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ΜΘΚ : ευρω # 8398  
ΘΘΘ : πορε # 1111  
ΝΧΗ : ορα # 3283  
ΛΦΟ : φηρ # 4949  
ΔΕΡ : γφγι # 9594  
ΜΝΔ : ται # 4838  
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# Ohio

# Third Frontier

Innovation Creating Opportunity

## 2012 Annual Report

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# Ohio

# Development Services Agency



## Development Services Agency

John R. Kasich, Governor

Christiane Schmenk, Director

### Third Frontier Commission

Christiane Schmenk, Chair  
*Ohio Development Services Agency*

Lisa Delp  
*Executive Director*

Richard Fearon  
*Eaton Corporation*

Ben Kanzog  
*Governor's Science and  
Technology Advisor*

John Minor  
*JobsOhio*

Bruce A. Langos  
*Teradata*

Gary Lindgren  
*Cincinnati Business Committee*

William McCreary  
*Pilkington*

Jim Petro  
*Chancellor  
Ohio Board of Regents*

David Scholl, Ph.D.  
*Athenian Venture Partners*

Richard Seaman  
*Seaman Corporation*

### Third Frontier Advisory Board

Mark Collar, Chair  
*Triathlon Medical Ventures*

Joseph Alutto, Ph.D.  
*The Ohio State University  
Office of Academic Affairs*

Mike Hooven  
*Enable Medical Technologies*

Christopher Coburn  
*Cleveland Clinic  
Foundation Innovations*

John Huston  
*USPrivatecompanies*

Lloyd Jacobs, M.D.  
*University of Toledo*

Sanjay Sadana  
*American Scientific LLC*

Mark Peterson  
*Procter & Gamble*

Kirk Schuring  
*Ohio House of Representatives*

Barbara Snyder  
*Case Western  
Reserve University*

Thomas Waltermire  
*TeamNeo*

Randy Oostra  
*ProMedica Health System*

Michael Sieron  
*DG Medical*

Bill Beagle  
*Ohio Senate*

January 2013

### John R. Kasich, Governor, State of Ohio General Assembly, State of Ohio

Dear Governor Kasich and members of the Ohio General Assembly,

I am pleased to present to you the 2012 Ohio Third Frontier Annual Report. This has been another significant year, as Ohio Third Frontier continues bringing prosperity to our state through job creation.

In 2012, we reached a milestone with a total of 882 companies created, capitalized or relocated to Ohio. The investments have helped leverage nearly \$9 in additional federal and private funding for every \$1 of invested state funds. The program continues to see an increase in the average annual salary per job, which is now more than \$62,000 per year. All of this is resulting in economic growth for Ohio's companies and citizens.

Ohio Third Frontier also strengthened its partnership with JobsOhio to create, retain and attract jobs in and to Ohio by providing critical attention to emerging and promising opportunities around the state in 2012. The Ohio Third Frontier Commission was expanded from nine to 11 members and worked closely with the Ohio Third Frontier Advisory Board to consider strategic new programs for increasing support to entrepreneurs and a wide range of high-growth technology-based companies. In addition, we partnered with the Ohio Army National Guard to educate Reserve Officers' Training Corps (ROTC) cadets about internship opportunities through the Ohio Third Frontier's Internship Program. All of these activities are serving to stimulate the growth of emerging technology start-up companies and are continuing to catalyze the conversion of Ohio's economy through new, innovative technologies for economic growth.

On behalf of the Ohio Third Frontier Commission, the Ohio Third Frontier Advisory Board, and the Ohio Development Services Agency, we are proud of the 2012 accomplishments in this report. These, along with all of our Ohio Third Frontier successes, serve as a testament to what we can achieve with our steadfast investments in Ohio.

Thank you for your continued support of Ohio Third Frontier.

Sincerely,

Christiane Schmenk, Chair  
Ohio Third Frontier Commission  
Director, Ohio Development Services Agency

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This report is submitted as required by Section 184.02(B)(2) of the Ohio Revised Code.

The State of Ohio is an Equal Opportunity Employer and Provider of ADA Services

## Ohio Third Frontier: Successes

### Developing Talented Workers through the Ohio Third Frontier Internship Program

The state is contributing to the expansion of a technologically proficient workforce and retaining highly knowledgeable and talented college students in Ohio through the Ohio Third Frontier Internship Program. These students are gaining insightful, hands-on experiences related to their field of study at for-profit Ohio companies. In turn, the companies are benefiting from these students' innovative ideas and high-value capabilities that are helping to make the companies more competitive in the global marketplace. The students and companies are further benefiting each other by establishing valuable relationships, many of which are leading to long-term employment in Ohio for the students upon graduation.

Joe Anguilano, business operations director at Cleveland-based Jurlnnov Ltd., is one such example of an Ohio Third Frontier Internship Program success story. Anguilano began participating in the program during his senior year at John Carroll University and was matched up with Jurlnnov, a high-tech company specializing in computer forensics, electronic discovery and information security services. Jurlnnov was getting ready to launch several company and product initiatives to prepare for rapid growth and anticipated business changes, and considered utilizing a student intern to add high energy and creativity to the critical launch process activities. Anguilano was quickly integrated into many key business and technical operations of the small company, including managing Jurlnnov's move from Westlake, Ohio to its current location in downtown Cleveland.

Upon his graduation from John Carroll University, Anguilano accepted a full-time position as a business analyst with Jurlnnov. Since then, he has received several promotions and

increasing levels of responsibility. Anguilano also enrolled in post-graduate studies at Cleveland State University, where he graduated with a Master of Business Administration. In his current position at Jurlnnov, Anguilano is responsible for sales and marketing, financial management and reporting, procurement, operations management and strategic planning. Both Anguilano and Jurlnnov officials attribute his success to having been influenced by the Ohio Third Frontier Internship Program – the program helped him find an opportunity to gain an immense amount of experience that has blossomed into a successful career.



In 2012, Ohio Third Frontier proudly announced a partnership with the Ohio Army National Guard to engage cadets enrolled in the Reserve Officers' Training Corps (ROTC) for internship opportunities through the Ohio Third Frontier Internship Program. This partnership is promoting the ROTC cadets to Ohio businesses and providing employment opportunities for the cadets, many of whom wish to remain in Ohio with their families and local communities upon graduation.

Since the start of the Ohio Third Frontier Internship Program in 2003, more than 4,000 students and more than 800 Ohio companies have registered to participate in the program. The Ohio Third Frontier Internship Program targets key areas of science and technology, engineering and math relating to Ohio Third Frontier's technology focus areas. More information about the program is available at [www.development.ohio.gov/bs-thirdfrontier/intern.htm](http://www.development.ohio.gov/bs-thirdfrontier/intern.htm) and [www.thirdfrontierintern.ohio.gov](http://www.thirdfrontierintern.ohio.gov).



## Technology Validation and Start-up Fund

Universities and other research institutions consistently develop technologies that have commercial potential. When this potential is realized, these institutions can serve as an important source of economic development. However, the path to commercialization can hit road blocks. The Technology Validation and Start-up Fund, initiated in 2012, helps new technology move successfully through challenges and establish start-up companies in Ohio that have a foundation upon which to build a successful company.

Many great ideas and innovative technologies emerge from an institution with a vibrant research program, many of which have commercial potential. However, there are many challenges before these new technologies can become commercial successes that support economic development.

The first challenge that has been addressed is the need to validate the commercial potential of a technology. Innovative technology often is developed as part of a basic research project that has been funded by a federal source such as the National Science Foundation or National Institutes of Health. Typically, the scope of these federal research grants is focused on basic research and does not include funding to explore the commercial potential of new concepts. Without some validation of the technology, such as building a prototype, most technology is too unproven for a company to license from the research institution.

Phase 1 of the Technology Validation and Start-up Fund Program addresses this gap in funding by providing up to \$50,000 for a research institution to take the steps necessary to validate the commercial potential of a technology. The critical aspect of Phase 1 is ensuring that the funded project takes the technology forward to a point that it is ready to be licensed by an Ohio start-up company. The first two cycles of awards in 2012 have resulted in 15 Phase 1 projects being funded at eight different institutions.

The focus of Phase 1 of the program is to validate the commercial potential of technology, lowering the risk to the point that a commercial entity is willing to develop it into a commercial product. Phase 2 focuses on helping Ohio start-up companies that license technology from research institutions to move the technology forward to the point it is ready to be launched commercially or achieve a milestone that is needed to raise additional capital from professional investors.

The Phase 2 awards, of up to \$100,000, are given directly to the start-up company for projects that are clearly focused on achieving a well-defined technology milestone that has critical commercial significance. Applicants to Phase 2 are expected to have credible management in place and a well-developed business plan. To date, 11 Phase 2 awards have been made to Ohio start-up companies that have licensed technology from eight institutions.

In 2012, Ohio Third Frontier funding of nearly \$2.5 million was awarded to eight universities and nonprofit research institutions and 13 companies to support their technology validation and commercialization projects. Phase 1 and Phase 2 awards across Ohio Third Frontier's focus areas include an advanced flight controller for unmanned aerial vehicles, a software application to provide portable testing to assess concussions in athletes, a process developed to treat waste water produced by shale gas wells, a new propulsion system for marine applications, an improved manufacturing method for use in producing flexible electronics and carbon nanotube fibers to provide a cost-effective replacement for precious metal cathodes in batteries and fuel cells.

## Industrial Research Development Center Program - Philips

Philips Medical Systems, in partnership with Ohio Third Frontier's Industrial Research Development Center Program, has relocated its research and development operation for the Single Photon Emission Computed Tomography (SPECT) instrument from San Jose, California to the Philips facility in Highland Heights, Ohio. SPECT is a medical imaging technique that can assist in cancer detection, neurology and cardiac function. With movement of the SPECT research and development facility to Ohio, Philips has consolidated its nuclear medicine division in



Ohio. Manufacturing facilities for nuclear medicine imaging such as Positron Emission Tomography (PET) instruments and SPECT instruments are already located in Highland Heights along with the research and development operations of PET. Much of the recent development in nuclear medicine has focused on combining the unique information on diseases provided by nuclear medicine techniques with high-quality special information provided by Magnetic Resonance Imaging (MRI) and X-ray-based Computed Tomography (CT) imaging.

Before deciding that Ohio was best suited for the company's needs, Philips considered locating the SPECT research and development division to Israel, the Netherlands, China or Russia. Driving the decision to locate in Ohio was ongoing collaboration with major hospitals and universities in the state along with the growing cluster of medical imaging businesses in northeast Ohio. Collaboration with The Ohio State University, Case Western Reserve University and University Hospitals has been strong for Philips and was a unique asset that pushed the decision to relocate the facility and its jobs to Ohio.

The relocation of the SPECT research and development operations will create at least 100 jobs at the Philips facility in Highland Heights. The Ohio Third Frontier commitment of \$5 million from the Industrial Research and Development Center Program will be matched by a Philips' commitment of more than \$72 million in renovation, equipment and payroll.

## Juventas Therapeutics

One of the primary goals of Ohio Third Frontier is to ensure that the right resources are available to assist emerging technology companies. Ohio Third Frontier includes multiple initiatives that address specific stages of development. One such initiative is the Entrepreneurial Signature Program (ESP), which was designed to provide services and support during the earliest stages of company development. Six regional ESP organizations package and polish Ohio technology companies to reduce risk and attract investment capital. With the development of these early-stage companies comes the need for funding. Ohio Third Frontier supports funding at this pre-seed stage through a second initiative with the Pre-Seed Fund Capitalization Program. Angel investors who have formed investment funds can access Ohio Third Frontier funds to create sources of investment capital to help technology companies execute proof-of-concept work and advance toward commercialization.

Ohio Third Frontier programs also work in collaboration with other state and local initiatives to assist Ohio companies in their progression to profitability and job creation. The result of the collaborative strategy is shown in the development path of Juventas Therapeutics, a Cleveland-based company that has successfully used the state's available resources to build a strong Ohio business with a bright future.

Juventas is a pioneer in the use of regenerative medicine to improve the restoration of cardiac health. The company's lead product, JVS-100, has been shown to protect and repair tissue following ischemic injury by recruiting the body's own stem cells to the damaged tissue, preventing cell death and promoting new blood vessel growth. A Phase I trial evaluated



the safety and efficacy in the treatment of patients with Class III heart failure and demonstrated that JVS-100 is well tolerated with no adverse effects. Juventas received U.S. FDA authorization in June 2012 to commence two Phase II studies to test JVS-100 efficacy in heart failure and critical limb ischemia patients. Juventas conducted a successful site investigator meeting on June 2, 2012 to kick off the heart failure trial. As of third quarter of 2012, Juventas is actively enrolling patients in its phase II heart failure trial. The first patient was treated on August 19, 2012.

The company has been assisted at various stages by the Cleveland Clinic, Pre-Seed Fund Capitalization Program participants North Coast Angels and Blue Chip Ventures, Entrepreneurial Signature Program organization JumpStart and other programs connected to Ohio Third Frontier. Through its access to Ohio Third Frontier resources, Juventas was able to find the funding necessary to begin operations, support business plan development, participate in fundraising activities and hire a CEO. In 2007, the company closed a seed investment round of \$1.5 million. The seed round funding enabled the company to reach critical milestones and successfully raise an additional \$6.5 million. Some of the funds came from Ohio investors who were participants in various Ohio Third Frontier programs, but more importantly, several investors in this round came from outside of Ohio. The early capital raised in Ohio enabled Juventas to accelerate development and hit major value-creating milestones. In 2012, Juventas raised \$22 million in Series B financing, which included investments from Ohio, New York, Wisconsin and Japan.

Juventas has 10 full-time employees. The company operations were housed in the Cleveland Clinic's Innovations/Global Cardiovascular Innovation Center incubators until growth necessitated a recent move to a larger space. The success and support for Juventas has led to the creation of its own spin-off, SironRX, which currently employs four full-time employees.

## Ohio Third Frontier Performance Metrics – 2012

Performance Criteria	As of 12/31/2011	As of 6/30/2012	Percentage Change
State Funds Awarded	\$1,138,599,560	\$1,170,239,594	2.8%
State Funds Expended	\$847,122,246	\$907,910,178	7.2%
Cost Share Expended	\$1,260,438,871	\$1,425,906,069	13%
Leveraged Dollars*	\$7,312,753,309	\$8,048,717,740	10%
Leverage Ratio** (Goal 3.5:1)	8.6:1	8.9:1	3.5%
Direct Jobs Created	14,568	15,945	9.5%
Total Direct and Indirect Jobs***	88,874	95,510	7.5%
Companies Created, Capitalized or Relocated	802	882	10%
Average Salary	\$61,957	\$62,013	0.1%
Cost Per Job****	\$58,150	\$57,001	-2%

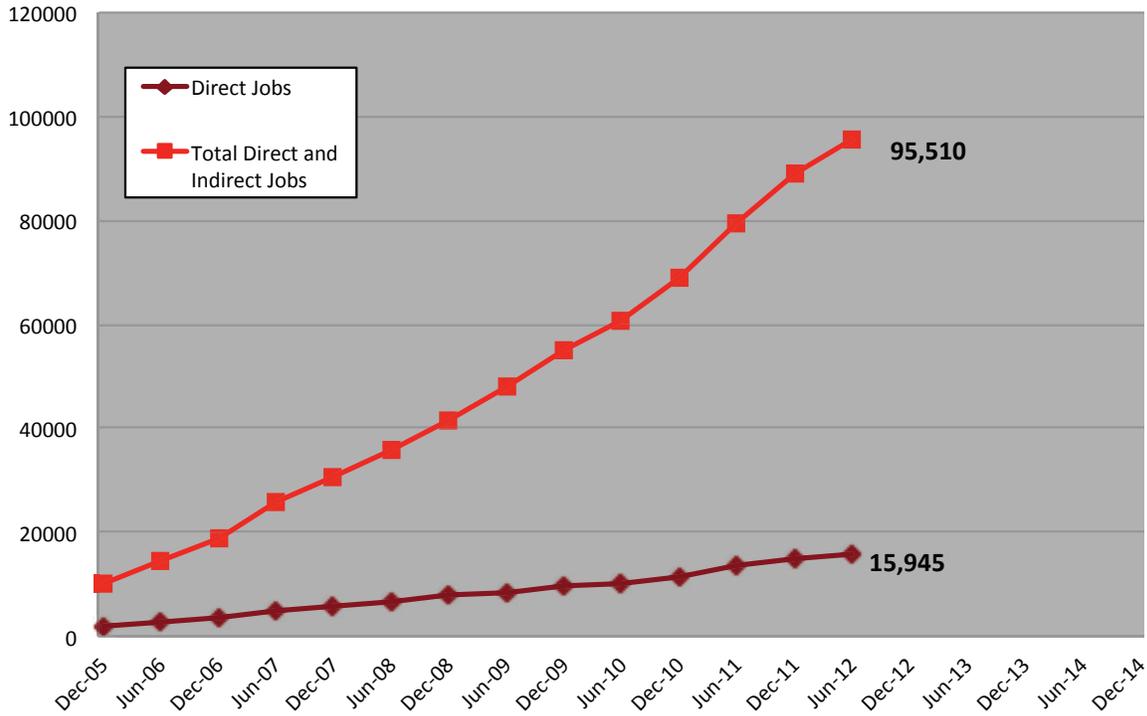
\*Leveraged dollars include funding from federal, industry and non-Ohio Third Frontier state sources, equity investments, product sales and licensing revenue.

\*\* Leveraged dollars to state funds expended (does not include any cost share)

\*\*\* Metric based on multiplier from 2009 SRI Report, *Making an Impact: Assessing the Benefits of Ohio's Investment in Technology-Based Economic Development Programs*

\*\*\*\* State funds expended/direct jobs created

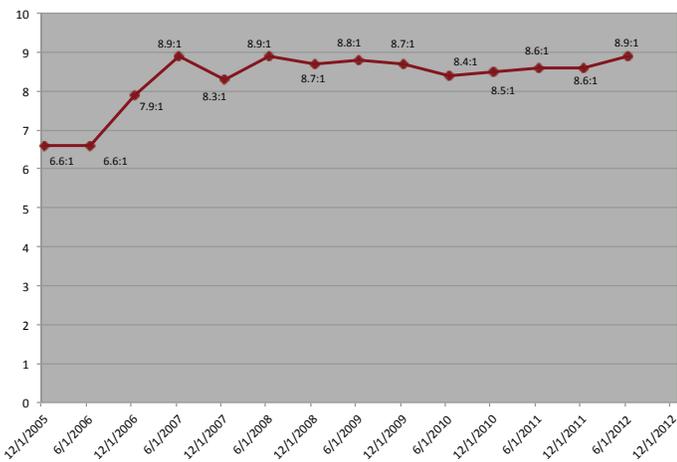
### Ohio Third Frontier Direct & Indirect Jobs



Goal equals value estimated by Ohio Public Expenditures Council

**15,945 direct jobs** (Types of direct jobs – Prod/Mfg: 23%; R&D: 50%; Admin/Other: 26%)

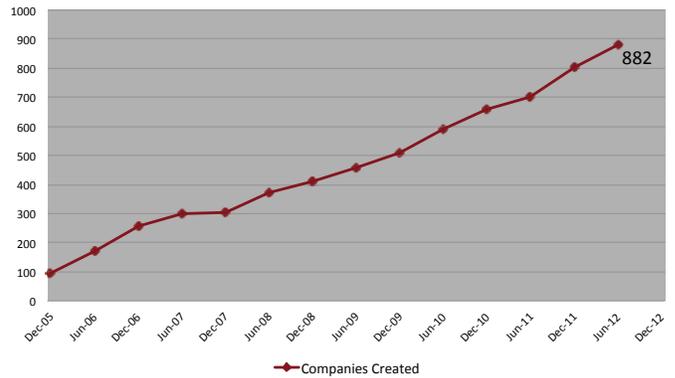
### Ohio Third Frontier Leverage Ratio



Biomedical Research and Technology Transfer Commission and Ohio Public Expenditures Council estimated the leverage as 3.5:1

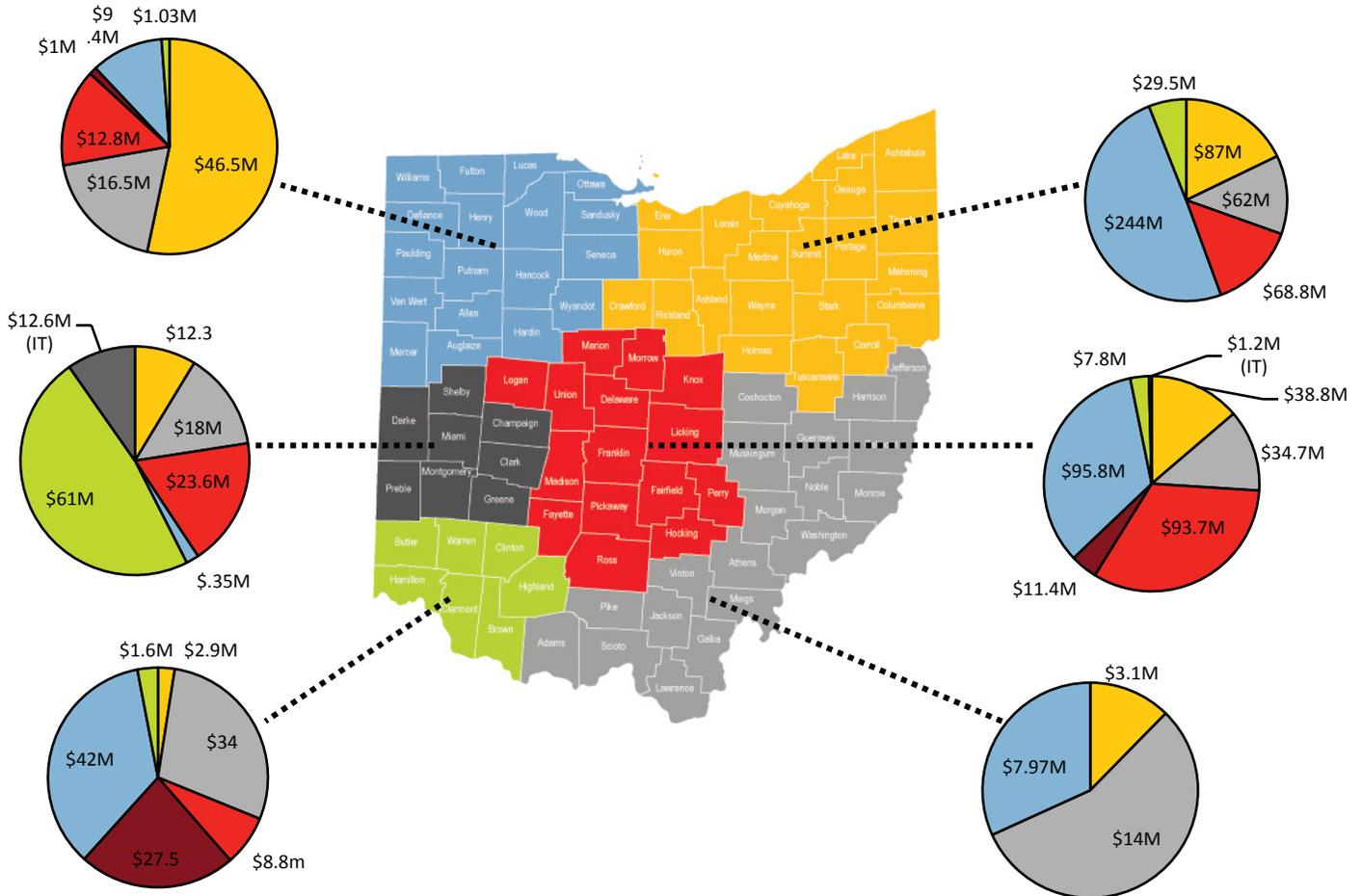
Dollar value of leverage is **\$8 billion**

### Ohio Third Frontier Company Creation/ Capitalization/Attraction



Companies reported that have since ceased all operations in Ohio: **89**

Ohio Third Frontier Funds Awarded by Sector/Region

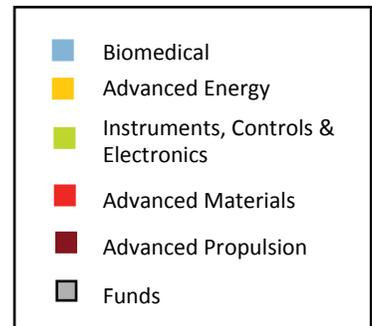
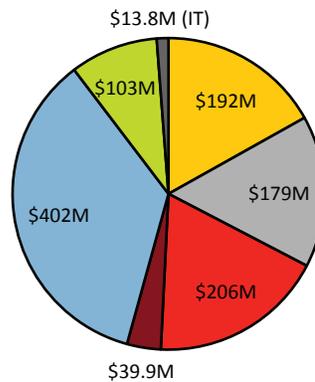


**Awards Per Region:**

Northeast: 213  
 Central: 111  
 West Central: 56  
 Northwest: 37  
 Southwest: 33  
 Southeast: 8

**Total State Funds Per Region:**

Northeast: \$494M  
 Central: \$282M  
 West Central: \$130M  
 Southwest: \$118M  
 Northwest: \$87M  
 Southeast: \$25M



## Grand Summary of Statistics (Since the program's inception in 2002)

Program Name	State Funds Awarded	State Funds Expended	Cost Share Reported	Leverage	Jobs Created/ Retained	Companies Attracted	Leverage Ratio	Cost per Job	Average Salary
Biomedical Research Commercialization Program	\$151,769,923	\$140,890,198	\$209,501,491	\$953,753,876	1,650	40	6.7	\$85,976	\$64,778
Engineering & Physical Sciences Research Commercialization Program	\$81,677,370	\$75,648,605	\$91,517,544	\$353,156,972	641	6	4.7	\$118,017	\$66,356
Biomedical Wright Centers of Innovation	\$87,302,970	\$87,302,967	\$183,401,015	\$441,747,211	754	20	5.1	\$115,786	\$100,861
Engineering & Physical Sciences Wright Centers of Innovation	\$149,594,300	\$132,211,859	\$272,703,236	\$956,598,060	1,350	56	7.2	\$97,935	\$57,526
Mega-Wright Centers of Innovation	\$59,999,086	\$33,768,800	\$90,595,595	\$266,737,590	270	44	7.9	\$125,070	\$70,000
Wright Projects	\$102,371,597	\$74,252,901	\$126,631,141	\$187,442,649	593	25	2.5	\$125,216	\$58,204
Ohio Research Scholars Program *	\$146,510,334	\$72,643,523	\$47,051,167	\$66,894,397	174	6	0.9	\$417,492	\$68,780
Biomedical	\$13,960,148	\$4,639,689	\$8,716,173	\$14,902,989	86	0	3.2	\$53,950	\$71,477
Advanced Energy	\$41,115,854	\$28,772,033	\$28,821,701	\$116,921,923	294	6	4.1	\$97,864	\$53,648
Advanced Imaging	\$13,542,470	\$5,621,638	\$8,180,105	\$29,945,955	114	1	5.3	\$49,313	\$89,004
Advanced Materials	\$14,579,672	\$7,550,683	\$9,646,512	\$20,642,777	50	1	2.7	\$151,014	\$64,121
Advanced Sensors	\$8,977,738	\$5,451,831	\$6,683,884	\$2,858,660	50	0	0.5	\$109,037	\$51,957
Fuel Cell	\$51,288,209	\$45,427,754	\$35,386,796	\$190,295,042	365	2	4.2	\$124,460	\$59,722
PhotoVoltaics	\$10,333,963	\$6,827,349	\$6,307,739	\$2,697,005	52	0	0.4	\$131,295	\$60,087
Ohio Research Commercialization Grant Program	\$13,333,115	\$13,060,518	\$6,566,066	\$209,227,949	306	14	16.0	\$42,681	\$58,157
Third Frontier Action Fund	\$18,582,863	\$17,342,877	\$32,335,323	\$138,534,215	429	57	8.0	\$40,426	\$52,210
Entrepreneurial Signature Program	\$115,486,477	\$101,617,886	\$62,657,523	\$1,422,843,568	3,991	609	14.0	\$25,462	\$47,173
Pre-Seed Fund Capitalization Program	\$64,286,032	\$48,414,137	\$193,289,543	\$2,650,475,368	4,405	348	54.7	\$10,991	\$69,559
Industrial Research & Development Center Program	\$22,267,473	\$5,374,929	\$5,663,514	\$4,920,446	81	0	0.9	\$66,357	\$82,301
Ohio's New Entrepreneurs (ONE) Fund	\$560,000	\$340,000	\$0	\$4,885,000	16	25	14.3	\$21,250	\$30,625
Targeted Industry Attraction Program	\$2,700,000	\$750,000	\$250,000	\$13,266,087	274	0	17.7	\$2,737	\$54,612
<b>Grand Totals</b>	<b>\$1,170,239,594</b>	<b>\$907,910,178</b>	<b>\$1,425,906,069</b>	<b>\$8,048,717,740</b>	<b>15,945</b>	<b>882 **</b>	<b>8.9</b>	<b>\$57,001</b>	<b>\$62,013</b>

\*Expenditure for endowment is recorded once a research scholar has been hired

\*\*Adjusted to eliminate duplication of company data by collaborating programs