2017 IMPACT REPORT

30 Years of OCAST Innovation

OCAST

Oklahoma Center for the Advancement of Science and Technology

30 Years of OCAST Innovation

1983 Oklahoma Council on Science and Technology created

1986 Oklahoma Health Research program created

1987 OCAST established in the Economic Development Act

1988 State Question 611 allowed for the Seed Capital Program | Small Business Research Assistance program created

1990 Oklahoma Applied Research Support created

1992 Industrial Extension System created in HB2137 to be administered by the Oklahoma Alliance for Manufacturing Excellence (now Oklahoma Manufacturing Alliance)

1997 Intern Partnership program created | Application Engineers program initiated by the Manufacturing Alliance

1998 Technology Transfer Act of 1998 permits OCAST to begin investing | Oklahoma Technology Commercialization Center (now i2E) created | State Questions 680 and 681 passed allowing universities and researchers ownership of their technology | Inventors Assistance Act transferred to OCAST

2002 New Product Development Center (NPDC) created

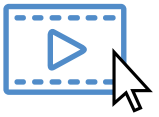
2004 Economic Development Generating Excellence (EDGE) program created

2006 Northeast Oklahoma office opened | Seed capital fund launches with $5 million investment | Plant Science Research Program was created and funded for $1 million | Nanotechnology Applications Project (ONAP) was created and funded for $2 million

2013 Began annual Oklahoma Technology Showcase

2015 STEM Empowers OK launched | Oklahoma Innovation Model created to provide concept to commercialization services to Oklahoma's innovative firms

2016 NPDC expands with new office in northeast Oklahoma



OCAST CELEBRATES 30 YEARS

Letter from the Executive Director

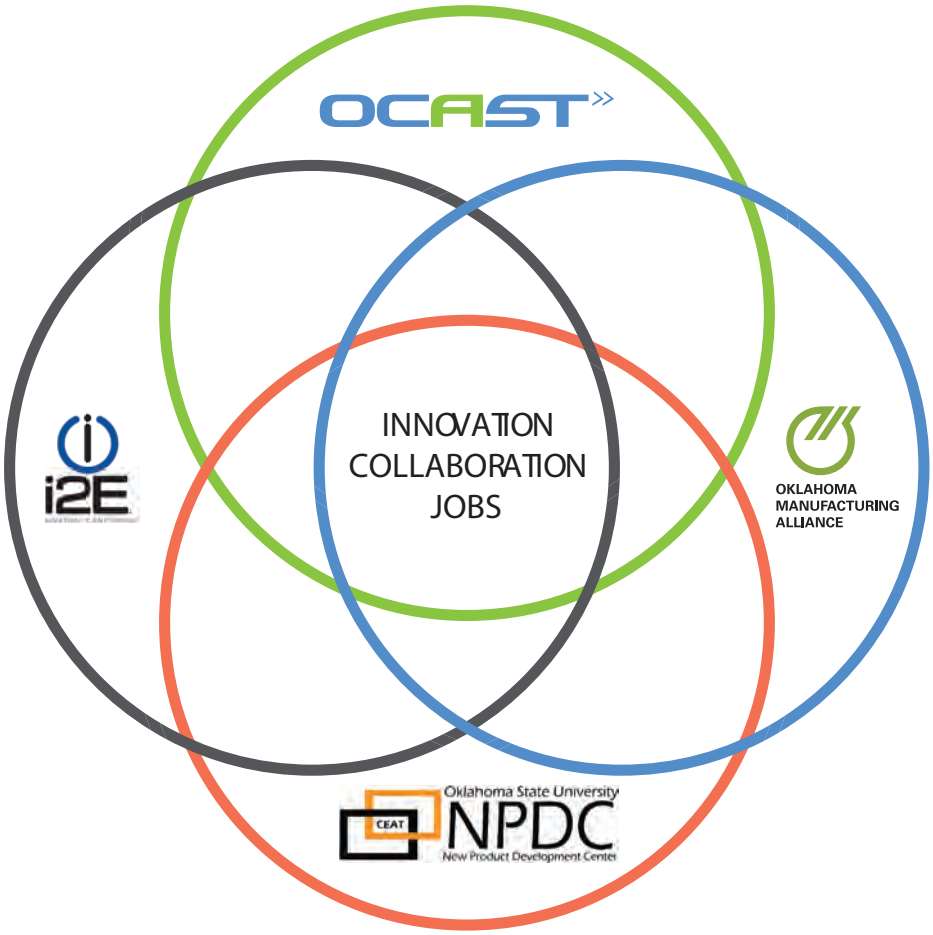
Thirty years ago, Oklahoma was still suffering from a historic collapse in the energy sector. As a result, the state endeavored to create a more diversified, prosperous and robust economy. Leaders envisioned new industries, new jobs and transformational steps toward greater economic resilience. Part of that vision included the creation of the Oklahoma Center for the Advancement of Science and Technology (OCAST) as a means to grow and diversify Oklahoma's economy through strategic investment in technology-based economic development.

Thirty years later, we take a moment to look back at the accomplishments we made. Our 2017 impact report showcases four of the many companies OCAST has worked with over the course of nearly three decades. Each successful, each enduring and each the epitome of innovation. From the company that grew from one to many, the serial entrepreneur and the researcher-turned-community-developer, each individual's story and contributions to our state lend proof to the notion that technology-based economic development has and will continue to grow and diversify Oklahoma's economy.

In 1987, 1 in 11 Oklahoma workers were in the energy industry. Today, 1 in 27 workers are in the energy sector – reflecting not only a shift in technology, but also a shift in diversification. Diversification has worked, and our economy is more resilient than ever to the ebbs and flows of energy prices. And while we take a moment to look back, we must remain focused on the future. Technology is moving at an even faster pace, global markets are changing, supply chains are shortening and reshoring is occurring at accelerating rates. Our state is positioned to take advantage of these global shifts, so long as we continue our commitment to growth through innovation.

Please join me in celebrating the accomplishments OCAST has made over the past three decades. Oklahoma researchers, entrepreneurs and innovators of the '80s, '90s and today have paved the way for a brighter future, and we look forward to continuing – and accelerating – the momentum that will propel Oklahoma in the 21st century knowledge economy.

C. Michael Carolina,
Executive Director

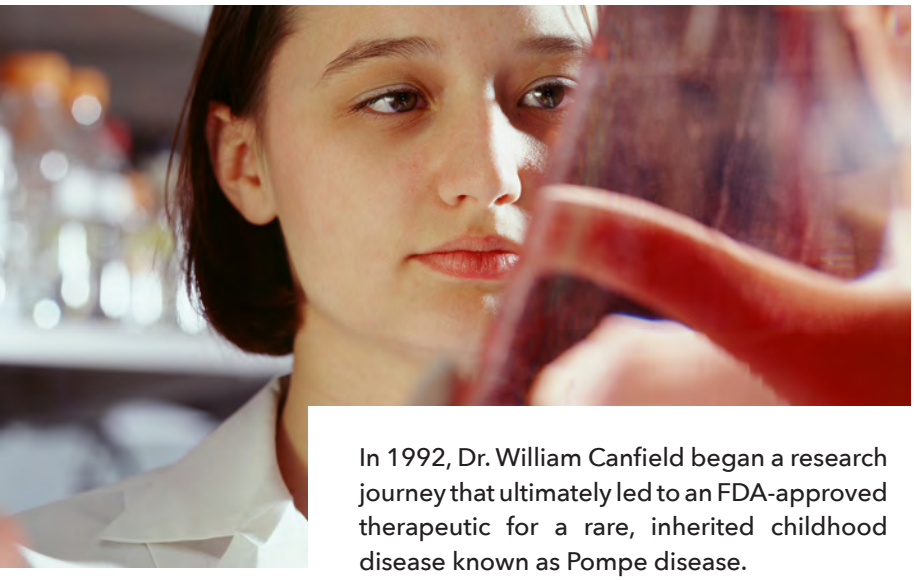

OCAST
INNOVATION
COLLABORATION
JOBS
i2E
OKLAHOMA
MANUFACTURING
ALLIANCE
Oklahoma State University
CEAT
NPDC
New Product Development Center

Oklahoma's Innovation Model

OCAST is uniquely positioned to serve as the bridge between research activities and business needs. 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. 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.

Jump-starting Research

Early OCAST funding fueled research by Dr. William Canfield that ultimately led to an FDA-approved treatment for the often-fatal Pompe disease.



DR. CANFIELD
discusses the impact of our contributions.

In 1992, Dr. William Canfield began a research journey that ultimately led to an FDA-approved therapeutic for a rare, inherited childhood disease known as Pompe disease.

A glycobiologist, Dr. Canfield had taken a faculty position at the University of Oklahoma Health Sciences Center in 1991. He turned to OCAST for a $150,000 grant that fueled groundbreaking research into causes of often fatal enzyme deficiency conditions such as Pompe disease.

"The early OCAST funding was really essential to jump-starting the whole program," Dr. Canfield said. "Ultimately, I got NIH funding, but the OCAST funding allowed us to continue to develop the data that was necessary to get a successful grant."

Dr. Canfield's lab eventually developed an enzyme treatment for Pompe disease and similar conditions.

"That led to the founding of Novazyme Pharmaceuticals in 1998, and we continued to develop it primarily as a treatment for Pompe disease," he said. "We did that through September of 2001, when we were acquired by Genzyme Corp. out of Boston."

The $206 million acquisition by Genzyme was just another step in Dr. Canfield's journey. Two years later, a contract manufacturing firm known as Cytovance Biologics was founded by Dr. Canfield's former Novazyme colleagues.

"I wound up getting involved in the company after it was formed, recapitalized it and ran it for about six or seven years until it was sold last year," he said. "Cytovance has grown to around 200 employees, which is probably the biggest biotech company in the state of Oklahoma."

Along the way, Dr. Canfield built a high-end housing development near downtown Oklahoma City to provide an urban housing option for professionals recruited to Oklahoma from urban cores such as Boston or New York.

All 78 townhomes in The Hill at Bricktown have sold, and 60 more are planned.

"Turns out that the health sciences is actually the No. 1 career of our residents," he said.

Today, Dr. Canfield leads Siwa Biotech, which is advancing a technology to ensure that people having blood transfusions receive the correct blood type. OCAST has provided funding for Siwa just as it did for Canfield's earlier research that became Novazyme.

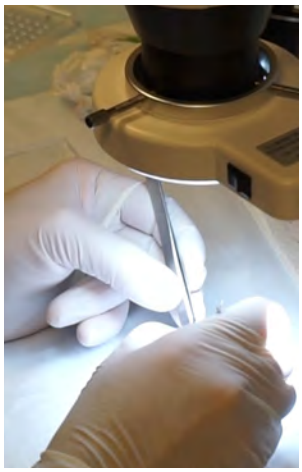
"OCAST grants were essential in supplementing investor dollars at Siwa to keep the program going when you don't have a lot of money at the beginning."

And without that original OCAST funding that jump-started Dr. Canfield's Oklahoma research, all the successes that followed might never have happened.

"The thing I'm most proud of is the development of the treatment for Pompe disease," Dr. Canfield said. "I didn't do it all myself, but I am proud of the role I played."

The Serial Mindset

As co-founder of Moleculera Labs, Dr. Craig Shimasaki continues long-standing pursuit of advancing bioscience technologies.



DR. CRAIG SHIMASAKI
discusses the impact of our contributions.

If there were a perfect match for the term "serial entrepreneur," it might be Dr. Craig Shimasaki, co-founder and CEO of Oklahoma City-based Moleculera Labs. Since the early 1990s, he has been involved in the founding of three Oklahoma City-based bioscience companies, ZymeTx, InterGenetics and most recently, Moleculera Labs.

Research support from OCAST has been an important element of Dr. Shimasaki's entrepreneurial journey for more than a quarter of a century.

"My first interaction with OCAST was probably in the early 1990s when we started a company that was focused on ways to identify influenza in a physician's office," he said. "We applied for and received OCAST support."

Funding support from OCAST along with matching investment dollars raised by ZymeTx co-founders helped the team build the company, receive FDA approval for its ZstatFlu test and eventually become a publicly traded company.

Dr. Shimasaki credits the impact of OCAST and its partners for helping him build successful enterprises.

"I would say that we have been successful because of the support that we have had from OCAST and its partners," Dr. Shimasaki said. "They have been very critical to the development of a bioscience and technology ecosystem here in Oklahoma."

InterGenetics developed a DNA-based test for women that indicated their likelihood to develop breast cancer. Moleculera Labs is commercializing a set of diagnostics for neuropsychiatric conditions using technology that was developed in the laboratory of University of Oklahoma researcher Dr. Madeleine Cunningham.

"We provide blood testing mostly for children who have these treatable neuropsychiatric conditions that are triggered by infections," Dr. Shimasaki said. "When we identify what is happening in their bloodstream, they can be treated and the symptoms resolved."

Moleculera Labs offers the testing in a certified laboratory setting from the University Research Park, and in less than two years, it has already conducted 3,500 tests for children from around the world.

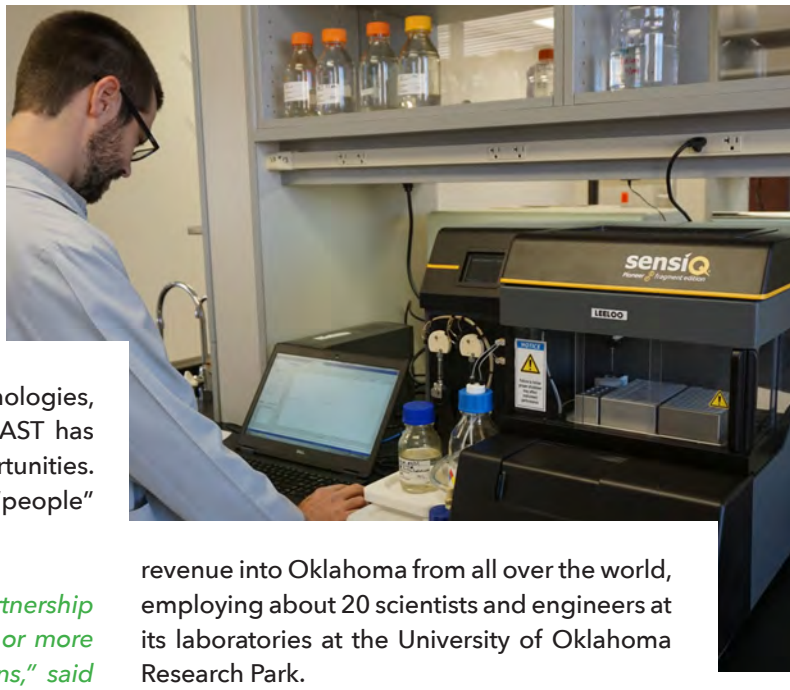
Whether it is diagnostic testing for influenza, breast cancer or neuropsychiatric conditions in children, Dr. Shimasaki said he is proud to have been a part of technologies that have positive impacts on the lives of people.

It all goes with the territory of being a "serial entrepreneur."

"When you think about it, every large organization was at one time an entrepreneurial company, started up by a handful of people," Dr. Shimasaki said. "I think these entrepreneurial, forward-looking ideas that OCAST represents are so vitally important to the state."

Intern Transformation

Oklahoma City's SensiQ Technologies uses the OCAST Intern Partnership program to identify, hire valuable employees.



TOM JOBE
discusses the impact of our contributions.

For Oklahoma City's SensiQ Technologies, the relationship established with OCAST has meant much more than funding opportunities. OCAST has provided a critical "people" connection for the company.

"Through the OCAST Intern Partnership program, we have hired probably 10 or more employees who were originally interns," said Tom Jobe, SensiQ's chief operating officer. "In fact, our chief scientist right now was originally one of our interns from the University of Central Oklahoma. So we've hired interns from OU, OSU, UCO, Rose State and Oklahoma Baptist University over the years."

SensiQ's relationship with OCAST was well-established almost two full decades before it was founded as a spinoff of Stillwater-based Nomadics Inc., in 2005. Nomadics, which created explosive-detection technology, was one of the first clients of OCAST after the agency was created by the state legislature in 1987. SensiQ develops and manufactures sophisticated life-science equipment used by academic researchers, biotechnology and pharmaceutical companies in the early stages of drug discovery. Nomadics co-founder Colin Cumming is also a co-founder of SensiQ and its CEO. For SensiQ, an OCAST Oklahoma Applied Research Support (OARS) grant awarded in 2006 helped in development of its first device that measures the binding affinity and kinetic properties of biomolecules.

"That first OARS grant really helped us complete the key research that we needed," Jobe said. "We were able to complete the development and essentially commercialize our product within a year of receiving the grant."

Today, SensiQ successfully competes against the largest companies in the industry. It brings revenue into Oklahoma from all over the world, employing about 20 scientists and engineers at its laboratories at the University of Oklahoma Research Park.

Jobe describes Oklahoma's business environment as "very startup friendly" to tech-based and life-science companies such as SensiQ.

"OCAST is particularly important for smaller companies like we were when we first started," he said. "I think it's vitally important to have that kind of help and technical assistance and financial support. If we had not been helped by the OCAST grant, I'm sure we would have been delayed in commercializing our instrument."

SensiQ continues to push ahead in R&D to develop new technologies and automated versions of its SensiQ Pioneer instrument. It markets its equipment worldwide through sales reps in the United States and 17 distributors in Asia, Europe and South America. In a high-tech industry full of giants, SensiQ, a small Oklahoma-based company, is successfully competing.

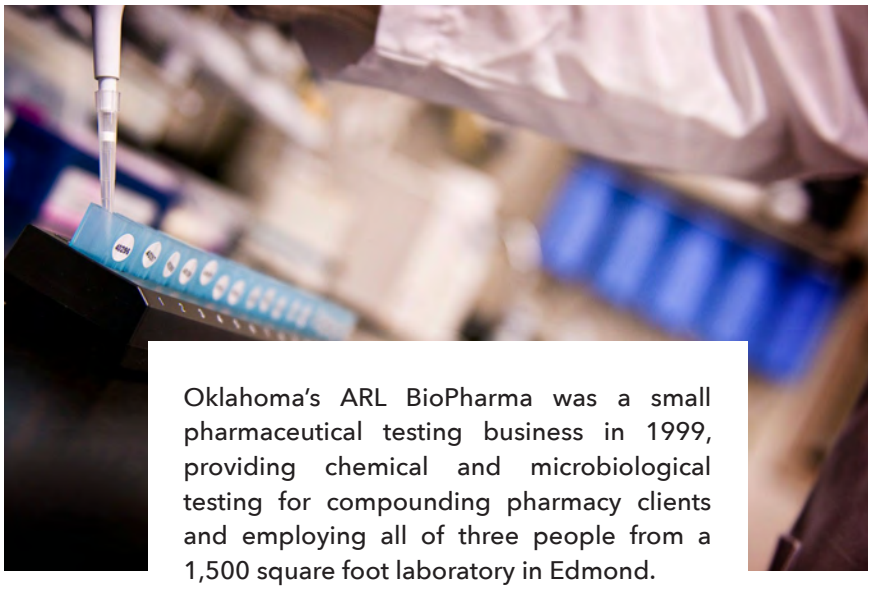
"We feel like that is a significant accomplishment to be commercially successful even though we are really small," Jobe said.

A significant milestone is the impact of the OCAST Intern Partnership program, which has brought almost half of the SensiQ team on board over the years, Jobe said.

"It's been wildly successful," he said.

A Bigger Vision

With OCAST support, Dr. Tom Kupiec has built three biotech companies that employ 130 Oklahomans.



Oklahoma's ARL BioPharma was a small pharmaceutical testing business in 1999, providing chemical and microbiological testing for compounding pharmacy clients and employing all of three people from a 1,500 square foot laboratory in Edmond.

Dr. Tom Kupiec had a bigger vision.

A native Oklahoman educated at both the University of Central Oklahoma and the University of Oklahoma Health Sciences Center College of Pharmacy, Dr. Kupiec began his journey down the entrepreneur's path the previous year when he bought the pharmaceutical testing business known as Analytical Research Laboratories.

Dr. Kupiec applied for Oklahoma Applied Research Support (OARS) funding through OCAST that allowed the business to explore new avenues to provide its drug-testing expertise.

"Our companies have received funding from both the state and federal sources such as SBIR (Small Business Innovation Research)," Dr. Kupiec said. "OCAST has an SBIR incentive program that we've participated in. We also received and repaid funding from the OCAST Technology Business Finance Program, the TBFP. We've been very blessed over the years."

Today, ARL and its sister companies, DNA Solutions and The Kupiec Group, employ approximately 120 highly trained life-science professionals from more than 20,000 square feet of lab and office space in Oklahoma City's University Research Park. The Kupiec-owned companies have expanded both the services they provide and the markets they serve over the years.

– ARL now provides services to a wide swath of the pharmaceutical research industry for any stage of the drug development process.

– DNA Solutions began as an animal-genetics testing laboratory and now provides genetics testing for humans and has expanded into the area of forensics.
– The Kupiec Group provides forensic expertise for the legal industry.

Most of the three companies' revenue flows into Oklahoma from out of state or even out of the country.

OCAST support has had a similar impact on many other tech-based startups across Oklahoma, which has led Dr. Kupiec to become a vocal supporter of the state's science and technology economic development agency.

"This fiscal year, OCAST is going to have a return on investment of approximately 40 to 1," he said. "That means that for every dollar the state puts in there is $40 in return. That's unheard of. Its cumulative return is greater than 20 to 1.

"That's a fantastic return on investment for the state of Oklahoma."

DR. KUPIEC
discusses the impact of our contributions.

2017

OCAST Impact Overview

2,451

JOBS CREATED OR RETAINED

224

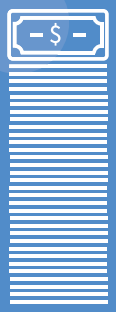
STUDENT INTERNS PLACED

$52,866

AVERAGE WAGE

$93,025,444

TOTAL PAYROLL



36

PATENT APPLICATIONS

$575,500,573

TOTAL FINANCIAL IMPACT

$258,297,031

IMPACT ON GROSS SALES

$18,200,000

VALUE OF PATENTS

46

PATENTS GRANTED

27

COMPANIES FORMED

42:1

(30 Year Cumulative 22:1)

Return on Investment

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