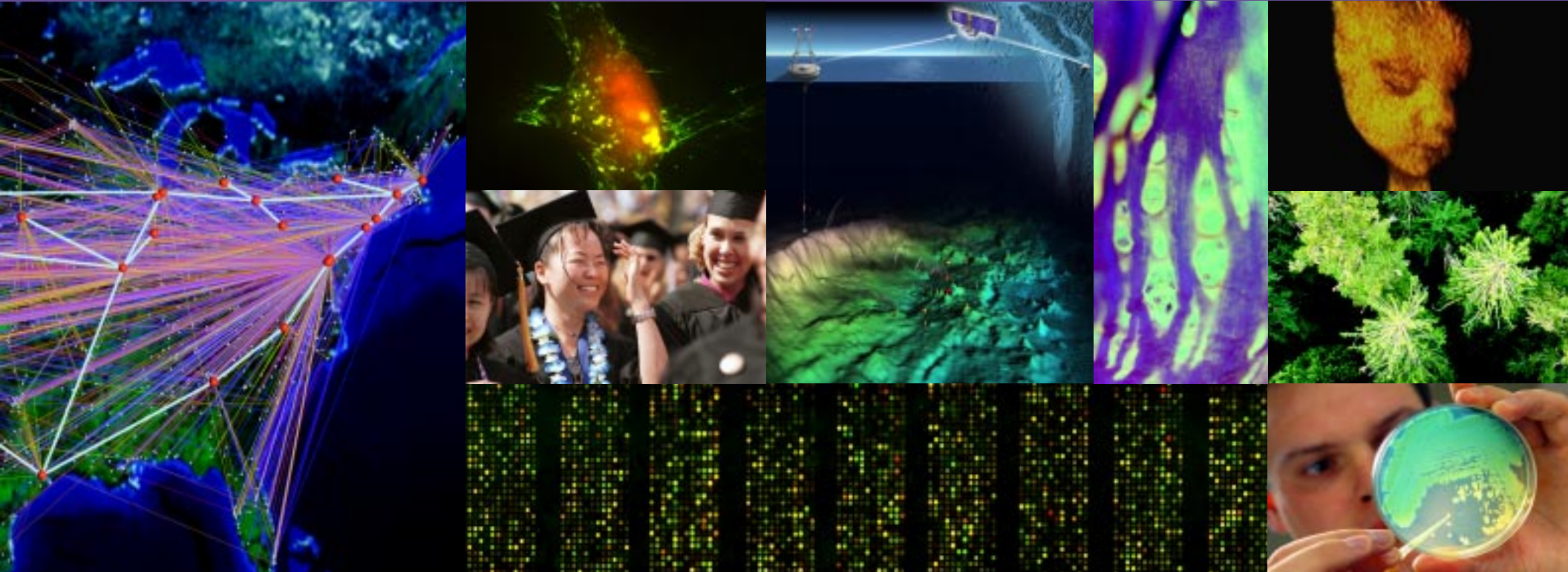


# FUELING OUR STATE'S ECONOMIC FUTURE



UNIVERSITY OF WASHINGTON

"I can't think of a single factor more important to economic vitality than the research university."

*Dr. Robert Parry, President, Federal Reserve Bank of San Francisco*

# FUELING OUR STATE'S ECONOMIC FUTURE



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UNIVERSITY OF WASHINGTON

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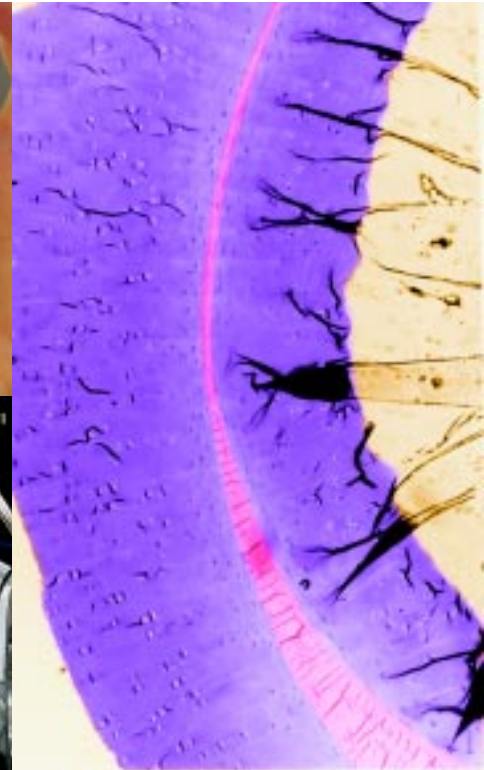
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Trees, fish, fertile land, and Alaska gold fueled the early prosperity of the state of Washington.

Today's economy requires different kinds of fuel: knowledge, technical skills, innovative ideas, and widespread connections to a shrinking world.

The University of Washington, one of the nation's leading research universities, is at the center of this state's new knowledge-based economy. UW education, research, and technology transfer have been critical in making Washington a high-tech and biotech powerhouse.

The University will continue to fuel our state's economic future — if Washington citizens do their part in strengthening public support.

# EDUCATING TOMORROW'S WORKFORCE

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THE UNIVERSITY OF WASHINGTON PREPARES ITS STUDENTS TO THRIVE IN 21ST-CENTURY JOBS AND PROFESSIONS—FROM AEROSPACE TO SOFTWARE DEVELOPMENT, FROM BIOTECHNOLOGY TO BUSINESS SYSTEMS, FROM FOREST MANAGEMENT TO MEDICAL IMAGING.

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Educated people are the University of Washington's most important contribution to the state's economy. "If you believe that ideas drive prosperity," says Stanford economist Paul Romer, "you ask, where do ideas come from? The answer is skilled people."

**Every year, the UW confers more than 10,000 degrees:**

- almost one third of all bachelor's degrees awarded in the state
- almost one third of all master's degrees
- about two thirds of all Ph.D.'s
- about half of all professional degrees, including the only medical degrees

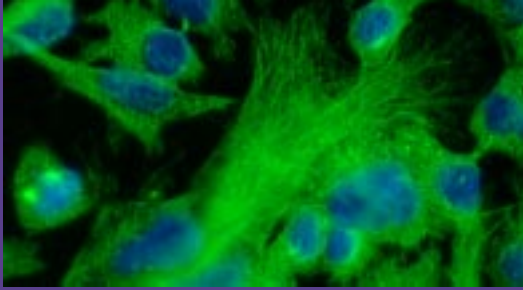
Eighty-seven percent of UW undergraduates are Washingtonians, and a large majority of UW graduates stay in the state.

Besides the 39,000 students enrolled on the UW's three campuses, another 25,000 a year take UW distance education and extension courses. Many of these courses enhance work skills or fulfill professional continuing-education requirements.

The value of higher education, both to individuals and to society, has never been greater than in today's knowledge-based economy. According to the latest Census Bureau figures, a college graduate now earns 1.8 times as much as a high-school graduate, compared to 1.5 times as much in 1975. The earnings gap for advanced degrees has widened even more.

So at the most basic level, those thousands of UW degrees translate into higher earnings for individuals and higher tax revenue for the state. But a well-educated





*“ This is a knowledge business, and our competitive advantage is going to be driven by our ability to recruit top-tier talent. We view Seattle as one of the top five biotech hubs, with rich intellectual capital. The University of Washington — its graduates and its research — was one of the key factors in our decision to move to the Northwest.”*

**GREG WEAVER**, Chief Financial Officer, Nastech Pharmaceutical Company, Bothell (relocated from New York in 2002)

work force also boosts the state's economic productivity, generates innovation, and acts as a magnet for leading-edge, high-paying businesses. These are the broader economic benefits of investing in high-quality education.

#### **UW graduates bring these strengths to their work:**

- the benefits of a broad-based education. “A strong liberal arts education,” says H. Stewart Parker, who studied Slavic languages and literature at the UW and is now CEO of Targeted Genetics, “teaches critical thinking skills, how to articulate the right questions. One is constantly challenged to think for oneself.”
- teamwork and problem-solving skills grounded in hands-on learning. More and more UW undergraduates have direct experience in faculty research labs, company internships, and community-service projects.
- cutting-edge technical knowledge and skills that come from studying at a major research university, with faculty members at the frontiers of discovery.



“We have employed dozens of UW graduates,” says Burton Smith, chief scientist of supercomputer firm Cray, Inc., “and these people are responsible for most of what we have accomplished. Their education and talent are remarkable.”

## COMPUTER SCIENCE AND ENGINEERING

“Even with the recent economic downturn, technology and computer companies need exponentially more students with bachelor's degrees than we produce,” says Steve Davis, President and CEO of Corbis in Bellevue. To help meet that need, the UW's top-ten Department of Computer Science & Engineering (CSE) has continuously expanded its undergraduate programs. In 1999 it doubled the size of its computer engineering program.

A new CSE building (the Paul G. Allen Center, more than half privately funded) will allow further expansion when it opens in 2003.

CSE graduates are in high demand at Microsoft, Intel, IBM, and numerous regional technology firms. They also win national recognition. In 2000, CSE's Emma Brunskill was the only Rhodes Scholar in the nation with a degree in computer science or engineering, and

CSE's Kevin Zatloukal won the national outstanding-undergraduate award from the Computing Research Association.

CSE has also helped to create Computing and Software Systems programs at UW Bothell and UW Tacoma and the new Technology Institute at UW Tacoma. Graduates of all these programs will be a critical resource for the state's high-tech economy.

# FUELING THE ECONOMY: TECHNOLOGY TRANSFER AND COMPANY

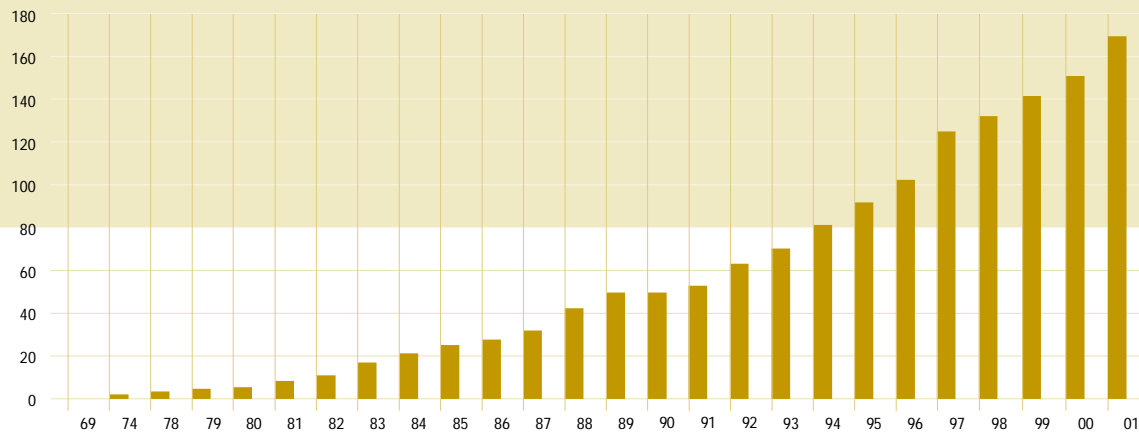
EVERY YEAR SINCE 1974, THE UW HAS RECEIVED MORE FEDERAL RESEARCH DOLLARS THAN ANY OTHER PUBLIC UNIVERSITY IN THE NATION. IN RECENT YEARS IT HAS RANKED SECOND IN FEDERAL FUNDING AMONG ALL UNIVERSITIES, PUBLIC AND PRIVATE. WHAT DOES THIS MEAN FOR THE STATE OF WASHINGTON?

It means, first, the broad social benefits that flow from new knowledge: medical cures and treatments; technologies that open up worlds of information; new understanding, won and used locally, of how children learn, how to brace for earthquakes, how to reduce teen pregnancies, how climate change might affect the Northwest—to name just a few.

It also means economic benefits. When university research moves into the marketplace—the process called technology transfer—it generates new products, new

companies, even new industries. It gives established industries and companies new ways to do their work and new work to do.

Where the volume and quality of research are greatest, and where the entrepreneurial spirit is strongest both on and off campus, universities become engines of economic growth for whole communities and regions. That has happened in Boston, in North Carolina, in the Bay Area—and here in Washington. UW research in



*NOTE: Includes total cumulative companies, beginning in 1969, from the following categories: (1) founded on technology licensed from UW, (2) founded by UW faculty, staff, or students around subjects derived from their UW research, (3) reconstituted around UW technologies, and (4) established near the UW because of the efforts and quality of specific UW research programs.*

*SOURCE: Ken Walters, professor of business, UW Bothell Business Program.*

## Total Companies Based on University of Washington-Related Technology

CUMULATIVE TOTALS FOR FISCAL YEARS 1969–2001



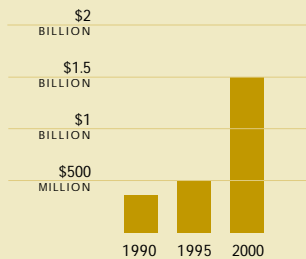
# CREATION



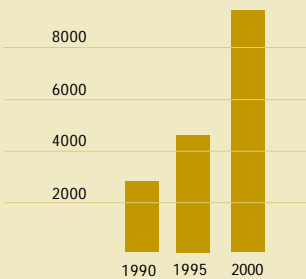
medicine, bioengineering, computer science, genomics, statistical analysis, and many other fields has played a major role in making the state of Washington a leading center of biotechnology, medical technology, and software.

**NEW ENTERPRISE.** In the past 50 years, some 170 new companies have emerged from the research of UW faculty, staff, and students—almost 100 in the last decade alone. More than three-fourths of all those companies are still in operation, although some have been acquired or changed direction. More than 90 percent of UW start-ups stay in the state, even after acquisition or merger, in order to capitalize on UW connections and research.

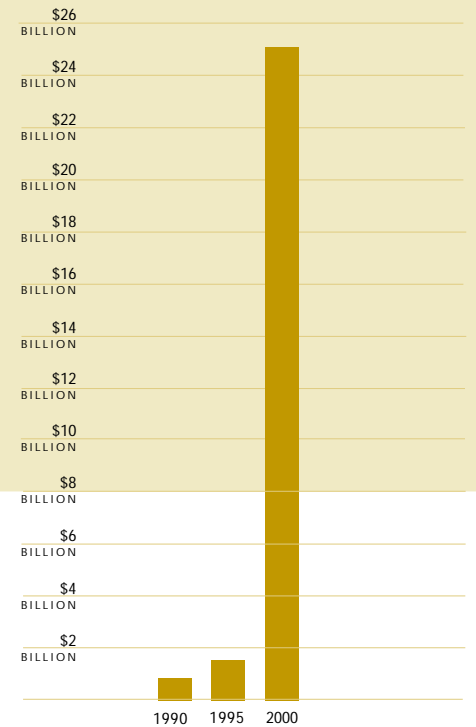
The charts on these pages tell the story of accelerating growth in UW spinoffs. Although the recent recession has taken a toll on the market values shown for the year 2000 (most recent comprehensive figures available), new UW start-ups have continued to emerge and thrive even during the economic downturn. As of June 2002, four of the state's ten fastest-growing public companies were UW-related.



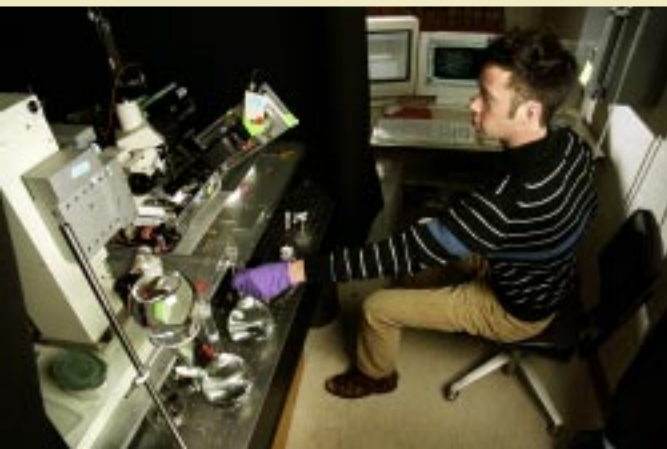
Sales Revenues

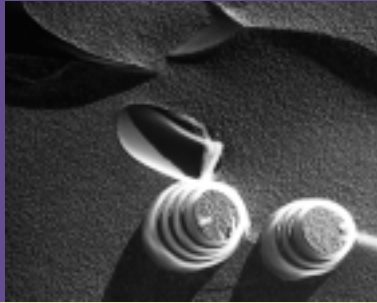


Direct Jobs



Market Capitalization





### Here are some recent national rankings of entrepreneurial activity:

- University of Washington—fifth among all American universities in the launching of start-up companies from its research (2002, *Chronicle of Higher Education*)
- State of Washington—first in the nation in new-company creation relative to the size of its workforce (2000 and 2001, *Development Report Card for the States*)
- State of Washington—first in “economic dynamism,” second overall in New Economy benchmarks (*The 2002 State New Economy Index*)
- Seattle metropolitan area—one of the top five areas of the country in recent growth of new biotechnology firms (2002 Brookings Institution report)

These rankings are four different perspectives on the same reality: the close connection between cutting-edge research and economic vitality. For example, of the ten principal biotech firms listed in the Brookings report, eight are related to research by faculty in the UW Health Sciences Center.

Some UW-related companies are well known: the pioneering biotech firms Immunex, recently acquired by Amgen for \$16 billion, and Zymogenetics, which uses UW technology to produce human insulin for diabetics; Visio, the computer graphics company, now a division of Microsoft; ICOS, which develops pharmaceuticals; and Optiva, which makes the Sonicare toothbrush.

## LUMERA CORPORATION

In April 2000, an article in *Science* magazine by UW chemistry professor Larry Dalton and colleagues gained wide attention. It announced the creation of a new polymer that could revolutionize telecommunications and data processing. The new “opto-chip” could translate electrical signals (from computers, for example) into optical signals (for fiber-optic cables) up to ten times faster than current devices, at a fraction of the power required. The discovery, said *U.S. News & World*

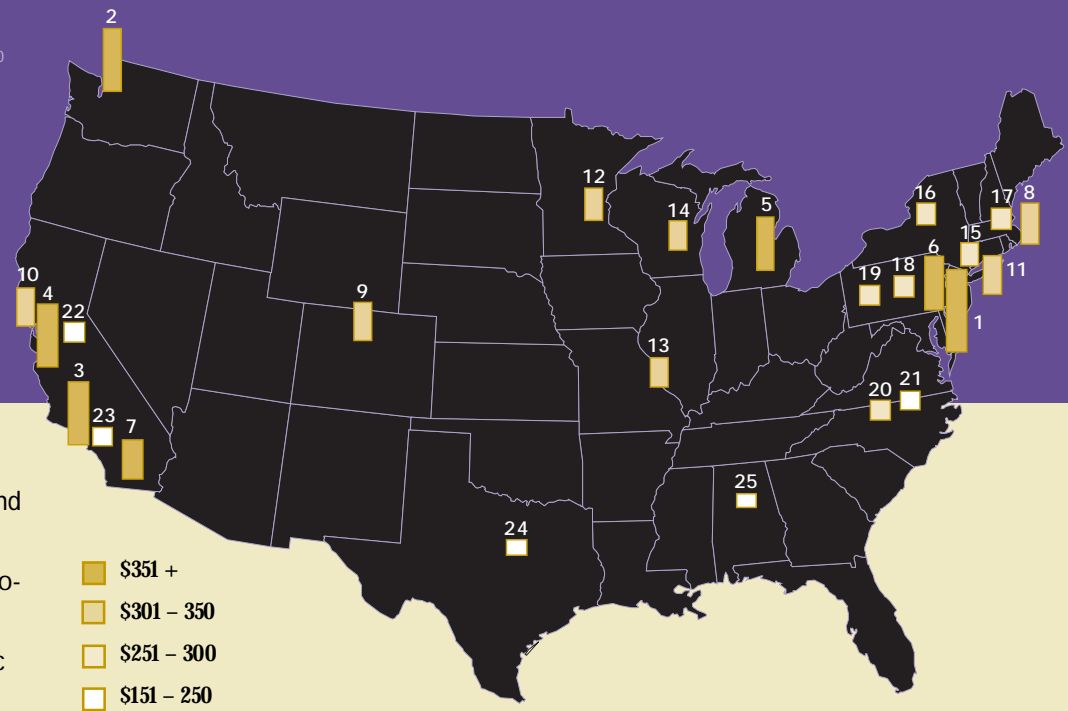
*Report*, “promises a vast acceleration of all forms of information technology.”

Six months later the new technology became a new Washington company: Lumera Corporation, a subsidiary of Microvision Inc., an earlier UW spinoff. Early in 2001 the company won investment funding from Cisco Systems and several venture capitalists. A few months later it gained a major contract from the U.S. government. Lumera expects to begin commercial production by the end of 2002.

Lumera represents the promise of photonics, the technology of light, widely regarded as a major cutting-edge technology for the 21st century. Professor Dalton, who remains involved with the company, has attracted other photonics experts to the UW since he arrived in 1998. In May 2002, the National Science Foundation chose the UW as the site of a new science and technology center specializing in photonics. Said Dalton, “I think this is going to create tremendous visibility for the region and for the work that we are doing with Lumera.”

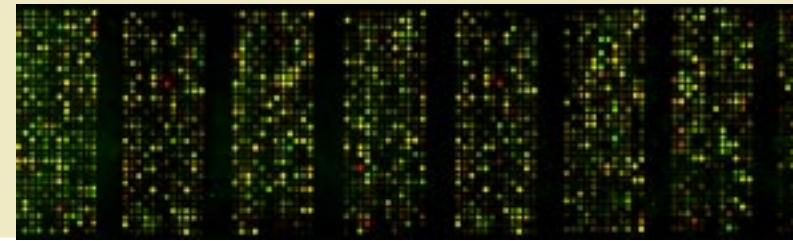
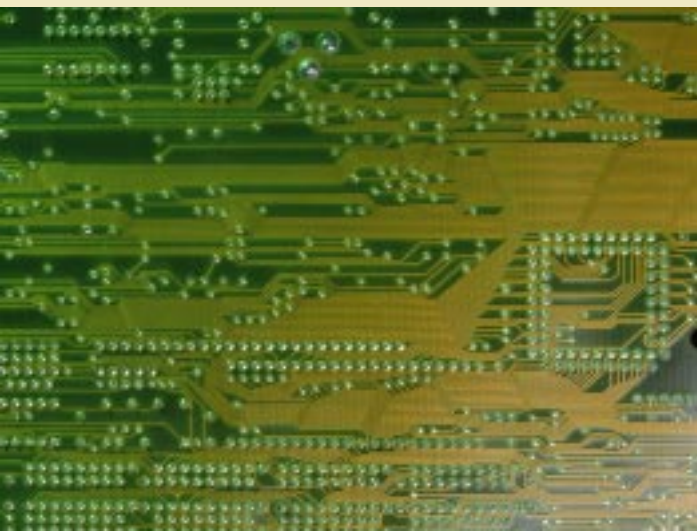
TOP TWENTY-FIVE UNIVERSITIES IN TOTAL FEDERAL RESEARCH FUNDING FISCAL YEAR 2000

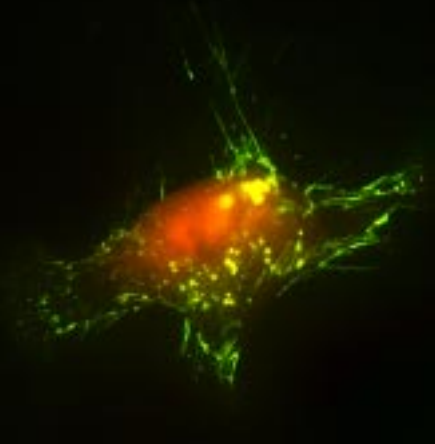
- |   |  |
|---|--|
| 1 Johns Hopkins University                  | 14 University of Wisconsin               |
| 2 <b>University of Washington</b>           | 15 Yale University                       |
| 3 University of California – Los Angeles    | 16 Cornell University                    |
| 4 Stanford University                       | 17 Massachusetts Institute of Technology |
| 5 University of Michigan                    | 18 Pennsylvania State University         |
| 6 University of Pennsylvania                | 19 University of Pittsburgh              |
| 7 University of California – San Diego      | 20 University of North Carolina          |
| 8 Harvard University                        | 21 Duke University                       |
| 9 University of Colorado                    | 22 University of California – Berkeley   |
| 10 University of California – San Francisco | 23 University of Southern California     |
| 11 Columbia University                      | 24 Baylor University                     |
| 12 University of Minnesota                  | 25 University of Alabama                 |
| 13 Washington University                    |  |



■ \$351 +  
■ \$301 – 350  
■ \$251 – 300  
■ \$151 – 250  
*In millions*

Newer companies include Rosetta Inpharmatics, purchased by Merck in 2001 and now expanding; Impinj, a semiconductor company that won a second round of venture-capital investment in May 2002; and Corixa, which is developing immunotherapies. The economic benefits of these and many other recent UW spinoffs won't be fully realized for a decade or more. Even more distant is the economic payoff of current UW research—the seed corn of future economic vitality.





**ESTABLISHED INDUSTRIES.** Washington gets high New-Economy marks partly because new technologies percolate through all economic sectors. For example, this state ranks 10th in the nation in “online agriculture”: the percentage of farmers who use the Internet and computers in their operations.

University of Washington research brings the benefits of innovation to established regional businesses, especially struggling resource-based industries like forestry and fisheries.

The Precision Forestry Cooperative supports pioneering research to improve forest production, management, and manufacturing. Funded by the legislature as part of the Advanced Technology Initiative, it is a joint project of the UW colleges of Forest Resources and Engineering.

In “precision forestry,” new technologies gather complex data about specific forest sites; turn those data into visual, interactive models; and design engineered ecosystems to achieve both the economic and environmental goals of modern forestry. These kinds of tools allow the industry to make smarter use of the state’s resources and, ultimately, provide more and better jobs in rural Washington. Even a ten percent increase in forest productivity, experts say, would add a billion dollars to the state economy and 25,000 new jobs.



## GENOMICS

“Biotechnology,” says a Brookings Institution report, “is the quintessential knowledge-based industry, built on fundamental breakthroughs in the understanding of genetic and biological processes.” Many of those breakthroughs happened at the University of Washington. In spring 2002, two scientists in the UW medical school, professors Maynard Olson and Philip Green, were among only eight winners worldwide of prestigious Gairdner

International Awards for groundbreaking work in genomics. (A third Gairdner awardee, Dr. Robert Waterston, arrives in January 2003 to chair the UW’s Department of Genome Sciences.)

Thanks to the record and promise of UW research in this field, the National Institutes of Health has awarded two of its three new Centers of Excellence in Genomic

Science to the University of Washington. (The third will be at Yale.) The two federally funded UW centers, one in the College of Engineering and one in the School of Medicine, will pursue the next phase of research into how the human genome functions. The centers will also add to the ferment of research that has helped make the Puget Sound region a leader in the biotech industry.

*“The University of Washington is a catalyst for the high technology industry in Washington State. Many of the technologies our industry is based upon were pioneered and refined at the UW.”*

*JEREMY JAECH, founder of Aldus and Visio; now at Poseidon Ventures*

The salmon is an icon of the Northwest, and salmon research has been a major focus of the UW School of Aquatic & Fishery Sciences. With the 1999 listing of nine Northwest salmon species as endangered, scientific understanding of the fish and its habitats is even more urgent.

UW research ranges from the basic biology of the fish to salmon environments and behavior in the Snake and Columbia rivers, on the high seas, and in Alaska. UW high-tech programs like CRISP and DART allow detailed monitoring of fish movement and survival and the effects of various river environments and operations. (The UW spinoff company BioSonics provides advanced sonar equipment for tracking migrating salmon.) Salmon-run forecasting allows seafood processors to fine-tune their workforce each season, with multi-million-dollar consequences. Longer term, UW salmon research is aimed at helping to save this irreplaceable regional resource.



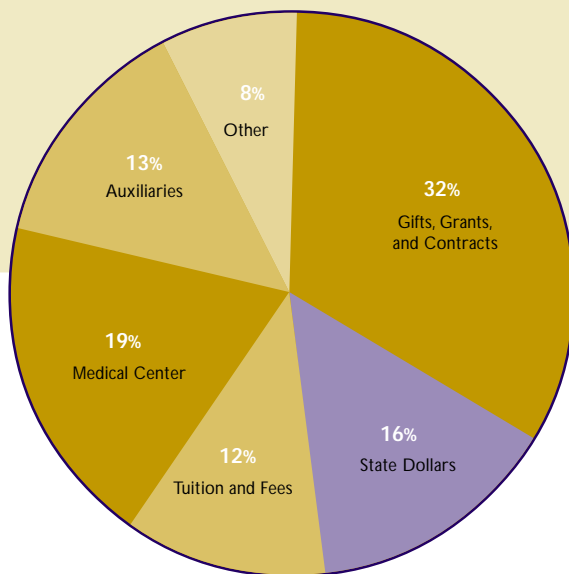
# THE STATE'S RETURN ON INVESTMENT

STATE FUNDING OF THE UNIVERSITY OF WASHINGTON IS AN INVESTMENT IN THE STATE'S HUMAN AND INTELLECTUAL CAPITAL AND IN OPPORTUNITY FOR ITS CITIZENS. MOST IMPORTANTLY, STATE FUNDS PAY THE SALARIES OF UW FACULTY, WHO CARRY OUT THE UNIVERSITY'S CORE MISSIONS OF TEACHING, RESEARCH, AND PUBLIC SERVICE.

These teachers, scholars, and researchers are the essential foundation of everything the UW does and achieves. The state also funds most of the UW's basic educational support services and, through its capital budget, some facilities costs.

Much of the return on this investment will be realized in the future, in greater prosperity, higher tax returns, and the benefits of new knowledge.

But state investment in the UW earns a very high rate of return even in the most immediate timeframe. The University, as it goes about its work, has a substantial economic impact. For one thing, it brings in hundreds of millions of research dollars from outside the state. UW funds spent on salaries, equipment, goods, services, and capital expenditures circulate throughout the economy, generating even more economic activity through job creation and increased demand for goods and services. Economists call this the "multiplier effect."



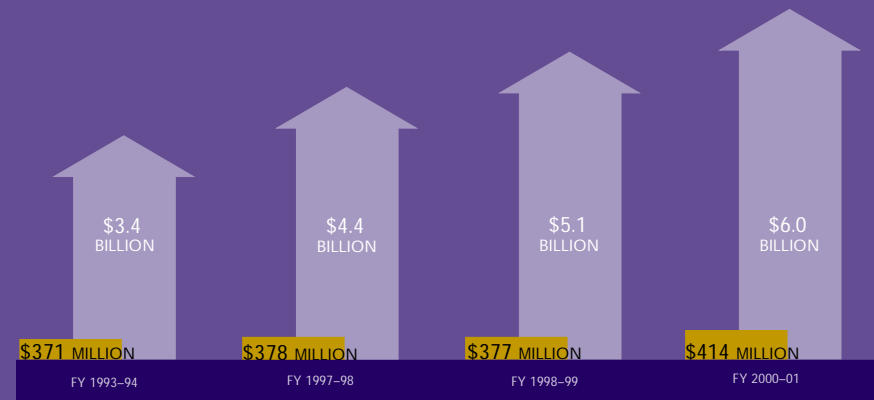
Sources of UW Funds FISCAL YEAR 2001





Economic activity generated from state investment

State investment in the University of Washington



State Funding vs Total Economic Impact

### Here is a calculation of the UW's impact on the state economy for the fiscal year 2001:

- The University's budget totaled \$2.2 billion (\$414 million of state funding plus \$1.8 billion from other sources, including \$552 million in federal research funds).
- This \$2.2 billion of total spending generated an additional \$3.8 billion of economic activity, for a total economic impact of \$6 billion.
- Of this \$6 billion in economic activity, \$4.8 billion occurred in the state of Washington.
- The University's \$4.8 billion statewide economic impact produced \$195 million in tax revenue for the state of Washington.
- When this \$195 million in tax revenue is subtracted from the UW's \$414 million of state funding, the remainder is a net state investment in the University of \$219 million.
- By this calculation, the state's investment in the University of Washington produced a rate of return in statewide economic activity of almost 22 to 1 (\$4.8 billion impact from \$219 million net investment).
- The University employed the full-time equivalent of 23,680 people. Another 56,608 jobs were generated in the state by the UW's economic impact.

*“Other states looked with envy on what Washington had and have found a way to do what we cannot seem to do—summon taxpayer support for investing in the future. Frankly, I think if the average citizen better understood what really drives economic prosperity, there would be a different set of decisions made.”*

STEVE DAVIS, *President and CEO, Corbis*



# INSURING THE FUTURE



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THE UNIVERSITY OF WASHINGTON MAY SEEM AS SOLID AND ETERNAL AS MT. RAINIER. IT IS NOT. IT IS A CREATION OF FARSIGHTED TERRITORIAL CITIZENS AND THEIR DESCENDANTS, WHO DEDICATED PUBLIC FUNDS TO BUILD IT, STRENGTHEN IT, AND TURN IT INTO ONE OF THE COUNTRY'S PREMIER PUBLIC RESEARCH UNIVERSITIES.

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Without that public investment, the UW cannot sustain its current strength—or its role as an engine of the state's economic future.

**State support of the University is slipping. In the past decade:**

- State appropriations per full-time UW student, adjusted for inflation, declined 16 percent—while the average level of state support for the UW's 24 peer universities rose 5 percent.
- The UW dropped from 12th to 20th among those 24 peer universities in its level of state support.

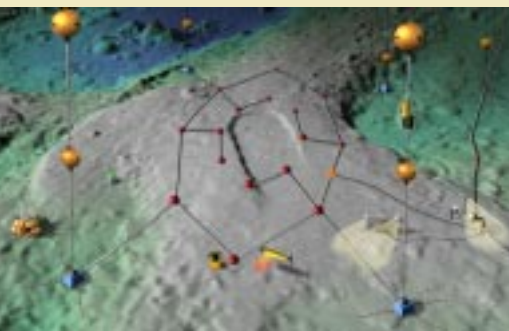
Per-student funding for the UW is now \$2,600 behind the average of its peers. That translates into almost \$92 million every year—additional state appropriations the UW would be receiving if its level of support matched the average of its peers.

A funding gap this large puts the University—and the state—at a dangerous competitive disadvantage. State dollars pay UW faculty and educate UW students. If the best faculty depart and the quality of graduates declines, the UW's role as an economic powerhouse will be over. Other states will reap the benefits of Washington's loss.

No investment the state can make will pay greater dividends than increased support for the academic core of the University of Washington.

It is also time for the state to increase its stake in UW research.

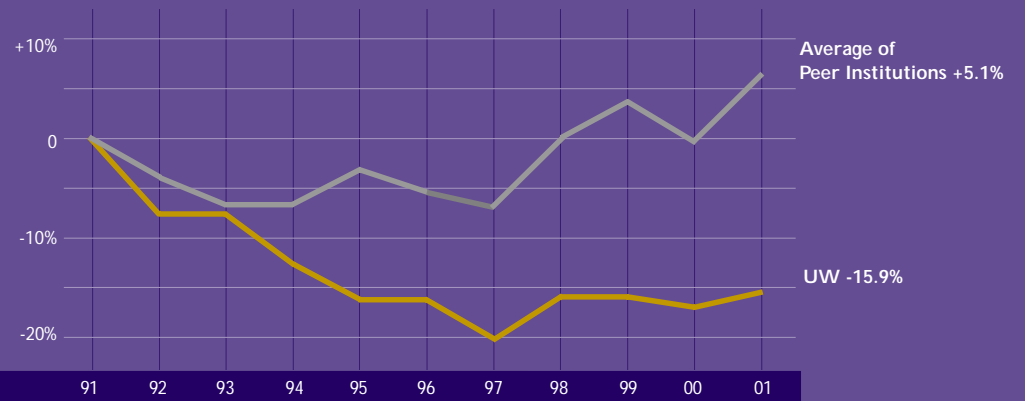
For many years, state support for UW faculty and students has provided the essential foundation for UW research, but the federal government has provided the



*“ If we assume that academic institutions are very important to the technology base and you need to have great people, then you need to be funding them at a competitive level, and we certainly aren't doing that.”*

**PAUL CLARK, *President and CEO, ICOS***





State Appropriations per Full-Time Student, in Constant Dollars FISCAL YEARS 1991-2001

lion's share of actual research funds. The UW has enjoyed spectacular success in winning federal grants, as well as research funding from industry. The state has been free to concentrate its funding on the UW's educational mission and capital facilities.

**But the world of research is changing.**

- Increasingly, federal grants require some share of matching funds from the recipient. In the case of public universities, that means the state.
- Federal research funds are growing, but the UW has run out of research space. At the same time, the state is spending less and less on building and renovating UW facilities.
- Other states have seen the benefits of research-based, high-tech economic development. Many are undertaking major, multi-year research initiatives.

Typically, these state projects aim to strengthen research infrastructure at universities and other institutions, stimulate research in targeted areas, and attract related industry. As the chart below shows, this is an area of intense competition, and Washington is not yet in the game.

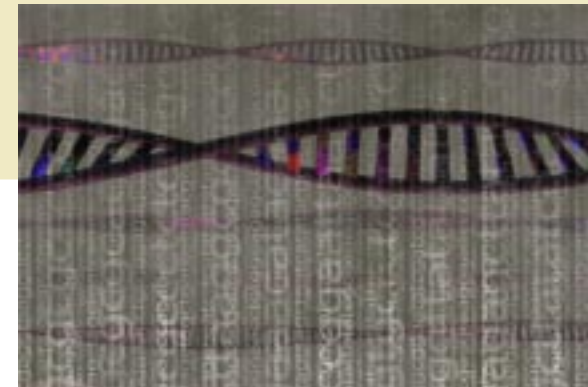
At the moment, the UW and the state of Washington are in an enviable position. Millions of research dollars flow in, extraordinary discoveries and innovations are produced, and the state is a center for high-tech, New Economy enterprise.

Unless the state acts more aggressively to maintain this lead, however, we will find ourselves falling behind. Washington needs to think big about the place of research in its economic future and take steps to provide the necessary resources, as other states are doing. The UW will gain from such a strategy—and so will the state.

**States' Comittments to Investment in Higher Education/Technology Research**

FISCAL YEARS 2002-2008 IN MILLIONS

STATE	2002	2003	2004	2005	2006	2007	2007	TOTAL
CALIFORNIA	100.0	100.0	100.0	100.0				400.0
GEORGIA	79.8	79.8	79.8	79.8	79.8	79.8	79.8	558.6
ILLINOIS	220.0	220.0	220.0	220.0	220.0	220.0		1320.0
INDIANA	33.0	33.0	33.0					99.0
MICHIGAN	50.0	50.0	50.0	50.0	50.0	50.0	50.0	550.0
NORTH CAROLINA	32.0	32.0	32.0	32.0	32.0	32.0	32.0	224.0
MISSOURI	21.5							21.5
OREGON	24.0	24.0	24.0	24.0	24.0	24.0	24.0	168.0
PENNSYLVANIA	90.0							90.0
TEXAS	325.0	325.0						650.0
WISCONSIN	90.5	90.5						181.0
WASHINGTON	9.0							9.0





"We can begin today as a state to make a series of right choices and right decisions. We can embrace the future and seize the opportunities it presents, make wise investments, and prosper. Or we can sit passive and observe the choices others make and wake up one day to find the innovation economy has passed us by."

*Steve Davis, President and CEO, Corbis*

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