHT - Norman

Builds education software to improve learning outcomes

nextthoughtstudios.com

- Number of OCAST Awards: 3 - Intern
- Interns Hired: 10
- Grants or Follow-on: $600,000
- Total Capital Investment: $10,000
- Total Gross Sales: $500,000

"This grant has been a great support to NextThought over the last year and in previous years. We have hired many OCAST interns over the years that are still with the company.

- Ken Parker, Co-Founder and Chief Executive Officer

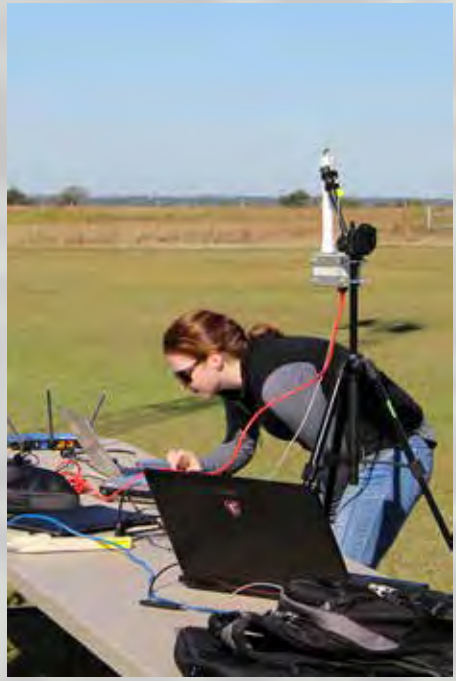
LAUREATE INSTITUTE FOR BRAIN RESEARCH - Tulsa

Discovers the causes of and cures for disorders of mood, anxiety, eating and memory

laureateinstitute.org

- Number of OCAST Awards: 4 - Health
- Industry partner for 1 Intern award with Oklahoma City Community College
- Grants or Follow-on: $221,441

Laureate's current OCAST funded project is to characterize clinical efficacy for an intervention targeting neural and cognitive deficits associated with opioid addiction by enhancing awareness and use of cognitive skills in the context of substance use recovery. The project will also complete a novel "Neurocognitive Empowerment for Addiction Treatment" (NEAT) program. This research study has the potential to identify a novel intervention that can be integrated into substance use treatment programs in Oklahoma and nation-wide to more effectively support recovery from opioid related disorders.



VIGILANT AEROSPACE SYSTEMS - Oklahoma City

Provides next-generation flight management and safety systems for both manned and unmanned aircraft

vigilantaerospace.com

- Number of OCAST Awards: 1 - Applied (with OSU)
- This project went to contract in FY 2019

"Under an exclusive patent license from NASA, Vigilant Aerospace Systems (VAS) is developing the technology that will provide the critical detect-and-avoid and autonomous traffic management capability to allow the integration of unmanned aircraft into the U.S. national airspace (NAS). The VAS system, FlightHorizon, will integrate with a variety of platforms, missions and concepts of operation to provide safe access to the NAS for UAS and UAM alike. This innovation is fundamental in helping to reshape the airspace of the 21st century."

- Jamey Jacob, P.E., principal investigator
Oklahoma State University

PRESTONEASTIN - Tulsa

Provides innovative solutions to positioning requirements serving the welding, aerospace, aviation, defense, automotive, transportation, ship building, material handling, thermal spray and heavy equipment manufacturing industries

prestoneastin.com

- Number of OCAST Awards: 2 - Applied, Intern, EDA grant
- The EDA grant was utilized for SEO development and engineering new product development for standard product dvision
- Number of Interns: 1 supplementing engineering staff
- Year-over-year growth within robotic sector of +30%
- Doubled robotic sales staff

"The EDA grant has helped us diversify our business tremendously. The grant allowed us to get out into very different industries, such as this large turntable for the nuclear power industry. A turntable of this magnitude is several hundred thousand dollars, and this is the fifth turntable that we've built for that customer."

- Robert Nock, Chief Executive Officer

PROGENTEC DIAGNOSTICS - Oklahoma City

Develops novel ways to engage lupus patients and other stakeholders for better clinical and patient outcomes

progentec.com

- Number of OCAST Awards: 2 - Applied
- Number of FTE: <10
- Additional Funding: Small Business Innovation Research (SBIR) grant from the National Institute of Allergy and Infectious Diseases (NIAID)
- $5 million Series A funding round completed in December 2019
- Significant Achievement: Completed technical validation of a panel of cytokine biomarkers

"Progentec Diagnostics received College of American Pathology accreditation in 2019 as a result of the technical validation experiments funded by this OCAST grant. Lupus patient enrollment in our community-based research study for clinical validation of a novel lupus flare prediction test is in the final phase."

- Mohan Purushothaman, Ph.D., President & Chief Executive Officer

GASTECH ENGINEERING - Sapulpa

Conducts process engineering, design and fabrication for the natural gas, oil production, refining, petrochemical and industrial gas markets

gastecheng.com

- Number of OCAST Awards: 2 - Applied, Intern
- Number of Interns: 2
- Number of Patents: 1 pending
- Annual Revenue: About $40,000,000
- Number of Employees: About 100

"We strongly believe the project will add to the growth and profitability of our company as well as provide revenue for the state of Oklahoma. Our test results are most encouraging. However, the product is not yet in the marketplace. Our next report should be more encouraging."

- Joe Reeble, President & Chief Executive Officer

OKLAHOMA MANUFACTURING ALLIANCE (OMA)

Each year, the Oklahoma Manufacturing Alliance works with hundreds of companies on thousands of projects. As a public-private partnership, the Manufacturing Alliance is a vital economic development organization chartered specifically to help existing industry. Support includes a field staff of 15 extension agents and 3 applications engineers with offices in local communities throughout the state. Services focus on improving the bottom line through concepts like Six Sigma and Lean Manufacturing, while growing the entire company through the adoption of new technologies, workforce development, strategic planning and expanded markets. As part of the national Manufacturing Extension Partnership, the Alliance is able to leverage federal resources on a local level.

Services Include:

- Lean Manufacturing and Six Sigma
- Engineering and technical assistance
- Business-to-business collaborations
- Export assistance and new markets
- Strategic and succession planning
- Supply chain efficiencies
- Continuous innovation and technology acceleration
- Regulatory and industry certification assistance
- Waste reduction, energy efficiency and sustainability
- Cybersecurity

okalliance.com

Annual Client Survey Results

- **Jobs Created/Retained:** 1,022
- **Annual Payroll:** $45.6m
- **Retained Sales:** $226.8m
- **Average Wage:** $62,267
- **Manufacturers Assisted:** 605
- **Projects Completed:** 298
- **Capital Investment Impact:** $80m
- **Impact on Gross Sales:** $97.2m

OMA CLIENT: GEORG FISCHER - Shawnee

Supplies piping systems made of plastics and metal for the safe transport of water, chemicals and gases, as well as corresponding services

gfcp.com

- Number of Employees: 500+
- Number of Interns: 10+
- Number of Patents: 20+

"OMA is thrilled to work with a company like Georg Fischer who is actively engaged in bringing industry 4.0 to their shop floor. The competitive edge gained through the integration of robotics into the manufacturing process is closely aligned with the programs which are being promoted and supported through the work of the OMA. Our goal is to bring this competitive edge to all Oklahoma companies, as they embrace technology in their company processes. The OMA will continue to work with Georg Fischer as they utilize our career tech centers and other higher ed entities to upskill existing employees."

- Kinnee Tilly, Vice President, Oklahoma Manufacturing Alliance

INNOVATION TO ENTERPRISE (I2E)

i2E provides business expertise and funding to more than 700 of Oklahoma's emerging small businesses. With nearly $64 million of investment capital under management, they are focused on serving Oklahoma companies in all phases of the business life cycle, from startups looking for their first round of capital to established businesses seeking funding to expand their markets or products. i2E helps launch new products into the marketplace quickly and efficiently while providing guidance to bring more non-dilutive funding to Oklahoma's researchers and entrepreneurs. The ultimate goal is to create more high paying jobs in Oklahoma while diversifying our economy.

Through its Seed Capital program, OCAST provides funding to innovative Oklahoma companies to incentivize co-investment. The statute and the related constitutional amendment allow the state to take an equity or debt position with firms – an authority that is unique to OCAST as a state agency. Required co-investment with the private sector, as the majority investor, leverages the agency's investment. OCAST invests through the Oklahoma Seed Capital Fund LLC, a for-profit subsidiary of i2E Inc.

i2e.org

Annual Client Survey Results

- **Jobs Created/Retained:** **1,312**
- **Annual Payroll:** **$92m**
- **Follow-on Funding:** **$4.4m**
- **Average Wage:** **$66,941**
- **Patents Awarded:** **49**
- **Equity/Debt Capital:** **$90m**
- **Impact on Gross Sales:** **$31.1m**

I2E CLIENT: LINEAR HEALTH SCIENCES - Oklahoma City

Develops products for various types of medical tubing based on its proprietary, breakaway safety-valve technology

linearsciences.com

- Oklahoma Seed Capital Fund recipient
- 13 global patents pending
- 1 U.S. patent issued
- Global manufacturing agreement executed
- Nationwide distribution established
- Over $14 million investment capital raised

The landscape of startup financing in Oklahoma compels capitalization tables piecemealed from multiple individuals given the state's relative lack of institutional investors. We gladly partnered with i2E to lead all three of our funding rounds because their involvement instills confidence in those individuals who recognize i2E and OCAST as sources of diligence, experience and governance"

- Ryan Dennis, MD., Chief Executive Officer

NEW PRODUCT DEVELOPMENT CENTER (NPDC)

The Oklahoma State University New Product Development Center is an engineering extension unit that offers a broad array of research, development and engineering services to inventors, entrepreneurs and manufacturers. Traditionally, we have served as the connection between the university and industry in terms of engineering support and new product development. We incorporate a collaborative approach that combines university faculty, our engineering staff, undergraduate students and industry partners to accomplish projects that result in new product launches, job creation or retention and increases in innovation capacity. Ultimately, these results have an economic impact on Oklahoma communities and affect human and social capital in those locations. The NPDC team has more than 65 combined years of experience in engineering design and support, over 20 years in manufacturing and nearly 20 combined years of experience in extension work.

The NPDC partners with the OCAST, Cowboy Technologies, Oklahoma Manufacturing Alliance, i2E Inc., University of Oklahoma iHub, and the Oklahoma Small Business Development Centers (SBDC).

npdc.okstate.edu

Annual Client Survey Results

- Economic impact $7.8m for IAS and affiliated programs
- $6.5m in research proposals submitted for NPDC and client-based innovation development projects
- 7 clients in varying commercialization stages in FY19
- 25 patents in process
- 30 product launches pending
- 33% clients are in distressed, underserved rural areas
- 23:1 impact ratio for IAS and affiliated programs

NEW PRODUCT DEVELOPMENT CENTER
College of Engineering, Architecture and Technology

NPDC CLIENT: NITRO-LIFT TECHNOLOGIES - Mill Creek

Delivers nitrogen solutions to the upstream, midstream and downstream segments of the oil and gas industry

nitrolift.com

- Pioneered the use of membrane nitrogen in the oil and gas industry
- Successfully de-watered or lifted more than 15,000 wells
- Purged and tested 32,000+ miles of pipelines
- Patented equipment and processes (United States, Canada and Mexico)

"We have worked with the NPDC for the last decade in technology development, grant proposal development and business diversification. The NPDC staff is always attentive to our requests and the relationship between the NPDC and our Oklahoma Manufacturing Alliance MEA have made an impact to our bottom line. It is with their help that Nitro-Lift is what it is today."

- John Beaver, Chief Operations Officer

OKLAHOMA CATALYST PROGRAMS (OK CATALYST)

The Oklahoma Catalyst Programs (OK Catalyst), headquarted at the OU Tom Love Innovation Hub, are helping local technology companies grow in Oklahoma by dramatically improving Oklahoma's performance in the federal Small Business Innovation Research (SBIR) program.

The U.S. Small Business Administration's SBIR program invests ~$3.7B annually into small businesses to do technology-focused research and development. SBIR success is highly correlated with venture capital success: the top 10 states that receive the most SBIR funding typically receive the most venture capital funding.

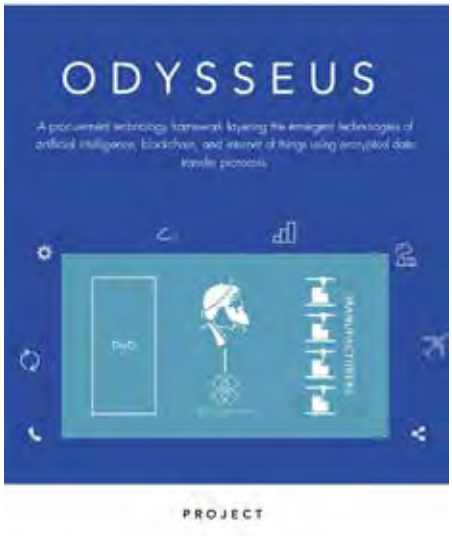
Historically, Oklahoma is in the bottom 10 for SBIR performance and has won ~0.34 percent of available SBIR funding since 1982. From 2009 to 2018, Oklahoma small businesses won ~$2.3M annually from the Department of Defense (DoD) SBIR program. In one year, OK Catalyst clients won $7.3M in DoD SBIR funding in industries such as aerospace, manufacturing, AR/VR, software and others.

okcatalyst.com

Annual Client Survey Results

- **Economic Impact: $182.6M**
- **Funding Awarded to Clients: $8.3M**
- **# of SBIR Awards to Clients: 16**
- **SBIR Proposals Submitted: 50**
- **% 1st Time Applicants: 85%**
- **Nationwide Success Rate: 10-15%**
- **Client Success Rate: 30-40%**

Every $1 of DoD SBIR funding that comes to Oklahoma generates $22 of economic impact.



OK CATALYST CLIENT: VERTIPRIME - Duncan

Developed a new procurement model for the Air Force using blockchain and Internet of Things (IoT) technology

projectodysseus.com

VertiPrime Government Services is a disabled veteran owned small business focused on the DoD's aging fighter jets and bomber fleets. VertiPrime's solutions address the spectrum of sustainment needs for U.S. Air Force, U.S. Navy, U.S. Army and Defense Logistics Agency (DLA) requirements. This includes modern CNC manufacturing of replacement parts to its newest technology advancement, Odysseus.

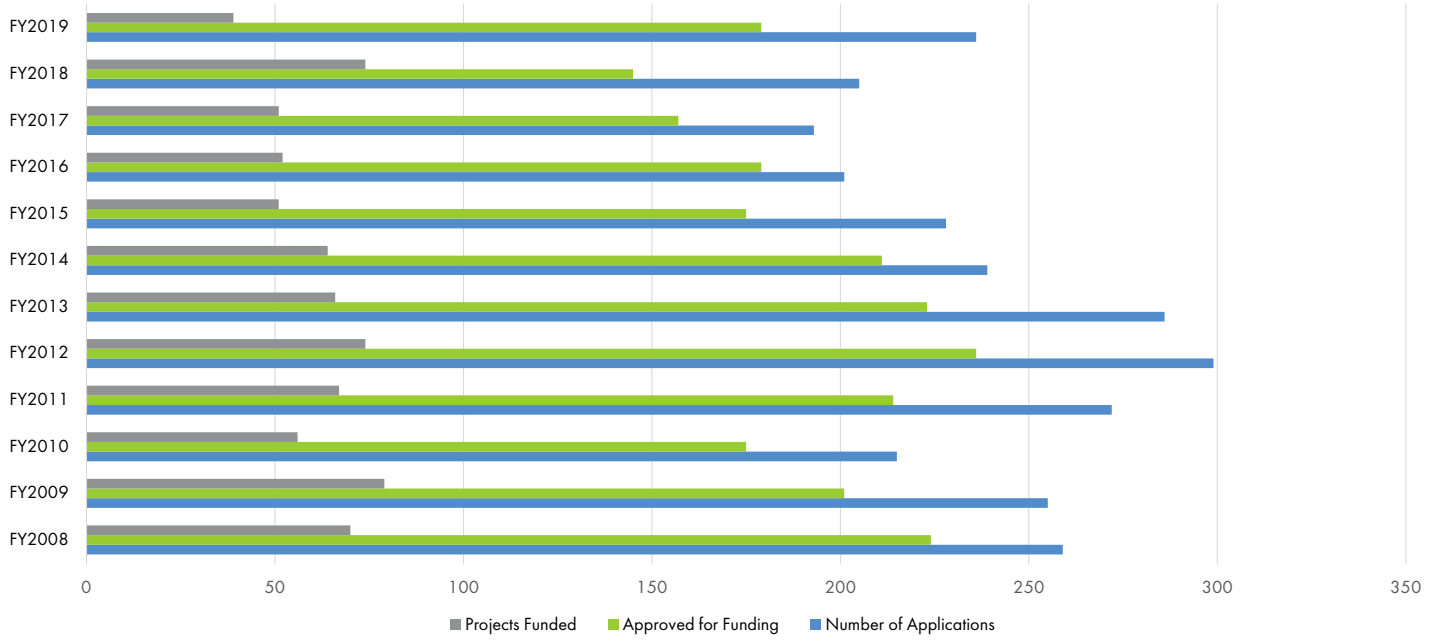
"Growth capital is critical to start-up success. Through the OK Catalyst Program's guidance, we have successfully won over $1M funding from the U.S. Department of Defense via their SBIR Program. This all happened in less than 6 months from our first meeting with this group. It is the greatest secret in the state of Oklahoma."

- Michael Morford, Chief Exectutive Officer

ANNUAL SURVEY RESULTS
FISCAL YEAR 2019 OCAST IMPACTS BY PROGRAM

	Total (all programs)	Health Research	OARS	Intern	Plant
Jobs Created or Retained	800	314	361	92	33
Student Interns Hired/Retained	90	0	0	90	0
Total Payroll	$24,415,178	$5,979,195	$13,584,091	$4,593,074	$258,758
Average Annual Wage	$66,209	$52,032	$88,650	$70,178	$34,235
Follow-on Funds Attracted	$131,833,113	$89,911,862	$32,175,431	$6,779,770	$2,966,050
Patent Applications	75	20	51	4	0
Patents Granted	22	7	14	1	0
Impact on Capital Investments	$88,254,472	$10,407,976	$36,842,496	$41,004,000	0
Impact on Gross Sales	$91,772,873	$2,211,223	$50,601,100	$38,960,550	0
Companies Formed	20	4	14	2	0
Total Financial Impact	$336,275,576	$108,510,256	$133,203,118	$91,337,394	$3,224,808
Return-on-Investment	8:1	5:1	9:1	41:1	1:1

OCAST RESEARCH FUNDING HISTORY
APPLICATIONS SUBMITTED, APPROVED & AWARDED
FY 2008 - FY2019



OKLAHOMA SCIENCE AND TECHNOLOGY RESEARCH AND DEVELOPMENT BOARD OF DIRECTORS

OCAST is a state agency governed by the Oklahoma Science and Technology Research and Development (OSTRaD) Board of Directors (Title 74, Section 5060.6). This 21-member board of directors consists of the director of the Oklahoma Department of Commerce, the chancellor of the Oklahoma State Regents for Higher Education, the secretary of agriculture, the presidents of Oklahoma's three research universities, the president of a regional university, 12 members appointed by the governor and two nonvoting legislators representing the Oklahoma House and Senate. Members appointed by the governor serve with the consent of the senate and generally serve four-year terms.

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Blayne Arthur - Secretary of Agriculture, Department of Agriculture, Food & Forestry
Gerard P. Clancy - President, University of Tulsa
V. Burns Hargis - President, Oklahoma State University
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Sherri Wise - President, Osteopathic Founders Foundation

Tom Kupiec

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