



Based on Testimony of Carlos E. Santiago, Chancellor UWM.

Introduction. The University of Wisconsin-Milwaukee is grateful for the support of the Wisconsin Legislature. This bi-partisan support has been critical to what the university has achieved over the last six years.

Research Institutions. The University of Wisconsin-Milwaukee is one of two universities in the state of Wisconsin that is designated as a doctoral research university. The other is UWM's sister university, the University of Wisconsin-Madison. Both institutions share the mission of a doctoral institution. Characteristics of a doctoral research university include:

- Offer baccalaureate, master's and doctoral degrees
- Conduct organized research programs
- Serve needs of women, minority, disadvantaged and nontraditional students; seek racial and ethnic diversification
- Support activities designed to promote economic development of Wisconsin

UWM is a research university that provides access which is explicitly part of the University's mission to support economic development of the entire state. But obviously, given UWM's location, Milwaukee and the counties surrounding Milwaukee, Southeastern Wisconsin, are a key part of UWM's focus.

The Need for a Second Wisconsin Research University. In his six years as Chancellor of UWM, Chancellor Santiago has advocated that the state of Wisconsin needs to have a, stronger second research university. UWM is pleased with the support it has received during that period of time.

When Chancellor Santiago arrived in 2004, Wisconsin had only one comprehensive research university among the top 200 public and private research universities in this country: the University of Wisconsin-Madison.

Madison is a phenomenal institution, ranked in the top five of the top 200 public and private research universities. Milwaukee was not on that list consistently until 2005—when it became 200. Since then the most recent data, 2007, shows that the University of Wisconsin-Milwaukee has now moved to 189 on the list and now ranks 141 in the country for doctoral degrees granted.

When the 2010 data comes out, UW-Milwaukee will probably be in the top 175. Chancellor Santiago has indicated to the campus that our goal should be to be in the top 100 of this nation's premier public and private research universities. The state of Wisconsin needs, and Chancellor Santiago believes that the state of Wisconsin will have, two doctoral research universities in the top 100 shortly.

Doctoral Research Institutions Help Create Jobs. One the reasons why Chancellor Santiago pushed this agenda of economic development for the University of Wisconsin-Milwaukee is that it is known that doctoral research universities have a particular job-creating reach. Whether it is MIT, UW-Madison or UWM, the job creating reach of a doctoral university is largely limited to a 50-mile radius around the institution where 90 percent of the jobs created lie within that area.



Southeastern Wisconsin needs a research university because it clearly falls outside the job-creating reach of UW-Madison.

Income Trends Emphasize the Need for a Stronger UWM. In 1970, the income per capita in the county of Milwaukee was 3 percent higher than Dane County. At present, income per capita in Milwaukee lags Dane by 41 percent. Milwaukee has been, in many respects, in 40 years of economic decline—a decline that has seen manufacturing, largely fabrication, decline quite dramatically. And it remains an important population and economic center that needs to be supported.

Building Research in Milwaukee. Wisconsin needs to build research in Milwaukee in a different way from the way it has been built in Madison. Madison has a hundred year head start on Milwaukee and Wisconsin can't wait for another hundred years. If the Wisconsin legislature were to fund Milwaukee like it has funded Madison it would require approximately an additional \$1.5 billion annually. In the current and future financial reality, it is unlikely that that kind of investment will be going to one institution.

Building Research Differently

Milwaukee has to do it differently. Milwaukee has to do it in partnership with other institutions. Milwaukee needs to create economic development from the existing strengths in the Milwaukee region. This is the direction that the University has moved under Santiago's leadership.



***UW-Madison,
established in 1848***

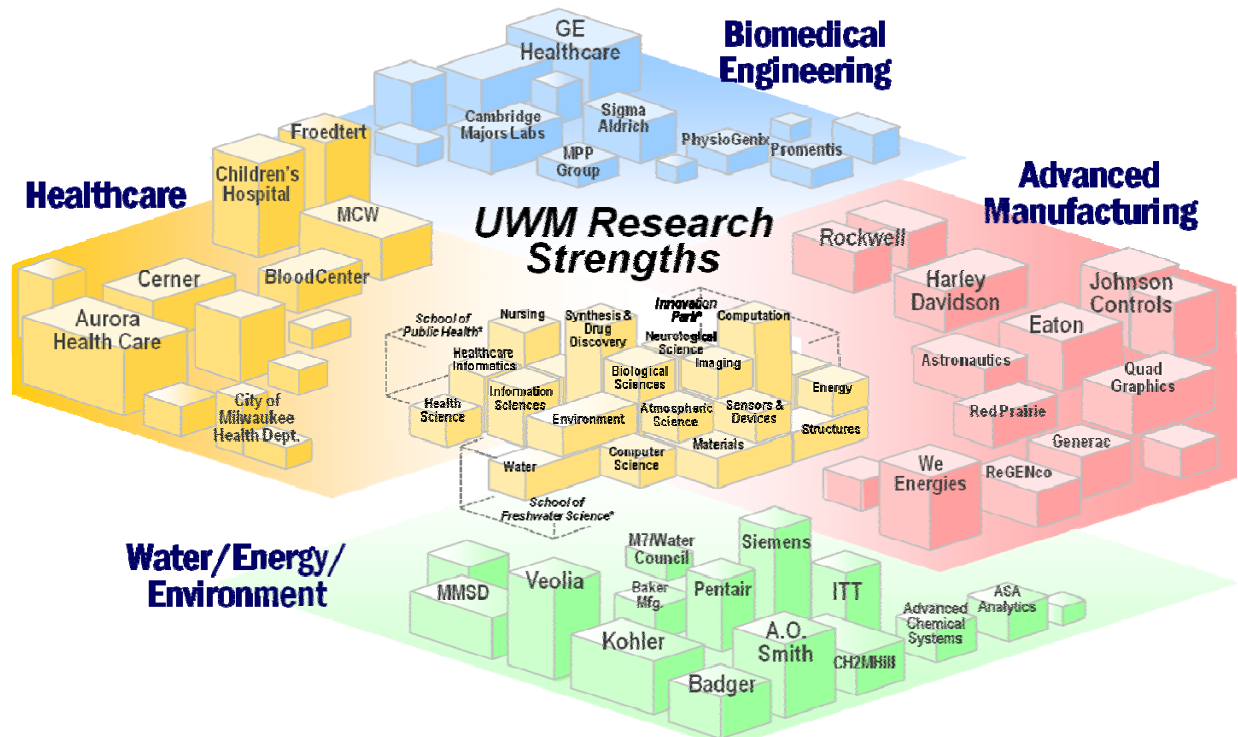


***UW-Milwaukee,
established in 1956***

Leveraging Strengths of Southeastern Wisconsin. UWM has identified four major areas where the University has been investing its resources. These areas reflect the strength of Southeastern Wisconsin. These are the areas the University and the State of Wisconsin need to continue to support and build.

1. Advanced Manufacturing. These areas include advanced manufacturing. The importance for this was underscored during a trip to Ireland that included Chancellor Santiago and other business and government leaders. There they saw the extent of automated manufacturing in facilities such as a Hewlett-Packard plant that made printers. While the production was occurring in Ireland, the machines making the printers were made in the Midwest. The Midwest continues to be a source of advanced manufacturing. While fabrication has left Milwaukee, the area must retain its advanced manufacturing expertise. There are a number of existing strong partners in the Greater Milwaukee area.

2. Water. Water research is a huge opportunity not only for Southeastern Wisconsin but for the state. Given Milwaukee's location next to Lake Michigan and the Great Lakes, the expertise of 120 water-related companies, UWM Great Lakes WATER Institute and the nation's first graduate school of freshwater sciences which was supported by the legislature, water is an area of considerable promise and growth.



UWM's research strengths align with key regional clusters.

3. Health Care. Health care is a major issue across the state. In Milwaukee, the public health issues in particular are acute. UWM has proposed and the legislature has supported the School of Public Health to be located in downtown Milwaukee. This is another area with many important partners, and UWM's effort in launching the School of Public Health will help address the needs of those partners.

4. Biomedical Research and Engineering. The fourth area, biomedical research and engineering, is strongly dependent on the existence of this state's second medical college. The Medical College of Wisconsin (MCW) is an important institution, which is generating approximately \$140 million in annual research expenditures. But MCW is one of only eight stand-alone private medical colleges left in this country. Most stand-alone medical colleges have merged to become part of a comprehensive research university. One need not look farther than Madison to see what an impact it can have on a community when one can bring together the medical sciences and a comprehensive university including engineering.

The biomedical and biotech sectors have experienced significant growth. UWM has identified the County Grounds next to the Medical College of Wisconsin as an area for expansion for engineering-related research; this area will be the birthplace of biomedical research in southeastern Wisconsin.

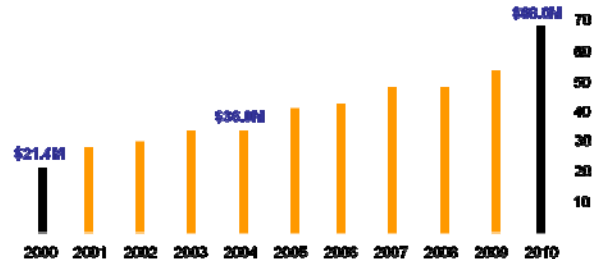
The Impact of Strategic Investments. When Santiago arrived at UWM, annual research expenditures were \$36 million. UWM, like all public institutions, has experienced budget cuts, but UWM has also received some very strategic investments from the State of Wisconsin and UWM has used those investments wisely. UWM has increased its research expenditures so that in the last fiscal year we're closing the books at nearly \$70 million. This is truly a phenomenal



increase that is a credit to the faculty, staff and students at the University of Wisconsin-Milwaukee.

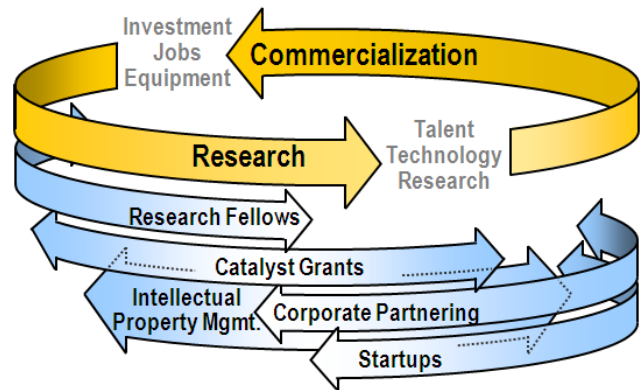
UWM has added some additional scientists and engineers, including 22 new faculty in engineering thanks to the support of the legislature in the Fiscal 07-09 budget. However, UWM has had no new exclusively academic facilities in those six years. (UWM has built two new residence halls through the partnership of the UWM Foundation.) There is significant promise in new facilities that will be coming up in the future. But as

Research expenditures up 218%



one looks at what UWM has done, without any new academic facilities, simply reorganizing the campus, reincentivizing research, providing strategic investment for new faculty in different areas, providing seed money for research grants, it is already paying dividends. As those new facilities are built, this campus will significantly expand its research enterprise.

Creation of the UWM Research Foundation. One of the things that UWM has done to help the University's research enterprise is to create a dedicated private, nonprofit research foundation as a subsidiary of the UWM Foundation. The UWM Research Foundation team, lead by Brian Thompson, has had a significant impact with a small and dedicated staff. The UWM Research Foundation is helping create incentives for research as well as helping UWM develop a culture of innovation. The UWM Research Foundation is taking the products of UWM research and working to commercialize that research. *That's* what innovation is all about. *That's* what creates the jobs. The start-up companies will come. The expansion of existing companies will happen. UWM is very proud of what its research foundation has done in a very short period of time.



The graphic illustrates a range of programs created by the UWM Research Foundation which help foster research and innovation at UWM. These programs include:

UWM Research Foundation programs are designed to bridge the gap between research and commercialization.

- **Research Fellows Program** – grants to attract and retain the best and brightest graduate students;
- **Catalyst Grants** – seed grants for research with high potential for commercialization; supported by the Rockwell and Bradley foundations;
- **Corporate Partnering** – outreach to targeted corporations for sponsored research; helping develop centers for water- and energy-related research;
- **Startups** – supporting faculty-based start-up companies with licensing, SBIR (Small Business Innovation Research) grant writers and business planning and coaching;
- **Intellectual Property Management** – managing patents and other intellectual property; marketing and licensing of UWM technologies.

These programs are fortunate to receive significant support from the private sector and UWM is grateful for this support.

The University of Wisconsin-Madison has the Wisconsin Alumni Research Foundation (WARF), which is one of the most successful innovation-creating entities in the world. Ultimately, the UWM Research Foundation will play a similar role for the University of Wisconsin-Milwaukee.

UWM Innovation. UWM has faculty that are achieving phenomenal results. The UWM Catalyst Grant program has helped foster the commercialization of some of this important work. The program is made possible by the support of the Lynde and Harry Bradley Foundation, the Rockwell Automation Charitable Corporation and the Richard and Ethel Herzfeld Foundation. The following highlights some results from nearly \$2 million in catalyst grant awards since the programs launch in 2007.



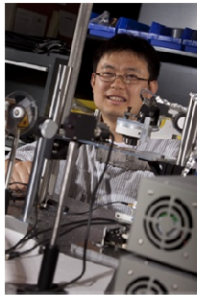
James Cook

Novel Compounds for Treatment of Alcohol Addiction

- License to MPP Group – local biotech startup company
- MPP Group: SBIR grant application & grant from Wisconsin Dept. of Commerce
- Two related patent applications
- Multiple peer-reviewed papers
- Additional funding from NIH



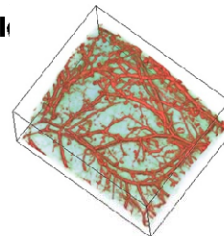
Bradley Phase 1



Hao Zhang

Retinal Imaging System

- Built prototype device to demonstrate retinal imaging system in mouse model
- More funding – Juvenile Diabetes Association
- Joint agreement with USC to protect and market technology
- Four U.S. patent applications
- Shaw Scientist Award Winner
- Investor presentations & meetings



Bradley Phase 1

Peter Geissinger

Fiber Optic Sensing for Industrial Water Applications



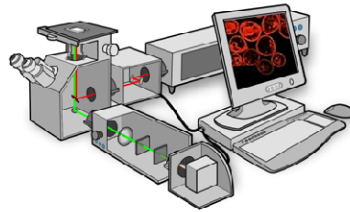
- Partnership and option agreement with Advanced Chemical Systems
- ACS is developing business plan and exploring SBIR grants to further develop technology

Bradley Phase 2



Vali Raicu

Microscope for Protein Studies

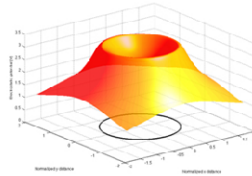
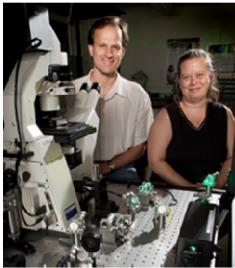


- Developed business plan with UWMRF and BizStarts Venture Track
- UWMRF First Look investor forum and other investor presentations
- Startup company formation and funding in process
- U.S. patent application

Bradley Phase 2

Jorg Woehl

Instrument for Genetic Profiling

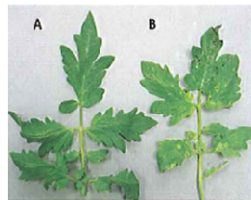
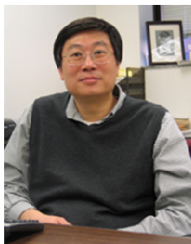


- A potentially transformational technology to enable a new method of genetic profiling
- Technology creates an electric field to trap charged particles – may ultimately be able to distinguish variations in genetic sequences

Bradley Phase 3

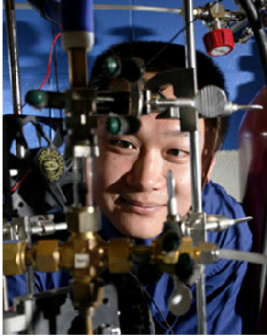
Ching-Hong Yang

Innovative Antibiotics



- Developing antibiotics that attack the virulence of pathogens without killing them – reducing the tendency to develop antibiotic resistance
- Applications in plants moving forward – future potential applications in human and veterinary applications

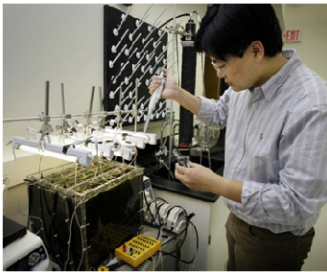
Bradley Phase 3



Junhong Chen
Nanotube Decoration

- **License completed with Dr. Chen's startup company, NanoAffix Technologies**
- **Over \$500k in follow on funding from the National Science Foundation**
- **Multiple U.S. patent applications based technology and applications**

Rockwell Phase 1



Zhen He
Biological Fuel Cells for Energy Production

- **Working to scale up technology that creates energy from wastewater**
- **Other applications in desalination**
- **New faculty member already establishing strong industry partnerships**

Rockwell Phase 3

Eventually, UWM hopes one of these innovations will achieve significant commercial success. We believe that success will potentially do for UWM what Vitamin D did for the University of Wisconsin-Madison and provide the resources that Madison has used so effectively to build that enterprise for the benefit of this state.

Transition of UWM to a Research University. UWM has made a transition over the last six years under Chancellor Santiago's leadership. The University of Wisconsin-Milwaukee has gone from a university that does research to a research university.

Moving Forward. Wisconsin needs and deserves to have a second research university. UWM is the institution that is educating the most Wisconsin residents. The University of Wisconsin-Milwaukee has more Wisconsin resident students than any other institution in the state, and that will continue. The University's doors have been open. But we need to play another role, and that's serving as a catalyst for economic development for Southeastern Wisconsin, for the city of Milwaukee and for the state.

"Thank you for your support. Thank you for your interest." – Chancellor Carlos Santiago.



Additional Inputs on UWM Job Creation.

Research to Jobs Initiatives. Under the direction on UW System President, Kevin Reilly, the Research-to-Jobs taskforce identified several areas where Wisconsin universities could support the creation of jobs. These areas included:

1. Job creation through startups;
2. Growth of mature businesses; and
3. Communication of the role of UW research.

UWM Efforts to Toward Job Creation Through Startups. UWM is already taking important steps to foster the creation of jobs through startup companies. These efforts include:

- **UWM Research Foundation** – The UWM Research Foundation was created to foster innovation and help commercialize research conducted at UWM. The UWM Research Foundation supports faculty members in creating startup companies and works closely with entrepreneurs in licensing UWM technologies to launch companies;
- **Catalyst Grants** – The UWM Research Foundation’s Catalyst Grant Program is designed to foster ideas with strong commercial potential;
- **UWMRF Investor Forums** – The UWM Research Foundation conducts investor forums to showcase UWM’s technologies to local entrepreneurs and investors.

UWM’s Efforts to Support the Growth of Mature Businesses. UWM is also working to support the growth of mature businesses. These efforts include centers focused on specific industry clusters where industry supports research and helps select projects for funding.

- **Energy Center** – the Wisconsin Energy Research Consortium is a collaboration between UWM, Marquette University, the Milwaukee School of Engineering, UW-Madison and regional energy companies including Eaton, Rockwell Automation, DRS Technologies, We Energies and Kohler. This center leverages industry funding for research as well as support from the U.S. Department of energy.
- **Water I/U CRC** – UWM and Marquette University were successful in the launch of a center for research in water equipment and policy supported by the National Science Foundation and six regional companies. This Industry/University Cooperative Research Center (I/U CRC) conducts research projects that are selected and funded by the industry members of the center.
- **Center for Composite Materials and Solidification Processing Laboratory** – Created by the UWM College of Engineering and Applied Science and led by Dr. Pradeep Rohatgi, Wisconsin and UWM Distinguished Professor, this center was established to provide a link between the materials processing industry and UWM, and to serve as a resource for the development of advanced composite materials.