



OCAST»

2015 IMPACT

Oklahoma's Future, Today

Letter from the Director



This history of success involves working with researchers, entrepreneurs and companies by helping fund their research, working through the proof-of-concept process and connecting them to investment capital, other researchers and resources to grow their ideas.

OCAST: A History of Science and Technology Success

One successful venture makes for a good story, but multiple successes make great stories. What we see at the Oklahoma Center for the Advancement of Science and Technology (OCAST) time and again is how companies leverage OCAST support to further launch their innovations and impact not only locally, but also globally.

From the success of Choctaw Defense, who worked with the Oklahoma Manufacturing Alliance (OMA), to secure contracts from many branches of the military to protect our soldiers, to the astounding health-related sugar science research and development by Dr. Paul DeAngelis of Hyalose LLC, Oklahoma companies are making a huge contribution to our state's economy.

Our Intern Partnership program continues to connect Oklahoma students with science and technology companies to enable real world experience on how science impacts our world. Our cover photo is an example of the one of the 283 interns supported by our program this year.

Iofina, based in western Oklahoma, is a great example of tapping into a unique resource as the third largest producer of iodine in the world and turning it into more jobs to grow the state's economy. On the nanotechnology front, XploSafe of Stillwater has been highly successful in identifying and assessing contents of explosives that threaten the safety of our citizens. These are all companies we are proud to support.

This history of success involves working with researchers, entrepreneurs and companies by helping fund their research, working through the proof-of-concept process and connecting them to investment capital and other researchers and resources to grow their ideas. To date, we have made awards to 2,455 companies.

From job creation to improved quality of life to a more diversified economy, the impact of OCAST and the citizens and companies we serve are a testament to the strength of the state's science and technology community. We look forward to adding to our history of success.

Michael Carolina

Michael Carolina
Executive Director

COVER PHOTO: Frontier Electronic System's OCAST intern Charlie Miller conducts a charge/discharge cycle test on one of Frontier's nanobattery prototypes for project manager Keith Sheets. The testing is performed in the inert environment of a glove box where the test specimen is protected from humidity and other atmospheric contaminants.

2014 IMPACT NUMBERS

\$483 Million

ROI: 30.8
(20.8 cumulative)
total leveraged
funds

1,561

Jobs created
or retained

283

Student interns
receiving support
from OCAST

\$274.4 Million

Direct impact
on gross sales at
participating companies

64

Projects funded
by OCAST

68

Inventors helped
by the Inventors
Assistance Service

IODINE AND INTERNS

NORTHWEST OKLAHOMA IS ONE OF THREE LOCATIONS IN THE WORLD where nature provided enough iodine to be commercially viable. Chile and Japan are the other two.

What does that mean? Big business in northwest Oklahoma.

Iodine is used in products ranging from fumigants and disinfectants to health care devices such as x-ray machines. Computer screens and flat screen TVs also need iodine. The continual development of new uses and its compatibility to form compounds has increased iodine demand, particularly from pharmaceutical and industrial manufacturers.

Northwestern Oklahoma State University associate chemistry professor Jason Wickham, Ph.D., and Rebecca Fenton, quality control and quality assurance coordinator at Iofina, worked together to forward an award-winning application for OCAST's Intern Partnerships program. That accomplishment cleared the way for Northwestern student interns and Alva iodine company Iofina to work together in a unique industry.

Wickham said the program enables students to work part time for a company while finishing their degree. Arysta, a company acquired by Iofina, was a previous OCAST Internship partner, a fact not lost on Wickham and Fenton, who used Arysta's success as a springboard to try again.

A RECIPE FOR SUCCESS IN NORTHWESTERN OKLAHOMA

The new internship award began with the fall semester 2014, giving Iofina two Northwestern interns who will work 12 hours each week for the next two years.

Iofina's name is derived from iodine, which is extracted using the company's exclusive Wellhead Extraction Technology™. Iofina PLC is the holding company of a group of companies involved in the exploration and production of iodine and natural gas on land the group acquired. In addition, they created a subsidiary, Iofina Chemical.

Iofina's location in northwest Oklahoma's iodine field is due to the existence of ancient sea beds with a high concentration of sea weed that captured the mineral.



OCAST's intern program gives students the opportunity to apply and contribute to science in the industry sector.

McALESTER MANUFACTURING AND THE MILITARY



SUPPORTING U.S. SOLDIERS AROUND THE WORLD is a daily mission for Choctaw Defense, which operates under the theme "Built for the Battlefield." McAlester-based Choctaw Defense employs 250 people with branch locations in Antlers, Hugo, Moore and Tulsa.

Their products include all-terrain trailers and Battle Damage Assessment and Repair (BDAR) kits, which are used on the battlefield to make repairs on damaged Army vehicles. Their products also include ground support equipment such as space heaters, pollution control equipment and most recently, Medium Tactical Vehicle Replacements, or MTRVs, all-terrain vehicles used by the U.S. Marine Corps and U.S. Navy for off-road conditions.

Choctaw Defense's ability to manufacture their products to military specifications and their membership in the Oklahoma Manufacturing

Alliance are waypoints on the road to success for the 25-year-old firm, which began as a supplier of military shipping and storage containers for Texas Instruments.

Today, the company has 15 major customers and manufactures a wide range of defense and aerospace support equipment. Customers include the U.S. Army, Marine Corps, Navy and Air Force, as well as key defense suppliers such as Raytheon, Lockheed Martin and Boeing.

Products including the "Improved Army Space Heater," the MTRVs for the Marine Corps and the "Camel II" potable water trailer system have established Choctaw Defense in the world of performance contracting.

CEO Steve Benefield says his firm's tenacity is what sets Choctaw Defense apart. He cites a talented, driven team and a vision of success engrained into the company's culture.

Choctaw Defense's transition from subcontract work to prime contractor allows them to set their own destiny. Creating revenue for the Choctaw Nation and providing job opportunities for their tribal members is a high-level mission.

In 2015, Choctaw Defense anticipates adding a new product line, Choctaw Defense Munitions, which will begin production of ammunition projectiles for the Italian firm Fiocchi and the commercial reloading market.

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SAFETY THROUGH SCIENCE WITH XPLOSAFE

ABANDONED BAGS IN PUBLIC PLACES have not always been cause for panic. That was before the age of terrorism. The situation begs the question, "How do we protect ourselves from those intent on causing harm?"

XploSafe, a Stillwater-based provider of critical safety solutions for homeland security and chemical safety, provides a big part of that answer. Through their technology, people who work with unstable and hazardous compounds are protected and empowered to protect the rest of us. The small firm accomplished some of its world-class research with a \$200,000, two-year OCAST award made in 2012.

XploSafe has two product lines. XploSens, used for trace detection, works by dramatically changing color in the presence of peroxide and chlorate-based explosives. Customers for this product include bomb

squads, first responders, the Transportation Security Administration and military and security personnel. All of those who work in this field should expect to return home each night to their families. XploSens helps make that happen.

Improvised explosives often are made with chemicals and XploSafe helps identify which chemicals may have been used in such devices.

Another XploSafe product, XPell, eliminates peroxide formation in organic solvents that can be explosive. It's the only product on the market that provides a visual indication of whether a solvent is safe or not. Customers include university research labs, analytical labs, pharmaceutical manufacturers, university environmental health and safety departments, chemical suppliers and manufacturers that use organic solvents.

Manager and co-founder Shoaib Shaikh says his firm used OCAST resources to position XploSafe to procure federal funding.

The combined investment by OCAST and federal agencies has helped XploSafe and its team of researchers to continue to create and test new ideas to make the world a safer place. Nanotechnology companies such as XploSafe showcase Oklahoma in the global marketplace as a place for innovative solutions.



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SERIAL SUCCESS FOR LIFE SCIENCE STARTUPS



PAUL DEANGELIS, PH.D., KNOWS THAT SUGAR SCIENCE AND SERIAL ENTREPRENEURSHIP are not mutually exclusive. His four companies, based on his research in glycobiology as a professor of biochemistry and molecular biology at the University of Oklahoma Health Sciences Center, are up-and-running examples of how discipline and an entrepreneurial spirit make for favorable outcomes.

His studies led him to identify several bacterial and viral polysaccharide synthases, (enzymes or protein machines that polymerize small sugars into long chains) resulting in the biopharmaceutical companies

Hyalose, Heparinex, Choncept and Caisson Biotech.

DeAngelis has won seven Applied Research awards from OCAST exceeding \$2 million in funding. Those investments generated innovative products destined to help untold millions around the world.

HYALOSE

DeAngelis, with colleague Dr. Paul Weigel, developed a new form of the raw material employed as an injectable gel for reducing knee pain and a surgical aid, for cataract surgery, that is now sold around the world.

CAISSON BIOTECH

A natural sugar polymer enhances performance of other drugs. Caisson entered into a \$167 million licensing agreement with Novo Nordisk with potential long-term residual royalties. Novo Nordisk will use the Caisson drug delivery technology in the development of drugs for diseases including diabetes.

HEPARINEX

Dermal fillers are big business in the beauty industry and DeAngelis

discovered and patented core technology platforms using proprietary carbohydrate production to be used both in the dermal filler market as well as the anticoagulation market. The former application has been licensed to a European supplier.

CHONCEPT

Have you heard of mad cow disease or endangered sharks? You may hear less about them thanks to the scientific innovation of new technology to produce chondroitin from fermentation of bacteria. Current chondroitin production comes from beef and shark animal by-products. By utilizing bacteria, Choncept's technology avoids the problems of potential prion contamination such as "mad cow" disease. The discoveries also reduce pressure on harvesting sharks, the top predators needed in healthy oceanic ecosystems.

Harnessing nature through glycobiology to create next generation medicines is a big part of DeAngelis's approach. It seems to be working and can be expanded as new basic science ideas are uncovered, optimized and translated.

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OCAST PROGRAMS

The following OCAST programs and strategic partners are available to help Oklahoma businesses and researchers prove their ideas, attract additional funding and take their products to market. For specific program requirements, funding levels, application deadlines or more information, contact OCAST or visit the OCAST website and sign up for notifications.

OKLAHOMA APPLIED RESEARCH SUPPORT (OARS)



Cutting edge research leads to commercially successful products, processes and services. OARS funds R&D in all fields from medicine, agriculture and energy to manufacturing and aerospace.

- » Projects funded in FY14: 15
- » Qualified projects left unfunded in FY14: 13

OKLAHOMA HEALTH RESEARCH



Oklahomans are developing treatments and conducting research to help people live longer, healthier lives. The Oklahoma Health Research program funds basic research projects related to human health.

- » Projects funded in FY14: 31
- » Qualified projects left unfunded in FY14: 102

INTERN PARTNERSHIPS



Internships are vital to keeping talented undergraduate students in Oklahoma. Intern Partnerships support R&D projects that involve Oklahoma businesses and Oklahoma institutions of higher education by providing funds to support internship positions.

- » Student interns funded in FY14: 29
- » Qualified intern applications left unfunded in FY14: 11

OKLAHOMA SBIR COLLABORATIVE RESOURCES (OSCR)



The federal Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs have complex application processes that can be challenging for small business owners and entrepreneurs. The OSCR program was created to improve the success rate of Oklahoma companies applying for the federal programs by providing proposal preparation advice, supporting proposal preparation costs, supporting critical "bridge" funding between Phase I and Phase II and offering technical assistance throughout the lifecycle of the project and through commercialization.

- » Assisted in developing more than 24 competitive SBIR proposals
- » Provided OSCR consultation services to more than 100 established and emerging businesses

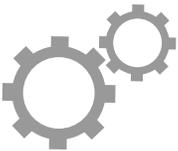
INVENTORS ASSISTANCE SERVICE (IAS)/NEW PRODUCT DEVELOPMENT CENTER (NPDC)



It's a long winding path from invention to marketplace. IAS navigates the process through education, information and referrals. The NPDC provides design, development, engineering and business support.

- » Prototypes fully developed: 9
- » Projects provided assistance through patent research, market analysis, prototyping or design assistance, product development or business plan development in FY14: 68

OKLAHOMA MANUFACTURING ALLIANCE



Small and medium-sized manufacturers must implement new technology and modernize in order to compete successfully in a global economy. The Alliance connects manufacturers to cost-effective resources, more efficient manufacturing processes and technologies to increase productivity and reduce costs.

- » Jobs created or retained in FY14: 1,562
- » Manufacturers assisted in FY14: 420

INNOVATION TO ENTERPRISE (i2E)



i2E was created to respond to OCAST's statutory directive to commercialize technology and is a private not-for-profit Oklahoma corporation focused on wealth creation by growing the technology-based entrepreneurial economy within our state. i2E operates under contract with OCAST to administer the following programs.

OKLAHOMA TECHNOLOGY COMMERCIALIZATION CENTER – Work with companies, inventors, entrepreneurs and researchers to turn technological innovations into business opportunities for Oklahoma. This includes providing technology startups with pre-seed financing and early-stage risk capital to encourage investments from private sources.

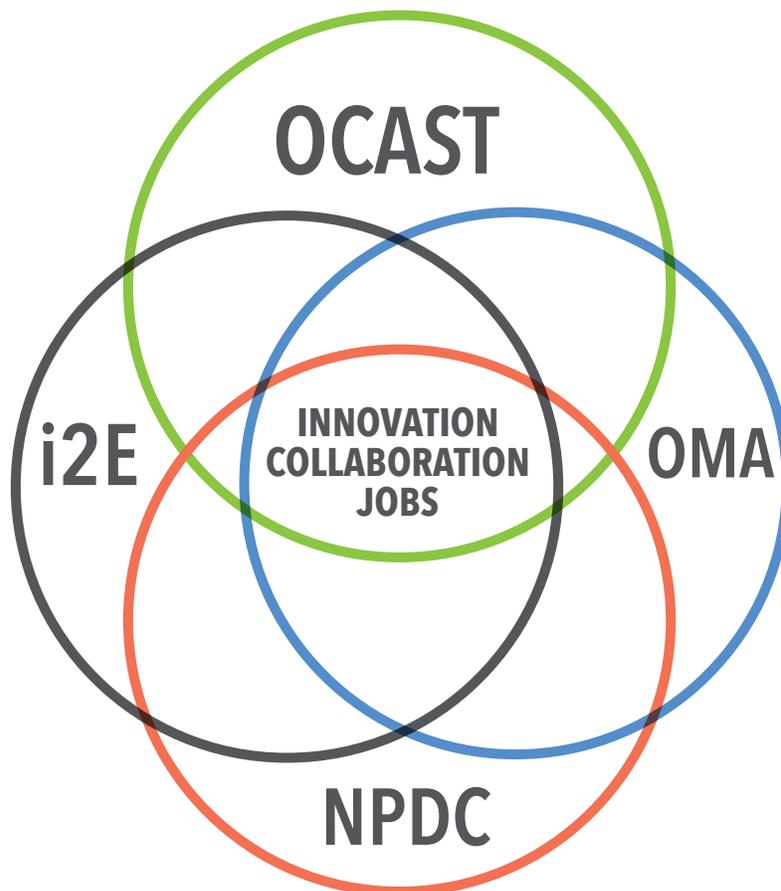
OKLAHOMA SEED CAPITAL FUND – OCAST also invests in the private sector Oklahoma Seed Capital Fund (OSCF). The OSCF was created to invest in Oklahoma high-tech companies that need the capitalization to grow their businesses. The state dollars used to invest in this fund are matched with private sector co-investment at an amount greater than the state's investment. Successful participants often return more than the original investment to Oklahoma. Those repayments help sustain future investments in the OSCF.

STRATEGIC PARTNERS: OCAST, MANUFACTURING ALLIANCE, i2E AND NPDC

REAFFIRM YEARS OF BUILDING OKLAHOMA THROUGH TECHNOLOGY

It has been more than 20 years in the making that four strategic partners have worked together to kick-start Oklahoma's technology-based economy. The four organizations added dimension but never diminished the state's long-standing reliance on energy and agriculture to build a strong economy. Today we honor a united front presented by OCAST, the Oklahoma Manufacturing Alliance (OMA), Innovation to Enterprise (i2E) and the New Product Development Center (NPDC).

Oklahoma Innovation Model Four Strategic Partners



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TECHNOLOGY**

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