

Michigan's URC

University Research Corridor

Annual Report 2009

Empowering Michigan



MICHIGAN STATE
UNIVERSITY

MUNIVERSITY OF MICHIGAN

WAYNE STATE
UNIVERSITY

WHO WE ARE

Michigan’s University Research Corridor (URC) is an alliance of the University of Michigan, Michigan State University, and Wayne State University with a vision to contribute toward the transformation of Michigan’s economy.

The URC is an intellectual and economic engine for the state, generating net economic impact of \$14.5 billion. The alliance attracts 93 percent of all external academic research and development dollars that come into Michigan and collectively, the URC partner institutions expended more than \$1.4 billion dollars in research activity this past year.

The URC is among the top R&D clusters in the nation (compared with regions of the USA such as Route 128 in Boston, Research Triangle in North Carolina, and Silicon Valley in Northern California) for producing patents, new business, and graduates with high-tech related degrees needed in growing new fields. In addition, the three universities serve as a magnet in helping to attract new business to the state of Michigan.

The URC is one of the largest employers in the state with almost 49,000 full-time-equivalent employees. In 2008, there were 572,123 known URC alumni living in Michigan, making up 7.5 percent of the population over age 18.

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MESSAGE FROM THE PRESIDENTS

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When we formed the University Research Corridor just three years ago, we asked ourselves and our institutions how we could work together most effectively to accelerate economic development in Michigan. We are discovering many answers to that question—everything from providing seed funding for promising collaborative research projects to teaming up on large initiatives in major growth areas such as energy technologies and the life sciences. And now, for 2010 and beyond, we are asking an even more important question: What should the new Michigan look like, and how can the URC become a major force in creating our state's new, dynamic economy? Together with Jeff Mason, our first URC executive director, we will enhance our successful collaboration and establish partnerships with the business development, policy, and higher education communities throughout our state. We know that the URC is and will be a magnet for talent attraction in Michigan, and we pledge our support to leverage that tremendous human resource as our institutions spark innovation and foster the spirit of entrepreneurship that is essential for Michigan's future.

Lou Anna K. Simon
Michigan State University

Jay Noren
Wayne State University

Mary Sue Coleman
University of Michigan

FROM THE URC EXECUTIVE DIRECTOR



Michigan's University Research Corridor has a clear vision: Help create the 21st century Michigan. In collaboration with partners across the state, the URC can play a key role to: create a vibrant Michigan economy by leveraging the intellectual capital of its three public research universities; attract knowledge economy businesses; connect research activity to new enterprises; educate a talented workforce; and plant seeds for the industries of tomorrow.

It is a powerful vision, and one that will be fully realized only as our universities work together with dedication and a focused set of goals. I have spent my first months as executive director working with the URC university presidents, vice presidents, and other state leaders to outline the work ahead. We have developed five major goals:

Encourage greater research collaboration among Michigan, Michigan State, and Wayne State. Working with the vice presidents for research at each of the URC universities, we will develop exciting new collaborative research initiatives in areas such as the life sciences, health information technology, alternative energy, sustainability, and urban revitalization.

Increase awareness of the URC and its assets in research and development among key stakeholders. The URC's R&D assets make the state of Michigan highly competitive among other knowledge economies across the country. Getting that word out is a key priority.

Provide support to the state in new business recruitment and development. We will support the state's international and national business development efforts, as well as leverage the power of our collective alumni network to encourage business growth in Michigan.

Accelerate statewide economic development efforts by catalyzing opportunities between the URC and other partners. We will build new models of collaboration with regional economic development organizations, business groups and policy leaders, and other public and private universities across Michigan.

Assist local communities in the revitalization of major metropolitan areas across Michigan. The URC universities can contribute to the renewal of our state's cities as we work with local leaders to create the quality of life so essential to a healthy 21st century economy.

Our goals are aspirational, certainly, but well within our reach. We look forward to collaborating with many partners throughout the state, and to the work ahead.

Jeff Mason
Executive Director

URC ANNUAL HIGHLIGHTS

Collaborative impact, in brief

URC Economic Impact Climbs to New High of \$14.5 Billion

New study shows increase in rankings, R&D, high-tech

Michigan's University Research Corridor has grown in all competitive categories over the past two years, rising among the nation's top research and development clusters for producing patents, businesses, and graduates with high-tech related degrees.

A new annual economic impact study, *Empowering Michigan*, shows URC partners Michigan State University, the University of Michigan, and Wayne State University created a net economic impact of \$14.5 billion while improving in several key benchmarks since the first study in 2007. The studies, which examine innovation clusters in other states, were conducted by Anderson Economic Group.

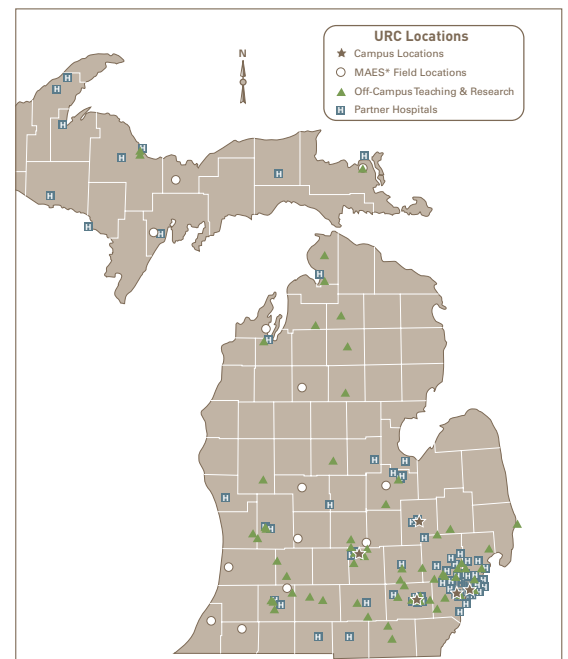
“Even in tough times, these three institutions are showing the whole is greater than the sum of its parts, with net economic impact up 12 percent,” said URC Executive Director Jeff Mason. **“These institutions are producing both innovation and new company spinoffs that rival other major research regions of the nation and generating \$16 in earnings for residents for every dollar the state invests,”** he said.

The new study found that, in comparison to peer clusters, the URC was third in patents granted (up from sixth two years ago) and together the universities produced an average of 20 new companies a year, more than one company a month for the past 60 months.

The number of start-ups the URC universities helped cultivate in 2008 dramatically increased from the previous year going from 14 in 2007 to 28 in 2008.

The URC also awarded the third largest number of high-tech degrees (7,638), close behind the Pennsylvania cluster (7,713) and Southern California schools (8,266).

More data and details from the Anderson Economic Group's third annual URC economic impact report, *Empowering Michigan*, can be found on pages 9–16 of this report.



*MAES: Michigan Agricultural Experiment Station

Created By: Anderson Economic Group, LLC
Data Source: ESRI; Michigan State University, University of Michigan, Wayne State University
September 2007

URC Spells JOBS

IBM, GE boost job market

URC-generated initiatives are driving job creation in the state of Michigan. Here are examples of large national companies setting up shop in 2009:

Big Blue found a fertile spot to grow in the land of green and white, with IBM's decision to locate an application development center on the campus of Michigan State University this year. The first of its kind for the company in North America, the IBM facility is the product of an agreement to expand MSU's recruiting, research, and educational partnerships with the information technology giant. The new center is expected to generate up to 1,500 direct and indirect jobs over the next five years.

And then there's GE. When CEO Jeff Immelt spoke to the Detroit Economic Club in June, he talked about the great public-private partnership that convinced GE to open a new Advanced Manufacturing and Software Technology Center in Van Buren Township, which is slated to bring 1,100 jobs to the state. He described the URC universities' engineering talent, the partnership of Governor Jennifer Granholm, and the fit between a lot of GE's work and the Tier 1 supply chain. **"There are good and strong incentives for us to be here, and so those things all came together with this investment,"** said Immelt.

Batteries Charge Up State's Economy



The state of Michigan was awarded \$1.36 billion in federal stimulus funding, more than half the entire federal program, directed to kick-start manufacturing of batteries for electric vehicles. Vice President Joseph Biden announced the funding at Wayne State's TechTown in August, underscoring the role the URC has in developing battery technologies as a major element of Michigan's future economy. All three universities have significant research programs dedicated to these new technologies. Such expertise attracts business growth and new business development, demonstrated with two recent announcements:

- Massachusetts-based battery designer A123 Systems, a company that has partnered with Michigan State and U-M, said it planned to build a manufacturing plant in southeast Michigan to supply the Detroit automakers.
- And, U-M and General Motors announced a \$5-million, five-year program to establish the GM/U-M Advanced Battery Coalition for Drivetrains (ABCD).

"Advanced battery technologies have quickly become a competitive advantage in the auto industry," said Bob Kruse, former GM executive director of global vehicle engineering hybrids, electric vehicles, and batteries.

"We aim to speed insertion of new technology, accelerate product design, and contribute to the cohort of automotive engineers and battery researchers who will shape our industry."

No degree programs in electric-drive vehicles currently exist in the United States. Recently, the U.S. Department of Energy awarded Wayne State a \$5 million federal grant to provide an electric vehicle engineering education and workforce training program. A critical component of the plan is to create a pipeline of next-generation technicians and engineers who are needed by an industry transforming to electric-drive vehicles.



Solar Energy Sector Heats Up

First URC seed grant generates major return on investment

The White House has named MSU and U-M two of its 46 “Energy Frontier Research Centers” to encourage advanced scientific research on energy technologies.

MSU is leading a multi-university solar energy research team in a \$12.5 million, five-year project studying how to improve thermoelectricity efficiency technology. A \$500,000 seed grant from URC in 2008, designed to provide start-up support for “revolutionary but feasible” energy projects, helped attract the \$12 million in 2009.

In April, the U.S. Department of Energy awarded U-M a \$19.5 million, five-year grant to improve materials used for solar energy conversion and storage. The new center will include 22 U-M scientists across a wide variety of disciplines.

In April, Nathan Bromey of the Ann Arbor Business Review reported that Michigan **“is quietly assembling a makeshift solar energy supply chain from research to commercialization.”** Bromey noted, **“The role of the University Research Corridor—a coalition between U-M, MSU and Wayne State—as a provider of basic energy research is critical to providing long-term energy breakthroughs.”**

State National Leader in Life Sciences Despite Recession

As the state lost a quarter of its manufacturing jobs, Michigan’s URC partners helped the state become a national life sciences leader, boosting the number of life sciences jobs 10.7 percent as average wages jumped 29 percent, according to a new analysis released in May 2009.

More than 79,062 Michigan residents now work in the state’s life sciences industry, the report found, with the average worker’s salary climbing from \$64,602 in 1999 to \$83,494 in 2006. The sector grew even faster than the services sector, including education, healthcare, accommodation, and food services, which grew 9.5 percent during the same seven-year period.

“The tremendous growth of life sciences employment and the fact that the average wage exceeds \$80,000 shows that Michigan is a powerhouse life sciences state,” said Patrick L. Anderson, CEO of Anderson Economic Group LLC (AEG) and a co-author of the report. **“The growing wages in the life sciences industry prove that Michigan can leverage its research and knowledge into high-skill jobs of the future.”**

MSU’s Biomedical Research Building



Stem Cells Put Michigan on the Map

Last fall, Governor Jennifer Granholm announced that the 2010 World Stem Cell Summit will be held in Detroit October 4-6, co-hosted by the URC universities. Some 1,200 experts will come together to foster collaboration, economic development, technology transfer, commercialization, private investment, and philanthropy in this emerging economic sector.

“Stem cell research and discovery are of tremendous importance not only to scientists, patients, and families, but also to transforming our state’s economy,” said U-M President Mary Sue Coleman.

The news comes after a year of significant momentum in stem cell R&D at the URC universities. The URC is collaborating with other institutions in a new embryonic stem cell research consortium. In February, Wayne State announced that its research and technology park, TechTown, will be home to the first stem cell commercialization lab in Michigan.

“Michigan is fast becoming a biotechnology hub,” said Bernard Siegel, executive director of the non-profit Genetics Policy Institute, organizer of the 2010 Stem Cell Summit.

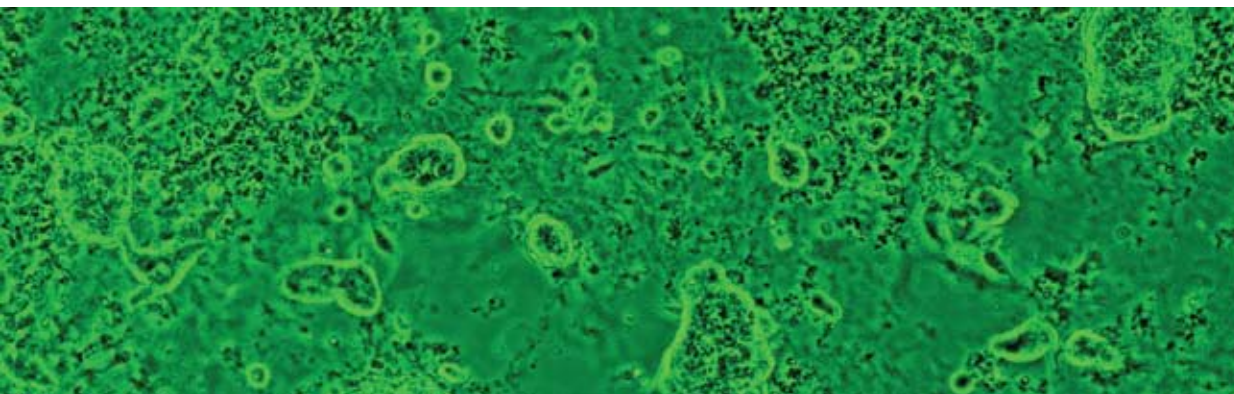
URC Wins \$12.5M from NIH for International Medical Research

In October, the National Institutes of Health awarded a total of \$12.5 million to two URC partners, Wayne State and the University of Michigan, to lead two international research studies.

U-M researchers will study a rare kidney disease, nephrotic syndrome, that leads to kidney failure and the need for dialysis. The syndrome contributes to nearly 12 percent of cases of kidney failure at an annual healthcare cost of more than \$3 billion. A highly active patient interest group called NephCure and U-M also committed funding to this study.

Wayne State will develop the Inherited Neuropathies Consortium, an international project aimed at developing a better understanding of and better treatments for various forms of a genetic nerve disease called Charcot-Marie-Tooth (CMT). Wayne State has one of the largest and most comprehensive CMT programs in the world.

“These studies will give great hope to patients with these debilitating diseases,” said Hilary Ratner, vice president for research at Wayne State. **“This critical support from the NIH and others will put us closer to the development of new targeted treatment options.”**





U-M's North Campus Research Complex

Major Facilities, Major Potential

This year marked significant research facility milestones for URC partners Michigan State and U-M, milestones that will mean more jobs, more research investment, and more talent attraction in the state.

The U.S. Department of Energy Office of Science Technology has named MSU as the site for the \$550 million Facility for Rare Isotope Beams (FRIB). The facility will attract researchers from around the world to conduct experiments in nuclear science, astrophysics, and applications of isotopes to other fields. The FRIB is expected to bring \$1 billion in economic activity and 400 jobs to Michigan.

“This is a great day for science,” said MSU President Lou Anna K. Simon, on the day of the announcement.

At about the same time, University of Michigan President Mary Sue Coleman announced that U-M planned to buy the Ann Arbor property and facility formerly owned by Pfizer, Inc. The \$108 million purchase includes almost 2 million square feet of laboratory and administrative space in 30 buildings, and is ideal for U-M’s growing research activities in health, biomedical sciences, and other disciplines. The university projects it will create some 2,000 new jobs associated with the facility, now called the North Campus Research Complex, over the next decade.

The new U-M campus will also provide incubator space for the private sector that will provide opportunities for collaborations with industry in areas such as pharmaceuticals, biotech, energy, nanotechnology, and many other types of research activity.

URC Names Executive Director, Establishes Lansing HQ

The URC is not just a “virtual alliance” anymore. Enter Jeff Mason, the URC’s first executive director.

Mason, formerly senior vice president and chief business development officer for the Michigan Economic Development Corp. (MEDC), became executive director of Michigan’s University Research Corridor July 6. Mason led the MEDC’s business development efforts focusing on national and international business attraction, as well as Michigan business expansion and job retention. In 2008, Mason and the MEDC team assisted more than 205 companies like Hemlock Semiconductor, IBM, and United Solar Ovonic make over \$60 billion in private investments while creating and retaining more than 100,000 jobs.

“I’m excited about the opportunity to be part of the URC and the chance to help drive economic development involving these three powerful research universities,” Mason said.

In addition to Mason’s initial outreach to potential university, business, and government collaborators, among his first responsibilities was the establishment of the URC’s headquarters in Lansing, at 500 E. Michigan Avenue. The new space will enable the URC partner universities and other collaborators to meet and work together in a central location.

Building Business in Detroit

TechTown, Wayne State University’s incubator park, tripled its clientele from 48 to 148 tenants in 2009. It also launched the SmartStart business accelerator program this year with 23 companies and has since grown to more than 70 innovative startups. This year TechTown partnered with the New Economy Initiative and the Kauffman Foundation on a \$9.25 million initiative to strengthen Southeast Michigan’s economy by offering FastTrac training courses to budding entrepreneurs. More than 1,000 people attended FastTrac summer conferences, and more than 600 will graduate from training programs by the end of the year.

Promising Start Ups

Creating an entrepreneurial culture, one new business at a time

BioPhotonic Solutions Inc. (BSI), an emerging company that controls, produces, and sells patented disruptive technology that revolutionizes the ultrafast (femtosecond) laser industry, won the PhAST/Laser Focus Innovation Award in 2009. BSI's disruptive, proprietary MIIPS® technology unlocks the potential of ultrafast lasers by automatically optimizing laser pulse duration at the target. MIIPS was invented by BSI's founder and MSU Professor **Marcos Dantus**.

Draths Corp., a next-generation chemical company founded on Michigan State University science, raised \$21 million in new venture funding in 2009 to commercialize chemical intermediates used to make nylon and other products with renewable resources instead of petrochemicals. Draths Corp. was founded by **John Frost**, a University Distinguished Professor currently on leave from the MSU Department of Chemistry, and his wife, **Karen Draths Frost**, a former assistant professor of chemistry.

HistoSonics, Inc. is an Ann Arbor-based company that will develop a novel medical device that uses tightly focused ultrasound pulses to treat prostate disease. University of Michigan inventors have secured \$11 million in financing for the launch, and the company will use the capital to develop its histotripsy technology—a non-invasive, image-guided system that ablates tissue with robotic precision. The company founders and the co-inventors of histotripsy are **Charles Cain, Brian Fowlkes, Tim Hall, Zhen Xu** and **William Roberts**, all from the University of Michigan.

Lycera Corp., a U-M spinoff company, has closed on \$36 million worth of venture capital funding. The company focuses on developing small molecule drugs for treating autoimmune diseases such as rheumatoid arthritis and lupus, and was founded in Ann Arbor by U-M professor **Gary D. Glick**.

Interva, Inc. is a Michigan based start-up founded in 2009 by Wayne State's **Steven Ondersma, David Johnson**, and **Manuel Tancer**. Dr. Ondersma developed a multidimensional survey software product that allows behavioral scientists to develop screening, assessment, and computer-delivered intervention packages with application for research and health promotion, without requiring the services of a programmer. Interva's business plan will focus on the software applications and commercial deployment in healthcare settings.

NewCo is a bio science company founded by **Zhou-Hua Pan** of Wayne State University and **Sean Ainsworth** of Ainsworth Bioconsulting. Dr. Pan and other colleagues developed a novel gene-therapy approach for treating blindness caused by retinal degenerative disorder retinitis pigmentosa and age-related macular degeneration. The treatment delivers a photoreceptor gene from blue-green algae (channelrhodopsin-2) and results in the conversion of previously non-photosensitive retinal cells to photosensitive cells, thus restoring light responses to otherwise degenerated retina. It is believed that this technology has the potential to actually restore vision in both of these diseases.

Wayne State's TechTown



SPECIAL EVENTS PROMOTE STATE'S ASSETS:

The URC was all over the state and Midwest this year, with the goals of promoting Michigan's assets and encouraging new business development in promising sectors of the economy. Here is a quick sampling of special events, sponsorships, awards, and activities.

2008

December

URC Wins Inaugural Renaissance Award – The URC was awarded the first-time honor from Detroit Renaissance for demonstrating outstanding leadership in reinventing the region's economy.

2009

February

Rx for Michigan – URC presidents are featured in the news documentary *Rx for Michigan: Is healthcare the prescription for what ails Michigan's economy?*

City Club of Cleveland – U-M President Mary Sue Coleman was the keynote speaker, presenting *The Role of Research Universities in Transforming the Midwest Economy*.

Detroit Economic Club – Wayne State president Jay Noren was the keynote speaker at the February 25 meeting, describing the assets and the potential of the URC.

April

Sectors of Promise for the Michigan Economy – WWJ Newsradio 950 and the URC presented a free morning business conference highlighting two of the most promising areas of economic growth, the life sciences and energy technologies.

May

Mackinac Policy Conference – The URC presidents discussed the state's leadership in the life sciences, and introduced Jeff Mason, the URC's first executive director.

June

The National Summit – The URC was a major sponsor of this national event held in Detroit under the auspices of the Detroit Economic Club. Billed as a "Gathering to Define America's Future," the summit attracted more than 1,500 attendees and featured the URC presidents as speakers and panelists.

August

URC Research Tour – Staffers for Michigan's congressional delegation spent three days touring URC institutions to review how the universities are investing federal research support. Visits included research related to healthcare, engineering and safety, physics, and veterinary medicine, as well as new developments in energy research, life sciences, and the social sciences.

October

Midwest Governors Association Conference in Detroit – URC Executive Director Jeff Mason and URC Presidents Mary Sue Coleman and Lou Anna K. Simon moderated panel discussions regarding development of "green" jobs.

University Economic Development Association Annual Meeting in San Antonio, TX – URC Executive Director Jeff Mason and Business Leaders for Michigan President and CEO Doug Rothwell present *Transformation through University-Business Partnerships: The Michigan Model*.

November

URC Headquarters – Michigan's University Research Corridor sets up shop at 500 E. Michigan Avenue, Lansing.

NIH Comes to Michigan – The URC joins other sponsors in bringing NIH representatives for a day-long event to discuss what is happening at NIH and learn how to take advantage of new funding opportunities.

THIRD ANNUAL ECONOMIC IMPACT: *Empowering Michigan*

Executive Summary and Selected Data

The following is an executive summary and selected data of the quantitative analysis commissioned by Michigan's University Research Corridor. Since 2007, the URC has asked Anderson Economic Group to undertake a comprehensive study that benchmarks the economic impact of the URC's activities on Michigan's economy. This 2009 report is the third in the series. The full report may be viewed at www.urcmich.org/economics/2009.

Key Benchmarks

This report presents benchmarks using the most recent data available. We present key benchmarks in Table 1 below. We used fiscal year 2008 (July 1, 2007 to June 30, 2008) financial data to estimate the economic impact of the URC's operations on Michigan's economy in 2008. In three years, the URC's economic impact on the state's economy has grown \$1.6 billion. The rankings of tech transfer activities are based on the average of the annual data for the previous five years from the date of the report. For example, the ranking for start-up companies is based on the average number of start-up companies the URC helped start between 2004-2008. A ranking of "1" indicates the university cluster with the highest tech transfer activity for that indicator. The URC performed the best in number of patent grants awarded, ranking third in this year's report—an improvement of three spots since 2007.

TABLE 1. Key Benchmarks of the URC

	2007 Report Benchmark Year (2006 data)	2008 Report (2007 data)	2009 Report (2008 data)	Change Since Benchmark Year of 2007
Operational Expenditure	\$6.5 billion	\$6.7 billion	\$7.3 billion	+ \$800 million
Fall Enrollment	133,331	135,697	133,469	+ 138 students
Net Economic Impact	\$12.9 billion	\$13.3 billion	\$14.5 billion	+ \$1.6 billion
Fiscal Impact on MI	\$351.5 million	\$372.0 million	\$414.2 million	+ \$62.7 million
Total R&D Expenditures ^a	\$1.369 billion	\$1.379 billion	\$1.405 billion	+ \$36 million
Rank Among 7 Peer University Clusters: (Rank of 1 is Best)				
No. of Start-up Companies Cultivated	5	5	4	+1 Improvement
Patent Grants Issued	6	4	3	+3 Improvement
Technology Licenses Issued	5	5	5	+0 Improvement

Analysis: Anderson Economic Group, LLC

See remainder of report body for detailed sources and calculations.

a. Total R&D expenditures lag one year behind the rest of the data. This year's report includes 2007 expenditures by the URC universities.

Scale of the URC

The URC universities collectively spent \$7.3 billion on operations in FY 2008. The \$7.3 billion was used to pay the salaries of 48,786 full-time-equivalent staff and faculty, purchase supplies and equipment, and maintain the physical plant. This figure—\$7.3 billion—is about 2.4 percent of all economic activity in the state, as measured by Michigan’s Gross State Product.

In 2008, there were 572,123 known alums of a URC university living in Michigan, making up 7.5 percent of Michigan’s population over the age of 18 years. These alums earned an estimated \$26.6 billion in salary and wages in 2008, or 14.2 percent of all wage and salary income in Michigan. See Table 2 below for the scale of the URC.

TABLE 2. Scale of the URC, FY 2008

Category	Impact
Operational Expenditures (e.g. supplies, payroll, equipment)	\$7.3 billion
Full-Time-Equivalent Employees	48,786
Enrolled Students	133,469
Known Alumni Living in Michigan	572,123
Wage and Salary Earnings of URC Alumni in Michigan	\$26.6 billion

*Data Sources: National Center for Education Statistics, IPEDS; URC Universities
Analysis: Anderson Economic Group, LLC*

Economic Impact, Defined

We define *net economic impact* as the additional earnings to state residents caused by the operations of these institutions. In estimating the net economic impact, we follow a careful methodology that counts expenditures only once, takes into account substitution of one activity within the state by another, and uses very conservative multipliers for indirectly-caused activity. Among other conservative assumptions, we assume most URC students would attend college even if these research institutions were not located in Michigan, and that many employees of the URC would find other jobs in Michigan even if the URC institutions left Michigan.

We detail our methodology for the economic impact of the operational expenditures by URC universities in "Operational Expenditures Methodology" in Appendix B (available online). In FY 2008, Michigan's residents were \$14.5 billion richer due to the operations of the URC universities. These new earnings to Michigan residents stem from expenditures by the URC universities on non-payroll items (such as supplies and equipment) and by employees, students, and alumni. See Table 3.

In addition to new earnings, 69,800 jobs in Michigan were directly and indirectly supported by the URC's operations in the state in FY 2008. This jobs figure includes 10,363 faculty members and 38,423 staff directly employed by the URC universities, and 21,014 indirectly generated jobs in other industries in the state due to the expenditures by the URC universities and their faculty, staff, and students.

TABLE 3. Net Economic Impact of URC, FY 2008

Impact Category	New Earnings in Michigan (millions)
Non-payroll Operating Expenditures	\$2,163.3
University of Michigan Hospital Non-payroll Operating	\$746.8
Faculty & Staff Wages and Benefits	\$4,331.0
URC Student Expenditures	\$2,051.4
Subtotal: Impact of Operations	\$9,292.5
Incremental Alumni Earnings ^a	\$5,195.1
Total Economic Impact	\$14,487.6

Analysis: Anderson Economic Group, LLC

See remainder of report body for detailed sources and calculations.

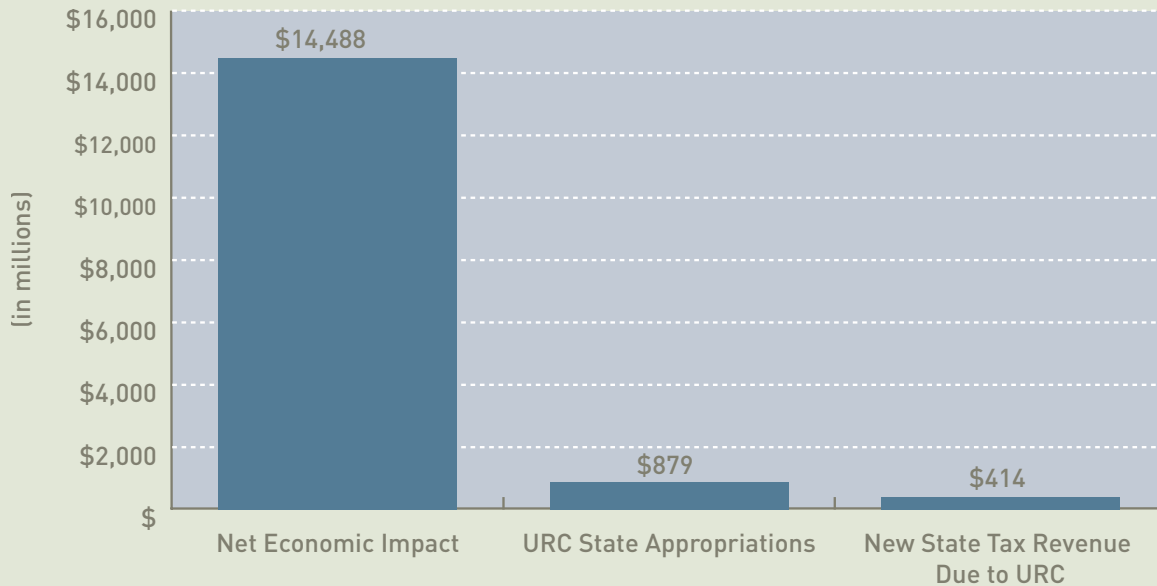
a. We estimate that \$4.4 billion of earnings by URC alumni living in Michigan in 2008 were additional earnings directly caused by the education they received at a URC university. See "Wage Earnings of URC Alumni Living in Michigan" on page 25 in the full report.

New State Tax Revenue Due to URC

In 2008, we estimate that \$2.6 billion in wages of URC employees and \$4.4 billion of the \$26.6 billion in URC alumni earnings in Michigan were caused by the URC. We estimate that the tax revenue the state received because of these earnings, that otherwise would not exist in the state, is \$414.2 million, up from our estimate of \$372 million in last year's report. This includes new tax revenue the state receives from personal income, sales and use, property, and gasoline taxes.

Comparison of Economic Impact With State Appropriations

Comparing the URC's net economic impact on the state to the State of Michigan's funding of the URC universities illustrates how much greater the benefits of the URC are compared to the state's cost. The \$14.5 billion in net economic impact is over 16 times greater than the state's funding for URC universities as shown below. Additionally, the State of Michigan receives \$414.2 million in tax revenue from URC employees and alumni that it would otherwise not have received if the URC universities were not located in Michigan.



Comparison With Peer Clusters

To benchmark the URC against other university clusters in the nation, we selected six of the best-known groups of universities in California (Northern and Southern), Illinois, Massachusetts, North Carolina, and Pennsylvania. All of these clusters have three universities from the same state and are well known for their research and development activities. For example, the Northern California cluster includes UC San Francisco, UC Berkeley, and Stanford University; the North Carolina cluster includes Duke University, University of North Carolina at Chapel Hill, and North Carolina State; and the Massachusetts cluster includes MIT, Harvard, and Tufts. We benchmark the URC to these peer university clusters on student enrollment and degree completions, research and development expenditures, and technology transfer activities.

STUDENT ENROLLMENT AND COMPLETIONS. The URC's 135,697 students in the fall of 2007 (the most recent year for which we have data for all university clusters) make it the largest research university cluster, in terms of enrollment, in our analysis. The next largest is the Pennsylvania cluster (University of Pittsburgh, Pennsylvania State University, and Carnegie Mellon University) with just over 127,000 students enrolled in the fall of 2007.

The URC universities award a variety of degrees each academic year. In terms of number of degrees granted, the URC ranks #1 in total number of degrees (undergraduate and graduate) conferred in *Physical Science, Agriculture and Natural Resources*; and *Medicine and Biological Sciences*. The URC is in the top three in total number of degrees awarded in *Engineering, Mathematics and Computer Science*; *Business, Management, and Law*; and *Liberal Arts*. Michigan has a vibrant high-tech industry, and the URC universities graduate a large number of students with degrees that prepare them for jobs in this industry.

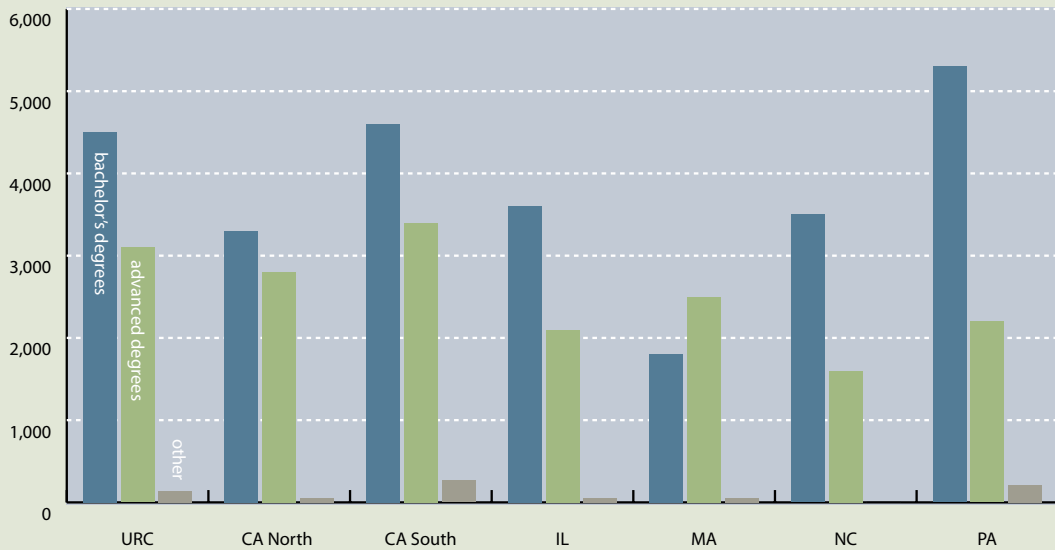
TABLE 6. COMPARISON PEER UNIVERSITY CLUSTERS

Michigan's URC	Michigan State University	University of Michigan	Wayne State University
Northern California	University of California, San Francisco	University of California, Berkeley	Stanford University
Southern California	University of California, Los Angeles	University of California, San Diego	University of Southern California
Illinois	University of Chicago	University of Illinois Urbana-Champaign	Northwestern University
Massachusetts	Harvard University	Massachusetts Institute of Technology (MIT)	Tufts University
North Carolina	Duke University	University of North Carolina (Chapel Hill)	North Carolina State University
Pennsylvania	Penn State University (all campuses)	University of Pittsburgh (all campuses)	Carnegie Mellon University

Source: Anderson Economic Group, LLC

We define “high-tech” degrees to include degrees in biological and biomedical sciences, physical sciences, computer sciences, architecture, engineering, mathematics and statistics, and some agricultural degrees. As shown below, the URC awarded the third largest number of high-tech degrees (7,638) of our university clusters. Southern California (8,266) and Pennsylvania (7,713) university clusters awarded more high-tech degrees than the URC.

The URC is preparing students for jobs in Michigan’s high-tech industries. Our high-tech industry includes many life sciences jobs—an area that has seen employment growth since 2000 when other industries shed a significant numbers of jobs in Michigan. The URC grants the most degrees of any university cluster in medicine and biological sciences, and physical sciences. These degrees prepare students for high-tech life sciences jobs in medical laboratories, research laboratories, and pharmaceutical manufacturing.



R&D EXPENDITURES. Total R&D expenditures by the seven university clusters were approximately \$11.1 billion in 2007, which made up over 20 percent of total R&D expenditures by all U.S. universities. Academic institutions in the state of Michigan spent \$1.5 billion on research and development, with the URC universities spending 93 percent of this amount, or \$1.4 billion. Approximately 61 percent of funding for these R&D expenditures came from federal sources. In other words, the URC universities brought \$862 million in federal dollars into the state of Michigan for research.

TABLE 4. Total Research and Development Expenditures, 2007

University Cluster	Total Expenditures (in millions)	Federally Funded Expenditures	Federal Share of Total Expenditures	Institutional Share of Total Expenditures
Michigan's URC	\$1,405	\$862	61%	25%
Northern California	\$2,083	\$1,253	60%	17%
Southern California	\$2,130	\$1,320	62%	18%
Illinois	\$1,240	\$765	62%	25%
Massachusetts	\$1,196	\$960	80%	2%
North Carolina	\$1,591	\$937	59%	16%
Pennsylvania	\$1,408	\$981	70%	14%
<i>All U.S. Universities</i>	<i>\$49,431</i>	<i>\$30,441</i>	<i>62%</i>	<i>20%</i>

Source: National Science Foundation, Integrated Science and Engineering Resources Data System
Analysis: Anderson Economic Group, LLC

TECH TRANSFERS. An important indicator of the success of university R&D is its effectiveness in transferring technology to the private sector. In terms of volume, the URC ranks third in average annual number of patents, and fifth in number of licenses granted. In terms of effectiveness of R&D expenditures, as measured by licensing revenue per expenditure, the URC ranks fourth. This means that a higher percentage of URC expenditures result in a product that is licensed and sold than three of the other comparison clusters. In the past five years, the URC has helped cultivate 20 new start-up companies each year on average. See Table 5, below.

TABLE 5. Average Annual Patent and Licensing Activity, 2004-2008

University Cluster	Start-up Companies Cultivated	Rank	Patent Grants	Rank	Licensing Revenue	Rank	Revenue per Expenditures	Rank
Michigan's URC	20	4	129	3	\$37.1	4	2.6%	4
Northern California	21	3	191	2	\$183.9	2	8.8%	2
Southern California	27	2	124	4	\$47.6	4	2.2%	5
Illinois	14	6	117	5	\$193.7	1	15.6%	1
Massachusetts	31	1	193	1	\$71.9	3	6.0%	3
North Carolina	13	7	81	7	\$10.4	7	0.7%	7
Pennsylvania	19	5	100	6	\$16.0	6	1.1%	6

Source: Data Source: Universities' websites, technology transfer offices, Association of Technology Managers (AUTM) Surveys

Analysis: Anderson Economic Group, LLC

Note: See "Average Annual Patent and Licensing Activity, 2004-2008" on page 18 of full report for complete source notes and methodology.

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URC AT A GLANCE

More than the sum of our parts

Net economic impact.....	\$14.5 billion
Operational expenditures	\$7.3 billion
Wage and salary earnings of URC alumni in Michigan	\$26.6 billion
Research expenditures.....	\$1.4 billion
Start up companies cultivated since 2004	102
Patents granted*	129
Licenses/options*	135

*Avg. per year between 2004-2008

Source: *Third Annual Economic Impact Report*, Anderson Economic Group, 2009

Education that works

More than 132,000 students, one million alumni, and last year awarded 7,600 high-tech degrees.

Major growth areas

Life sciences—The URC has been building Michigan's life sciences industry since 1999. Now almost 80,000 Michigan residents are employed in life sciences. Between 1999 and 2006, life science employment in Michigan grew by 10.7 percent while during this same time period manufacturing employment dropped by 24.7 percent.

Energy technologies—With studies showing Michigan has the resources to create 60,000 new energy jobs, the URC recently invested \$79.5 million in alternative energy R&D and is planning to grow rapidly in the near term.



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