



Five organizations, one purpose: 
Economic growth, from concept to commercialization

Oklahoma Center for the Advancement of Science and Technology

2021 Impact Report

Executive director highlights 24:1 return

The Oklahoma Center for the Advancement of Science and Technology (OCAST) is proud to present its 2021 Impact Report highlighting our activities that help to diversify and grow our state's economy. As the result of a dramatic downturn in the oil and natural gas industry in the 1980's, OCAST was established by the Oklahoma Legislature in 1987 as the state's agency for technology development, transfer and commercialization. Our 33-year history is one of performance excellence and a model for economic development – a model that has received national recognition and continues to be emulated by other states.

Innovation, collaboration and job creation are the core of what we do at OCAST and together with our strategic partners – the Oklahoma Manufacturing Alliance, i2E Inc., the New Product Development Center at Oklahoma State University and the Tom Love Innovation Hub at the University Oklahoma – we branded this partnership the Oklahoma Innovation Model (OIM). The OIM is a public-private partnership with a common mission and strategy to work collaboratively to expand Oklahoma's pipeline of research activity, inventions, investment capital and advanced manufacturing.

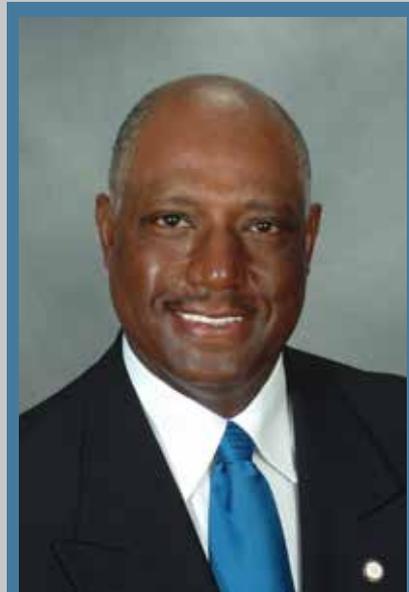
Our coordinated efforts ensure that as new ideas or technologies emerge anywhere across Oklahoma, inventors, scientists, entrepreneurs and manufacturers can easily access the resources and expertise from any of our partners to effectively move innovation to the marketplace.

We are keenly aware of market dynamics, and through our partners, we can develop new and innovative solutions to meet the ever changing needs of specific Oklahoma industry sectors such as aerospace and defense, bioscience and biotechnology, agricultural science, manufacturing and energy.

As with past annual impact reports, our 2021 Impact Report highlights some of our clients whose stories help to reinforce our successes over the years. As an example, one client that we featured in our 2020 Impact Report was Oklahoma City-based Martin Bionics. Their revolutionary "socket-less socket" for prosthetic wearers was recognized by *Time Magazine* as one of the "100 Best Inventions" in 2020 – clearly an example of how an Oklahoma researcher and innovator improved the quality of life for people who lost lower limbs.

OCAST programs have generated a cumulative return on investment (ROI) of 24:1 which means that for every dollar appropriated to OCAST, \$24 was returned to the state as the result of follow-on grants and investments, sales revenue and jobs.

We are proud of OCAST's accomplishments and proud of Oklahoma's history of innovation as we continue to build innovation capacity for future growth and prosperity. We hope you enjoy reading our 2021 Impact Report as much as we enjoyed preparing it.



C. Michael Carolina
OCAST Executive Director

Science and technology milestones driving a more diverse Oklahoma economy

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 program created

1992 · Industrial Extension System (Oklahoma Manufacturing Alliance) created

1997 · OMA established the Application Engineers program
· Intern Partnership program created

1998 · Technology Transfer Act allows OCAST to make innovation 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 authorization
· Plant Science Research program created

2015 · Oklahoma Innovation Model (OIM) formalized

2016 · NPDC expanded with new office in Tulsa to serve northeast Oklahoma

2018 · Postdoctoral Fellowship initiative launched
· Oklahoma Catalyst programs established at Tom Love Innovation Hub

OCAST has research funds available



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

Health Research Postdoctoral Fellowship Initiative

- · Encourages recent doctoral degree recipients to better prepare for science and technology 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

Oklahoma Applied Research Support

- · Funds R&D in all sectors important to Oklahoma's economy including 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

Intern Partnerships

- · Intern Partnerships support R&D projects that help Oklahoma businesses solve technological problems by providing resources to fund internship positions
- \$10,000 - \$30,000 per year for up to two years
- Requires 1:1 match

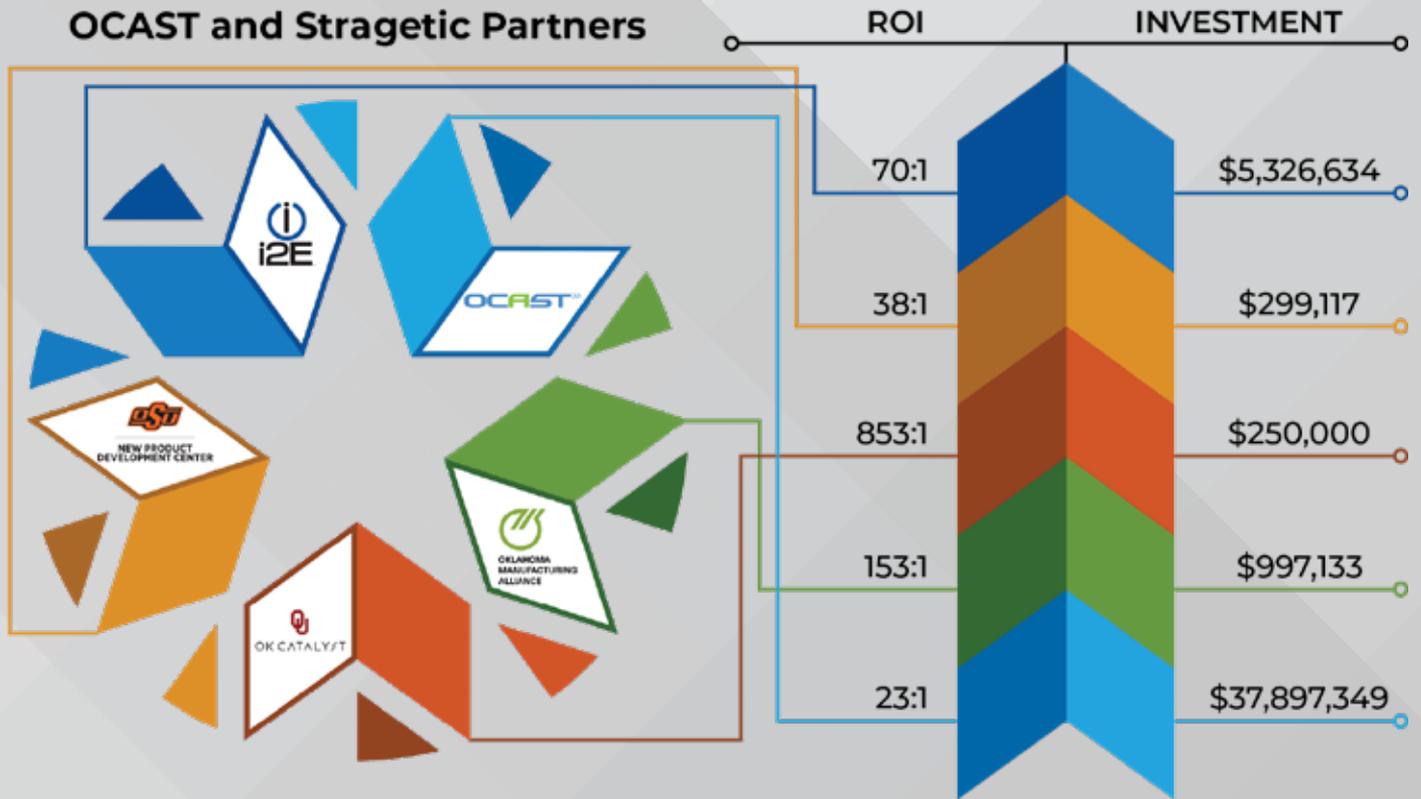
Plant Science Research

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

Small Business Research Assistance

- · The federal Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs have complex application process that can be challenging for small business owners and entrepreneurs
- OCAST's SBRA program improves the success rate of Oklahoma companies applying to SBIR/STTR by helping them access the more than \$4B available through this program annually

Oklahoma Innovation Model shows FY 2020 ROI



NEW PRODUCT DEVELOPMENT CENTER

Engineering and prototyping assistance

- Inventors Assistance Service



OK CATALYST

Federal funding

- Small Business Research Assistance



Capital investment

- Oklahoma Technology Commercialization Center
- Technology Business Finance
- Oklahoma Seed Capital Fund



Manufacturing assistance

- Industrial Extension System

OCAST clients give back



MaxQ designed and launched a COVID-19 specimen container that maintains a precise temperature during transport. They also manufactured a low cost face shield prototype using their existing materials and processes following the open source design. In addition, MaxQ collaborated with Oklahoma State University's Unmanned Systems Research Institute to demonstrate the feasibility of transporting specimens, critical supplies and vaccines using its packaging and OSU's drones.



Oklahoma City-based Happily and its Datebox "date in a box" subscription service was featured in a *Forbes* magazine article on the growth of subscription services during the Coronavirus national shutdown.



Clubhouse Trailers helped healthcare workers by 3D printing "ear guards" to help local health heroes wear face masks more comfortably.



Rapid Application Group worked to design, develop, test and manufacture two different types of adaptable, reusable masks for health care professionals, first responders and veterans.



Cosmetic Specialty Labs began large-scale production of hand sanitizer for distribution in its own factory store as well as for its private label customers across the nation.



IMMY developed and validated a nasal swab-based test known as PCR that allowed laboratories to provide results in a matter of hours. IMMY then set up drive-through mobile test sites in nine communities



To respond to COVID-19, Monscierge modified its Connect Staff tools to request urgently needed materials and PPE managed by a head nurse to coordinate distribution. In addition, Monscierge's Signage tools were modified to provide way-finding maps and need-to-know COVID-19 information in hospitals and make-shift facilities on large lobby screens, iPads, etc.

Podcast highlights Oklahoma entrepreneurs

During 2020 OCAST, in conjunction with Lieutenant Governor Matt Pinnell, launched a podcast to demonstrate the exciting companies that are working to make Oklahoma a Top 10 State. Many of these companies fly under the radar. These are companies that you may not have heard of but absolutely need to know about. The podcast strives to highlight the innovations that make each company unique.

Lieutenant Governor Pinnell's role as host of the Innovate That podcast is a great fit for his mission of emphasizing Oklahoma's strengths in the areas of weather, agriculture, oil and gas, aerospace and research and development along with other up and coming technologies.



Listen to the Innovate That podcast on innovatethat.podbean.com and on all major streaming apps.





KT Plastics supported by EDA grant matched with OCAST funds

Calera | ktplastics.com

An Economic Development Administration grant matched with OCAST funds and services provided through the OIM allowed KT plastics to develop a process for moving large press molds between a walk in oven and the press machines. Additional services were provided through the grant from the Inventors Assistance Service and the Oklahoma Manufacturing Alliance.

"The Oklahoma Manufacturing Alliance and the OSU New Product Development Center have helped us design better ways to manufacture the products that we solely own the rights to make. With their help, we've been able to lessen lead times, provide good products to our customers both domestically and internationally and provide designs for testing materials we're generating for some of the largest companies in the world."

Jim Willingham



Marshall Brewing Company interns create space for formal quality control lab

Tulsa | marshallbrewing.com

Marshall Brewing Company's multi-year intern partnership project started with building and developing a quality assurance/quality control program and laboratory. Students helped develop testing protocols using traditional microbiology testing and were part of getting a polymerase chain reaction (PCR) screening program up and running for testing and identifying potential contaminants.

"We have had an incredible experience through our partnership with OCAST and the University of Tulsa. It has given us the opportunity to offer students in the engineering and natural science fields of study the ability to get hands-on experience in production as well as quality control/quality assurance in an emerging industry. It has allowed us to expand our capabilities as a small independent craft brewery and family owned small business. This partnership has been beneficial and invaluable for both our brewery and the students and university."

Eric Marshall

OCAST clients diversify the economy



Ram Jack sees new markets emerge from technology pivot

Ada | ramjack.com

Development of the helical pile Sign Dart will provide Ram Jack the opportunity to change the way departments of transportation think about signage installation on a nationwide scale. The acquisition of data and generation of solid testing numbers for each addition to the Sign Dart family will allow Ram Jack to be ready with a solution for nearly any sign installation situation.

"Part of the money we are receiving from OCAST is a design for a bigger Sign Dart. We are also doing a full-scale crash test that will allow us to go all the way to the federal level and get our FHWA letter so the approval process for states is no longer an issue. We would not have been able to do this if not for our partnership with OCAST."

Justin Presley



MITO Materials Solutions is on the cutting edge of lighter, stronger

Stillwater | mitomaterials.com

In 2020, MITO Materials raised a \$1M seed round led by VC Dipalo Ventures and Clean Energy Trust. MITO scaled their flagship product E-GO to commercial quantities in anticipation of a pilot project in 2021. The company was awarded a Sustainability in Practice Award by VentureWell and was named a top 15 Startup in the US by Startup of the Year. The founders, Haley and Kevin Keith were named in 2021 Forbes 30 under 30 in manufacturing and Industry.

"OCAST support has helped MITO Materials further develop our functionalization process and create new additive variations to support new market opportunities for sustainability and bio-based materials research. We've been able to promote research with students and faculty at Oklahoma State University which allowed us to expand our operations in Oklahoma. I am confident that we will be able to link OCAST's development funding directly to strong, innovative economic development and impact to MITO's technology commercialization."

Haley Marie Keith

OCAST takes ideas from concept to commercialization



NPDC connects businesses, manufacturers and inventors with university resources

The New Product Development Center assists with market research, engineering analysis, prototype development and writing grant proposals for inventors, manufacturers and OSU communities. npdc.okstate.edu

- Economic impact of \$4.6M for NPDC and affiliated programs
- 15:1 impact ratio for NPDC and affiliated programs
- 33 patents pending on Oklahoma-based intellectual property
- 38 working prototypes developed in partnership with the University of Oklahoma iHub
- Assisted Oklahoma companies with securing \$1.2M to complete their R&D projects
- \$3.3M in grant proposals submitted to federal and state agencies for Oklahoma-based projects



Roll Offs USA experienced \$100K sales increase and created two new jobs



Durant | rolloffs.net

Roll Offs USA specializes in waste container solutions for traditional refuse; energy and wastewater tanks, roll offs and washouts; commercial and industrial water storage units; and environmental solutions such as front load recyclers, compactors and hoists. Roll Offs worked with NPDC and the Oklahoma Manufacturing Alliance to complete a machinery automation project that is now in production at the Roll Offs facility in Durant.

"Prior to implementing the automation project equipment that was designed, fabricated and installed by the OSU NPDC engineering team, Roll Offs had challenges in maintaining a sufficient supply of inventory to fill unscheduled orders. As a result of the newly created automated production equipment, we've experienced increased and retained sales of more than \$100K a year in addition to the creation of two new jobs."

*Randy Arneson, Production Manager
Kendell Philips, Vice President of Operations*

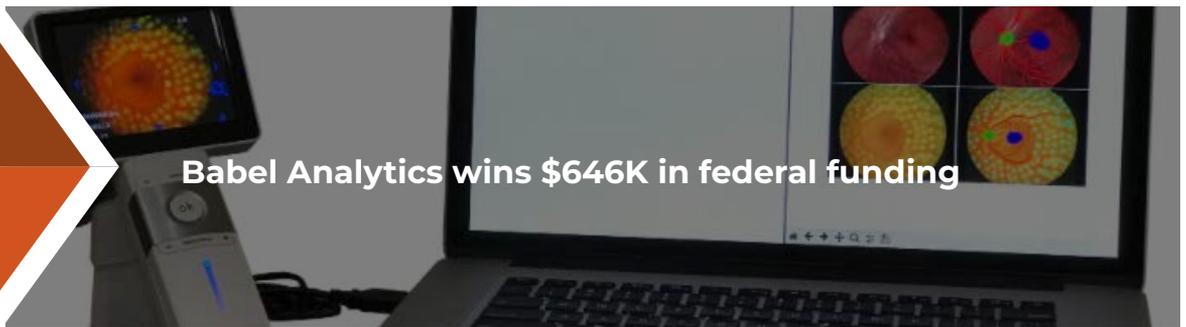




OK Catalyst guides companies in competing for SBIR funding proposals

OK Catalyst's expertise in the federal SBIR/STTR arena guides companies through every step of submitting a competitive proposal while providing mentorship, hands-on technical and business assistance and on how to use SBIR funding to grow a business and launch new products. okcatalyst.com

-  \$185M potential economic impact from OK Catalyst client companies by 2025
-  75% OK Catalyst entrepreneurs and SBIR awardees from under-served communities or backgrounds
-  10X for every \$1 raised by OK Catalyst results in \$10 invested in Oklahoma startups
-  60% success rate of OK Catalyst first-time SBIR awardees that win a second award of up to \$1,000,000



Babel Analytics wins \$646K in federal funding

Tulsa | babelanalytics.net

Babel Analytics leverages advanced machine learning technologies to develop data-driven software solutions for high-impact problems in chemistry, biology and healthcare. The team has developed systems to detect early signs of drug abuse, extract and summarize information from clinician notes and detect early-stage retinal epithelial lesions.

With the assistance of the OK Catalyst SBIR Accelerators, Babel won a \$225,000 Phase I award from Defense Health Agency and a \$400,000 award from the National Cancer Institute. In total, Babel Analytics has won \$646,822 in SBIR, and they have a pending Phase II proposal worth \$1,000,000.





OMA Works with manufacturers to help them grow and evolve

The Oklahoma Manufacturing Alliance is a network of trusted experts working with manufacturers to help them grow and evolve. The OMA evaluates companies holistically by assessing, diagnosing and optimizing operations to link manufacturers with the exact resources they need to quickly push changes into action. okalliance.com

- Jobs created and retained: 2,552
- Annual payroll: \$38.4M
- New and retained sales: \$362.8M
- Average wage: \$71,194.12
- Manufacturers assisted: 705
- Projects completed with economic impact: 264
- Capital investment impact: \$36.9M
- Impact on gross sales: \$28.6M



Clubhouse Trailers expands with the help of OMA

Edmond | clubhousetrailers.com

Clubhouse Trailer Company provides safe, efficient and innovative solutions for transportation of marching arts equipment. Its customizable product line is designed to meet the unique needs, size and budget of any program. The Oklahoma Manufacturing Alliance helped The Clubhouse connect with critical vendors like aluminum fabricators, as well as timely advice as the current campus was constructed.

"The Manufacturing Alliance has provided The Clubhouse with world-class support as we have grown. OMA extension agent Kevin Barber is considered a key member of our leadership team."

Drew Taylor Co-Founder and VP of Operations





i2E provides expertise and investment capital to emerging small businesses

i2E has provided business expertise and funding to more than 730 of Oklahoma's emerging small businesses. With nearly \$84 million of investment capital under management, they are focused on serving Oklahoma companies in all phases of the business life cycle. i2e.org

- Generated \$184M in revenue
- Raised \$1.6M in grants and \$84M in equity and debt capital
- Paid an average annual wage of \$75,542, 67% higher than the 2019 Oklahoma average annual wage of \$45,133
- 15 patents issued
- Paid \$104.6M in annualized payroll
- Retained 1,185 current jobs with the addition of 160 new FTE



Progentec benefits from i2E's investment expertise

Oklahoma City | progentec.com

Progentec, an Oklahoma Seed Capital Fund recipient, is developing industry-first biologic and digital biomarkers for Lupus flare predictive testing, followed by similar protocols for Multiple Sclerosis and Crohn's and Ulcerative Colitis. These tools provide clinicians with unparalleled insight into a patient's health trajectory.

"i2E created the atmosphere for us and worked with us, creating the right pitch and all the documents, serving on our board and being willing to come in and pitch our company to other investors when we were growing faster than we thought. All of these represent a huge value that we can never quantify."

Mohan Purushothaman, Ph.D., President and CEO



OCAST programs generated a 24:1 return

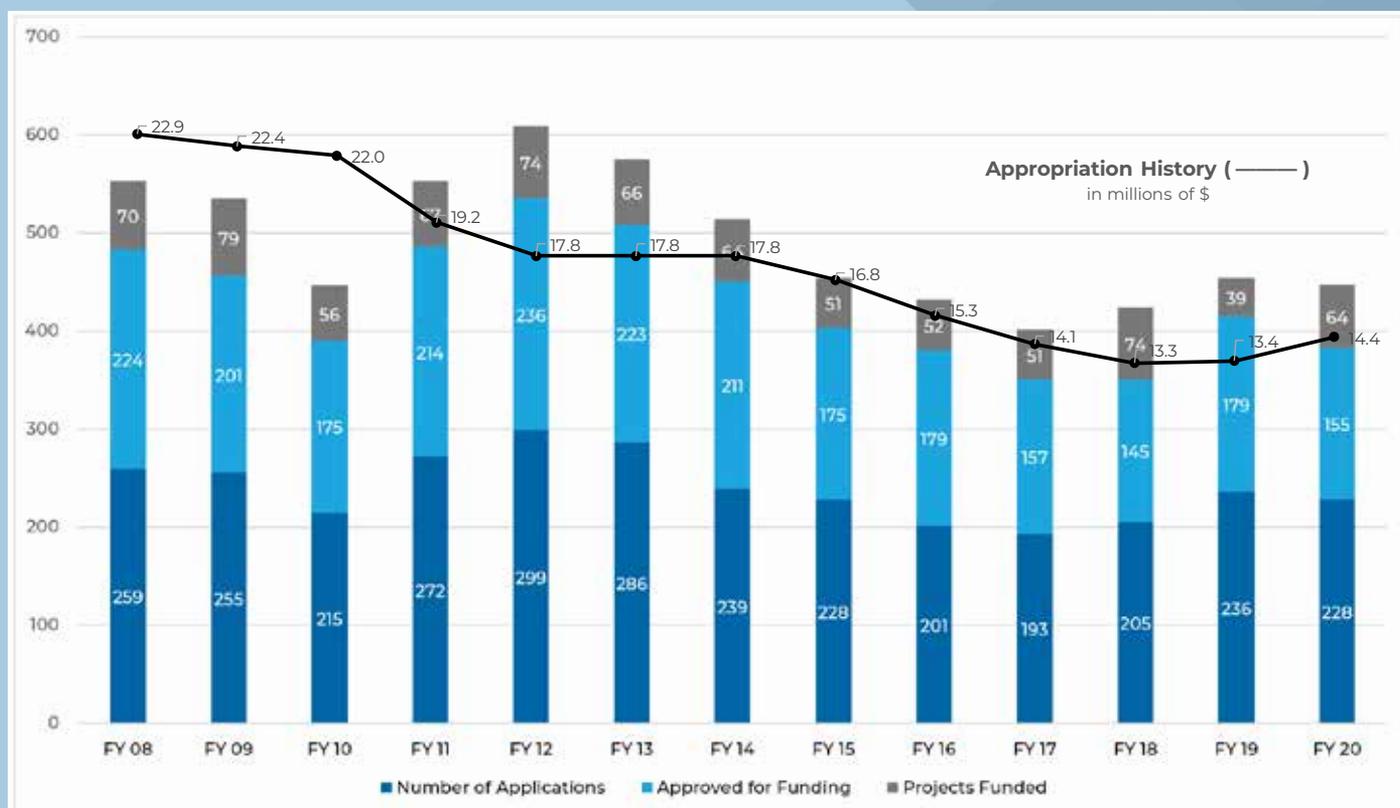
Annual survey results

Fiscal Year 2020 OCAST impacts by program

	Total (all programs)	Health Research	OARS	Intern	Plant
Jobs created or retained	1,908	281	286	45	47
Student interns hired/retained	90	0	0	90	0
Total payroll	\$199,318,405	\$3,758,996	\$5,550,496	\$2,937,300	\$618,560
Average annual wage	\$69,070	\$41,061	\$117,705	\$62,875	\$54,429
Follow-on funds attracted	\$193,699,295	\$100,935,968	\$66,955,447	\$7,690,458	\$6,016,205
Patent applications	42	0	30	4	0
Patents granted	44	12	27	3	0
Impact on capital investments	\$359,836,603	\$4,597,603	\$28,278,000	\$17,555,000	\$5,902,000
Impact on gross sales	\$374,259,001	\$1,510,001	\$43,073,000	\$4,926,000	\$75,000,000
Companies formed	19	6	13	5	1
Total financial impact	\$1,127,113,304	\$110,802,568	143, 856,943	\$33,108,758	\$87,536,756
Return on investment	24:1	5:1	14:1	13:1	29:1

OCAST research funding history

Applications submitted, approved & awarded FY 2008 - FY 2020



Finley & Cook CPA completes independent audit

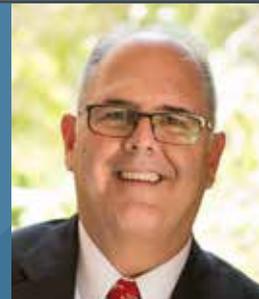
The FY 2019 audit report was completed by an independent auditor with no findings. As reported to the OSTRaD Board of Directors, there were no issues with the audit and the agency is in good standing.



OSTRaD board supports world-class research

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). Of the 21 members on the board, 12 are appointed by the governor and serve with the consent of the senate.



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ARL/DNA Solutions/
Kupiec Group



Blayne Arthur
Secretary of
Agriculture



Sean Bauman
IMMY



Mark Funke
Oklahoma Business
Roundtable



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