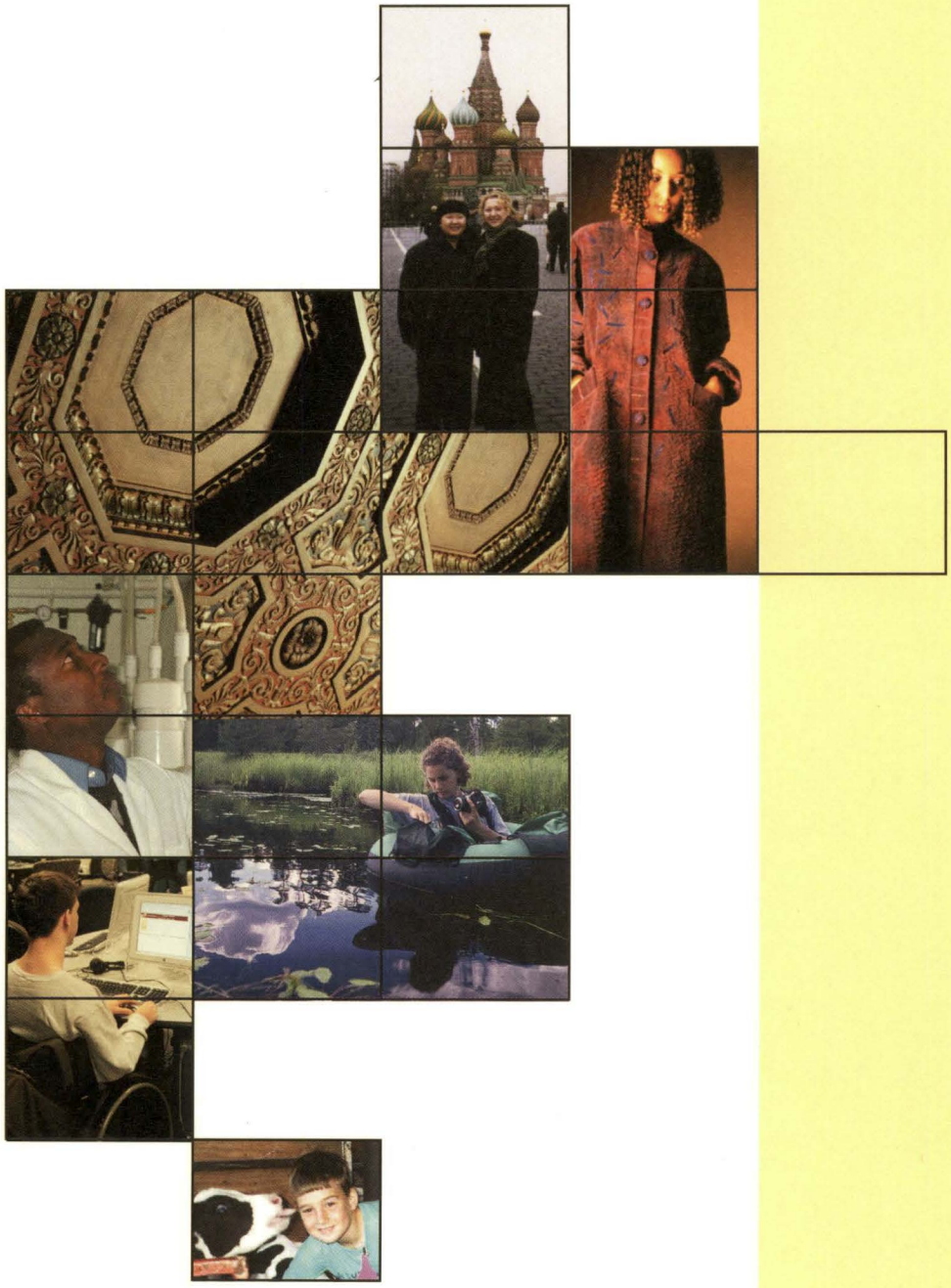
UNIVERSITY OF MINNESOTA

150 YEARS
1851 2001



MINNESOTA ACADEMIC INITIATIVES

WHERE WILL THE UNIVERSITY OF MINNESOTA BE IN 20 YEARS?

WHAT NEXT ?

Digital Technology

The goal of the digital technology initiative is to become a center of excellence at the University and to form partnerships with the community to recapture Minnesota's commanding position in digital technology as we move forward in the information era. The center is focusing on cutting-edge research and business areas: data storage, analysis and visualization, scientific computation, telecommunications, and software engineering. New faculty hired are also complementing and expanding those hired under the biological sciences initiative.

Molecular and Cellular Biology

The University aspires to be at the leading edge of the revolution occurring in the biological sciences. This initiative, founded on the reorganization of the biological sciences into four new departments—biochemistry, molecular biology, and biophysics; neuroscience; genetics, cell biology, and development; and plant biology—builds on the University's emphasis on interdisciplinary research and teaching and is strengthening its capacity to connect science to significant industrial applications across plant, animal, and medical fields. This initiative focuses on functional genomics, a new branch of science that determines the mechanisms by which thousands of genes are orchestrated to develop and maintain an organism in either a hospitable or hostile environment.

Design

The Design Institute has as its mission the exploration and communication of the new role that design plays for the University, industry, and society. Design is a critical component of how we communicate, collaborate, and compete. The institute will seek connections among such broad-ranging fields as genetics, computer science, computational mathematics, architecture, art, clothing design, and industrial design. Investments will be focused on three strategic areas: educating the public about design, fostering more interdisciplinary research and teaching within the University, and developing design tools and methods to aid community planning.

New Media

The new media initiative is strengthening the School of Journalism and Mass Communication (SJMC) by building a nationally preeminent program in communication education, research, and practice. The SJMC is providing students with the best possible academic and professional education for entry into diverse careers in this rapidly changing industry. The SJMC also houses the Institute for New Media Studies, a center for interdisciplinary research, industry outreach, and collaboration on emerging issues in the new media arena.

Agricultural Research and Outreach

The supplemental investment in Agricultural Research and Outreach enables the University to continue to respond to important challenges in food production, food quality, and the marketing of agricultural products—all areas of critical importance to the state's rural economy. Agricultural research is strongly linked to the University's initiatives in genomics.

MINNESOTA ACADEMIC INITIATIVES

START WITH A PLAN.

One of Minnesota's greatest assets is its knowledge economy. As a state we have been a leader in agriculture, medicine, and other fields. The key source of our knowledge has traditionally come from the heart of Minnesota's higher education system, the University.

One need only look at the pacemaker, developed at the University, to see how electronics and mechanical engineering combined with a very real medical need to save millions of lives and spawn an entirely new biomedical devices industry in Minnesota.

Our recipe for a new knowledge economy is simple.

Our plan is to keep the brightest students in Minnesota. Our plan is to be a magnet to attract groundbreaking, innovative faculty from around the world.

Our plan is to provide the best facilities and equipment for our teachers, researchers, and learners. Our plan is to reinvigorate the economy and soul of Minnesota with new ideas and technology.

I predict that over the next 20 years, the University of Minnesota will be affecting the quality of life and economic prosperity of Minnesotans just as it has for the past 150 years.

With best wishes, I am

Sincerely yours,

Mark G. Yudof, President
University of Minnesota

WHAT NEXT ?

Funded by a $10 million gift from Cargill and matching money from the state legislature, the Microbial and Plant Genomics Building will put the University on the leading edge of genome research. Ground was recently broken for this new building on the Twin Cities campus in St. Paul.

Pursuing bioinformatics

Now that scientists have accomplished genome sequencing, attention has moved to learning each gene's function. To modify genes in medicine, or to add nutrition in food systems, we have to know what each gene does.

Not so long ago a team of scientists would dedicate their whole lives to discovering the function of one gene. Today answers can be found in a fraction of the time using a process called bioinformatics, a new science that uses computer tools to compare one sequence to another, to analyze and predict its real-world structure.

The Microbial and Plant Genomics Building is one of the first buildings in the country specifically dedicated to genome research.

The building's circular space is devoted to bioinformatics and will be equipped with state-of-the-art computers and visualization equipment. At the other end of the building are wet labs. This allows researchers to move smoothly from a theoretical idea on the computer, to its confirmation on real cells in a petri dish. The answer can be evident by the next morning.

Wheels already turning

As a result of the digital technology initiative, the University has attracted some very talented faculty researchers. Here are six who are already at work.

Wei-Chung Hsu, Computer Science and Engineering—He develops agile software to accurately move applications mounted on old systems onto new computer architecture.

Hans Othmer, Mathematics—His research on the behavior of individual enzymes, cells, and organisms helps us understand the collective population of larger organisms.

Jiali Gao, Chemistry—He builds and analyzes computer models of biological molecules to help us understand enzyme reactions and design new drugs.

Alexander Grosberg, School of Physics and Astronomy—His wide-ranging theories, from statistics of knots to thermodynamics of glasses, help us understand how DNA folds and its code evolves.

Nikolaos Sidiropoulos, Electrical and Computer Engineering—His signal processing research helps prioritize and control traffic on the Internet and wireless information networks.

George Karypis, Computer Science and Engineering—His data mining helps us to effectively analyze large amounts of data, such as the human genome, to extract valuable knowledge and understanding.

In addition to 20 previously planned faculty additions, digital technology will create five endowed faculty positions courtesy of a recent $7 million gift from the ADC Foundation.

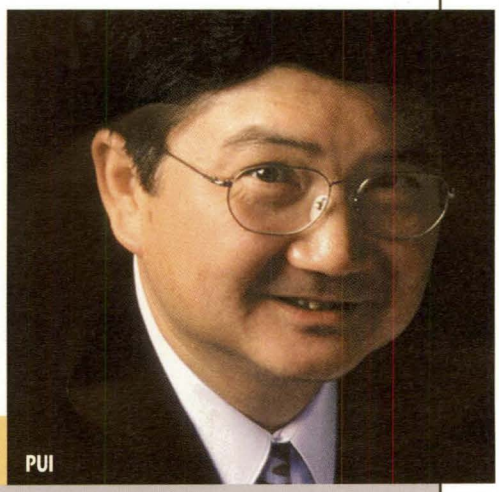
The gift will also establish eight graduate fellowships and provide base funding for 14 faculty positions from the state. The foundation has also agreed to possibly fund as much as $3 million in research projects, primarily in telecommunications and advanced networking technologies.

IN 1966, "FANTASTIC VOYAGE" WAS A SCI-FI MOVIE. NOW IT'S CALLED NANOTECHNOLOGY.

In the movie *Fantastic Voyage,* a medical crew is miniaturized in order to travel inside the body of a scientist to destroy a life-threatening blood clot. Today, the imaginations of scientists are driven to think small. With nanotechnology, researchers plan to go inside a cell to manipulate the structure at the scale of a nanometer—one billionth of a meter.

To see nanotechnology at work today, look inside a living cell. The cell works like a machine, converting fuel to energy and pumping out proteins and enzymes as directed by its DNA. What scientists propose is to go inside the cell structure and change it slightly, overriding the cell's natural limitations, to create new products or capabilities.

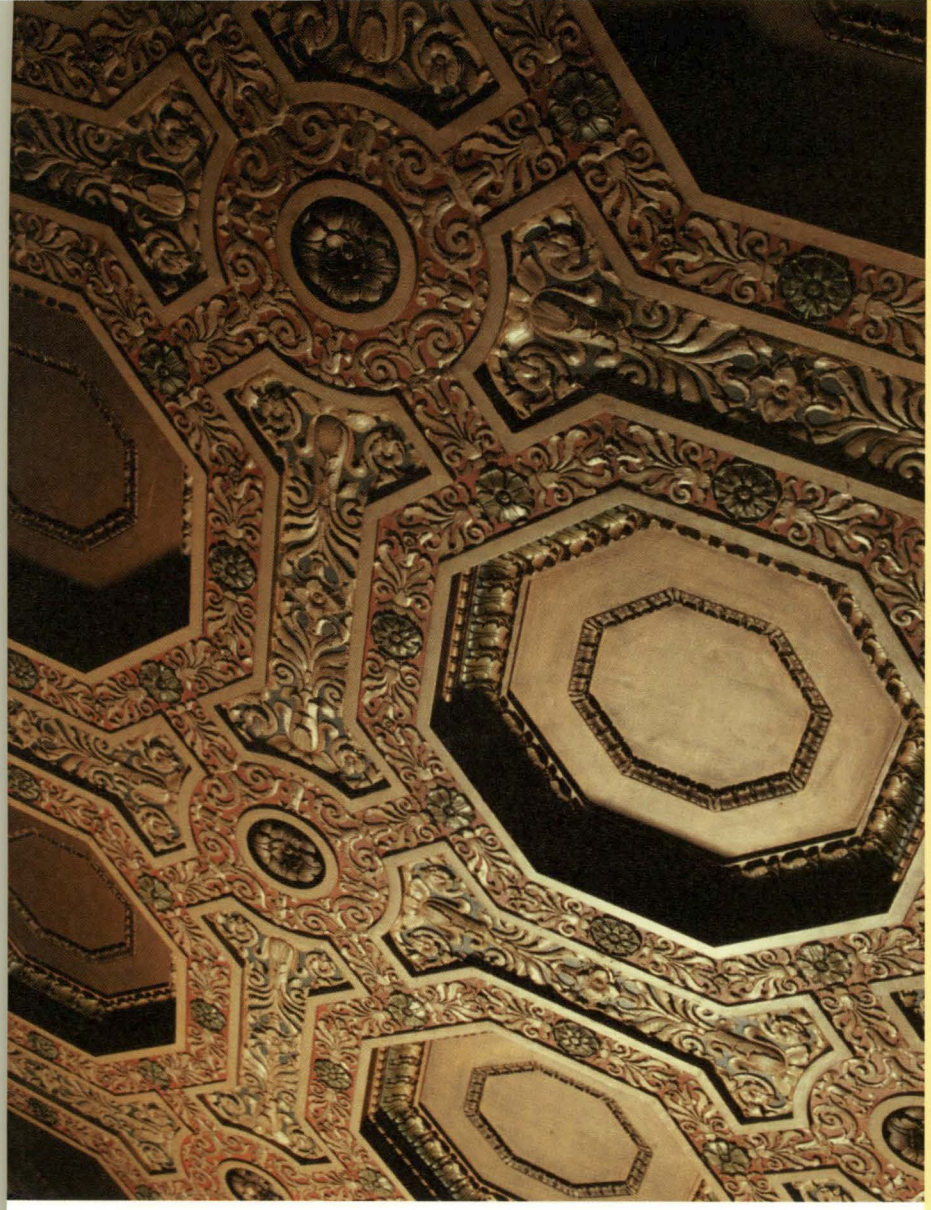
In the not-too-distant future, we could see construction materials with built-in sensors that detect weather conditions and control indoor climate. More amazing is the thought of creating an invisible airplane, cloaked from view with a special exterior coating. Nano-sized medical equipment might be created for eye surgery. And with the need for smaller and smaller computers, researchers are already thinking of replacing the silicon chip with, let's say, a nanochip with molecular electronics.



PUI

Oral exam leads to new gene gun

David Pui wasn't supposed to invent a gene gun. He's in pollution particle technology. Fortunately, he sat in on an oral exam in biology. The student, while describing a genetic implant, mentioned the gun used for particle handling, a gun that shot a one-micron particle into a cell. That's a big bullet and can cause cellular damage. The problem suddenly became an opportunity for Pui. His expertise happens to be particle handling. He left the room with an idea of how to create a better gun with a much smaller bullet. Three weeks later he had a prototype. It's a gun that shoots a 50-nanometer particle of DNA into a cell. Since a micron is 1,000 nanometers, Pui's bullet was 1/20th the size of the previous bullet. This invention is great news for the University, and even better as an effective tool for pursuing gene therapy.



At first glance this could be a new chip design, but the restored tile ceiling in Walter Library, home of the Digital Technology Center, merely serves as a beautiful reminder of the past and an example of how the University continues to reinvent itself.

"Nanotechnology is inherently multidisciplinary, and a comprehensive university like ours provides excellent opportunities to conduct such research."

—David Pui
Distinguished McKnight University Professor
and director of the University's Particle Technology Laboratory

DIGITAL TECHNOLOGY CENTER

DIGITAL TECHNOLOGY IS THE ENGINE.

In a 1960s movie, the graduate received one word of advice: plastics. A graduate of the 21st century will receive another simple promise: everything that can be digital will be digital.

When completed, the new Digital Technology Center in Walter Library will be precisely that. Books will be stored digitally. Computer stations will replace study carrels. It will be a state-of-the-art training ground for what Minnesota industry needs right now—digital designers, troubleshooters, and gurus.

One of the first tasks will be a herculean effort to find ways to accommodate the huge amount of data storage required for genomic data mining and bioinformatics. The center will be constantly working to develop new algorithms and hardware to improve data storage.

Digital technology at the University is also at the forefront of wireless communication, recently winning three major professional society awards.

It's not a farfetched idea to imagine doctors implanting wireless medical devices to monitor patients 24 hours a day.

Or with the Internet, a University brain surgeon could perform an operation that is monitored around the world, in real time.

We've also hired new faculty to help us. A computational biologist has an idea that may help someone with liver disease. A biopolymer physicist is exploring the theory of knots to understand how DNA folds and how genetic code evolves. There's a collaboration with Intel to develop a new dynamic microprocessor.

And to keep things revved up, we will provide the computational power for digital scientists to explore the world of nanotechnology.

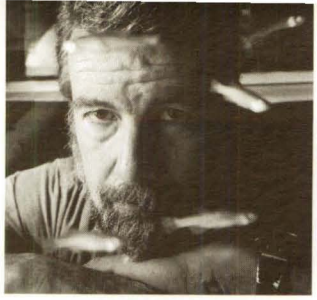
WHAT NEXT ?

To Biodale and beyond

One-stop shopping for biological research support services

Located on the Twin Cities campus in St. Paul, Biodale is where researchers go with projects that require state-of-the-art biological research equipment. Students, faculty, staff, and industry partners are welcomed into an environment offering state-of-the-art instrumentation and user-friendly, walk-in service and training. Biodale makes it easy for start-up companies to do advanced research before they have enough results to impress investors. It's also a place where large, established corporations can get timely results for their research—research that would otherwise wait for a lengthy capital investment proposal to be approved. Biodale makes it possible to conduct basic research in a public setting and to speed up public adoption of research results.

Genomics—Automated DNA sequencing, data management, and analysis
Bioinformatics—What you just sequenced; is it related to anything discovered before?
Imaging—Looks at your specimens with light and electron microscopes
Pilot facility—Grows lots of microbes in large quantities
Proteomics—Uses mass spectrometers to identify and sequence proteins from complex mixtures
Protein expression—If you know the name of a gene, come here to get the protein gene codes.



Gene vehicle discovered

Led by Perry Hackett, professor in the Department of Genetics and Cell Biology, researchers have successfully reconstructed a 15-million-year-old fish gene to create a new and better DNA delivery system for gene therapy.

A bug that goes for atrazine

Larry Wackett has a knack for getting rid of unwanted chemicals. His latest attack is directed against the herbicide atrazine, which degrades very slowly. Wackett and his colleague Michael Sadowsky found a bacteria that had evolved to eat atrazine. They did some gene therapy and made the bacteria eat faster. So if there is an unexpected spill of the herbicide, there's now an easy solution.

New companies started here

Recent start-up companies created by University of Minnesota faculty and graduate students include Midwest Molecular, Neuromics, Veos, Blizzard Genomics, and Minnesota Transgenomics.

MOLECULAR AND CELLULAR BIOLOGY BUILDING: HOME TO 70 RESEARCH GROUPS, 400 SCIENTISTS

Biochemistry, Molecular Biology, and Biophysics

Understanding how cells communicate with each other. Learning how cells signal each other as a disease—such as cancer—spreads, or as an organ is rejected.

Genetics, Cell Biology, and Development

Understanding human genetics. Understanding how a gene or groups of genes become dysfunctional and cause diseases such as cancer. Learning how to repair or replace disease-causing genes.

Neuroscience

Understanding the molecular and cellular building blocks involved in the control of sensation, movement, and thought. Understanding abnormalities that cause disease of the brain. Understanding pain, treating addiction.

How far we've come

There was a nice story in *People* recently. It told how a six-year-old girl's life was saved in no small part because of stem cell research conducted at the University. Blood from her newborn brother's umbilical cord containing stem cells that could rebuild bone marrow was infused in the girl's bloodstream. Eighteen days later she was full of energy and on her way home.

The story sounds almost routine now, and in time it will be. In fact, there will probably be a long list of *is-that-really-true* accomplishments coming from the University's Stem Cell Research Institute.

The institute is led by Catherine Verfaillie, profiled by *U.S. News & World Report* as one of the nation's 10 leading innovators in science and technology.

She and her colleagues are on the verge of some magnificent discoveries. They already know how to make stem cells mature into bone, cartilage, muscle, liver, pancreas, or brain cells.

The expectation is that this knowledge will someday allow doctors to repair heart muscle after a heart attack, fix spinal cord injuries, cure diabetes, restore brain function for stroke victims, and, eventually, treat Alzheimer's.

Patients with diseases considered untreatable a few years ago now have reason to hope. Verfaille is leading 15 research teams on campus and another 15 teams throughout the country in an effort to speed the research.

Stroke treatment identified

University researchers recently discovered what they believe to be a new way to treat stroke patients. What they have learned is that brain damage produced from a stroke is caused by an enzyme referred to as COX-2.

Their study has concluded that COX-2 inhibitors can reduce brain damage, even if administered several hours after a stroke occurs.

About ethics

While the University is exploring the hard science of genomics, substantial research, teaching, and public discussion on its profound implications are being addressed through the Center for Bioethics; Consortium on Law and Values in Health, Environment, and the Life Sciences; and a new J.D./M.S./Ph.D degree program in law, health, and the life sciences.

"The building serves not only as a focal point for molecular and cellular biology research and education, but also a tremendous recruiting tool for attracting the top faculty and the brightest students."

—David Bernlohr, Ph.D.
Head of Biochemistry, Molecular Biology, and Biophysics

CELLULAR AND MOLECULAR BIOLOGY

FOLLOW THE MAP OF GENOME.

You only have to count the number of covers *Time* and *Newsweek* have devoted to genomics in the past couple of years to see how important biology has become in the world.

Biology will be the dominant science during the 21st century. And a new research area—functional genomics—is predicted to revolutionize biology, medicine, and agriculture in the coming years.

Fortunately, the University and the state legislature made some smart decisions two years ago. The investment into genomics research facilities, equipment, and faculty couldn't have come at a better time.

With sequencing of the human genome just completed, the Molecular and Cellular Biology Building on the east bank of the Twin Cities campus is ready to take center stage by mid-2002.

This building will be the home to 70 faculty, including 30 newly hired from top research institutions including National Institutes of Health, Hutchinson Cancer Center, California Institute of Technology, University of California-Berkeley, and Stanford University.

A major objective of many scientists in this building will be to understand the function of the human genome—enhancing genes that suppress cancerous tumors, for example.

Where the University can go in genomics is now unlimited. The possibility for breakthroughs in human and animal health and for improving food production is outstanding.

These scientific advances also represent the potential for a large life sciences industry to flourish alongside the state's medical technology industry, and new kinds of agriculture growth.

WHAT NEXT ?

Where we've been

Here are some examples of design projects started by the Design Institute since the design initiative was funded.

Reclaiming what was mine

Former mining sites on the Mesabi Iron Range may get a new lease on life—one day becoming residential or commercial neighborhoods, recreational lakes with lush golf courses, parks, trails, or other industrial sites.

This is the focus of the Laurentian Vision Partnership, a voluntary group of private, public, and state organizations, including the University's Design Institute and Department of Landscape Architecture.

This project will provide technical design and planning assistance to mining companies, landowners, and communities to help them develop possibilities for the thoughtful reuse of Iron Range mines.

The project is being conducted through grants and in-kind staff contributions. Additional funding is being sought from the Minnesota State Legislature, private mining companies and other mining interests, and Iron Range communities.

The Laurentian Vision is exploring alternatives for the Mesabi Iron Range as an attractive place to live, play, and work.

Navigating a wheelchair through the lunch line

A group of mechanical engineering students is learning the trade by creating custom designs for clients with disabilities.

For Courage Center the group devised a plan to make the cafeteria line more user-friendly to wheelchair users. The final design showed how a person in a wheelchair could go through the line without an attendant.

In another case, a woman was frustrated with what might seem like a simple task: pushing an elevator button. But with limited arm and hand strength, it was a monumental task.

The design team created an antenna-like device controlled with a joystick. It functioned like a pointer, rising to the necessary height to touch the button.

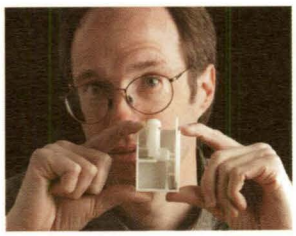
Students are quick to respond to challenging multidisciplinary tasks like these. It's a good way to get real-world design experience, with the added benefit of getting immediate feedback: smiles.

Quick turnaround

Rapid prototyping is a process that takes an idea from the computer screen and creates a physical model that can actually be held in your hand.

It's great for generating real-life models of medical devices and designs for automotive and aerospace parts, toys, or sculptures. The design team is also called on to make parts for inventions that require a working model in order to be patented.

Students learn the power of this tool when they examine a prototype, pass it around in class, rethink it, and make further modifications that will be ready to view the next time the class meets.



Will Durfee, director of design education in mechanical engineering, holds a prototype of a new medical device that will simplify taking a blood sample.

Design wherewithal

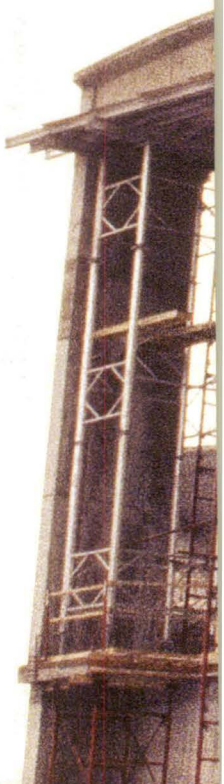
Some of Minnesota's most thoughtful and innovative designs have been gathered at the Goldstein Museum of Design on the Twin Cities campus in St. Paul.

"Here by Design" is a collection of works from graphic designers, product designers, craftspeople, gardeners, and architects from throughout the state.

The show features mass-produced objects, such as an Aveda soap dish made from recycled materials, to one-of-a-kind handmade objects, including clothing, pottery, and canoes.

Visitors to the show see great design that is as much a result of the designer's inspiration as where it was created: Minnesota.

Coat designed by Anna Carlson can be seen at the Goldstein Museum of Design.

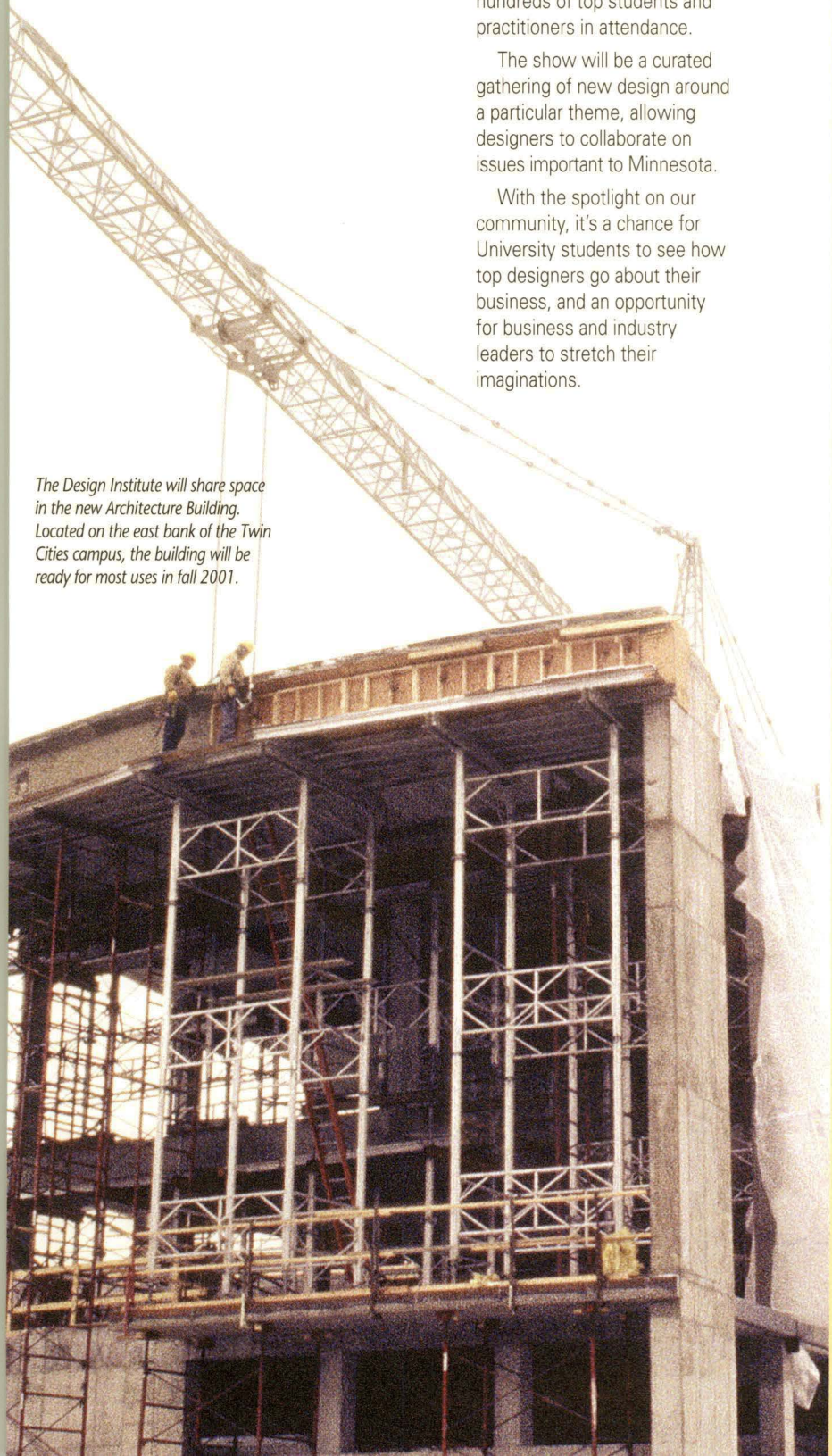


Around the corner

Janet Abrams, newly hired director of the Design Institute, is developing a vast range of new design projects, including an international design fair with hundreds of top students and practitioners in attendance.

The show will be a curated gathering of new design around a particular theme, allowing designers to collaborate on issues important to Minnesota.

With the spotlight on our community, it's a chance for University students to see how top designers go about their business, and an opportunity for business and industry leaders to stretch their imaginations.



The Design Institute will share space in the new Architecture Building. Located on the east bank of the Twin Cities campus, the building will be ready for most uses in fall 2001.

DESIGN INSTITUTE

WE'LL HELP DECIDE ON A DIRECTION.

Design is often seen as something glitzy—a Porsche zipping down the street, a new shoe from Nike, or a shiny cover on a cell phone. At the Design Institute, good design begins with the formulation of a fundamental question.

Why is this bus shelter always a mess? What happens to this Iron Range land when the mining is completed? How might a uniform voting machine look and function?

That the institute would like to answer questions like this is not surprising. The way the answers will develop is what is genuinely unique.

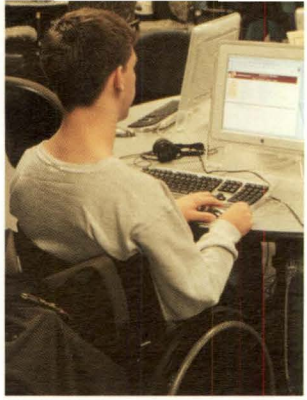
Under director Janet Abrams's lead, the design process at the University—no matter what the question—will bring together designers from disparate disciplines to work on the same problem. No other university has enlarged the scope of design in this manner.

This multidisciplinary philosophy will be seen in the formation of a Sounding Board—a collection of distinguished designers from Minnesota and beyond who will join together to assist in shaping the Design Institute.

It's an exciting atmosphere that promises regular visits from international designers as guest professors. And designers who normally do not work together will find focus and direction through the institute's lead.

In the process, new design tools and methods to aid community planning will percolate, helping to educate the public about design and fostering more interdisciplinary research and teaching at the University.

WHAT NEXT ?



Newly renovated Murphy Hall has a 150-seat multimedia auditorium.

A new start

Murphy Hall opened in 1940 as one of the first buildings in the nation built exclusively for journalism education. The renovated Murphy includes state-of-the-art equipment throughout five floors and 27,000 square feet of assignable space.

It has a 32-seat conference center with rear-screen projected computer, DVD, VCR, cable TV, HDTV, and document camera. It hosts seminars, classes, and industry-related gatherings. The 150-seat auditorium pictured above has similar equipment.

The digital media studio houses 48 computer workstations in a single room, designed to capture the open environment of newsrooms and many graphic design firms.

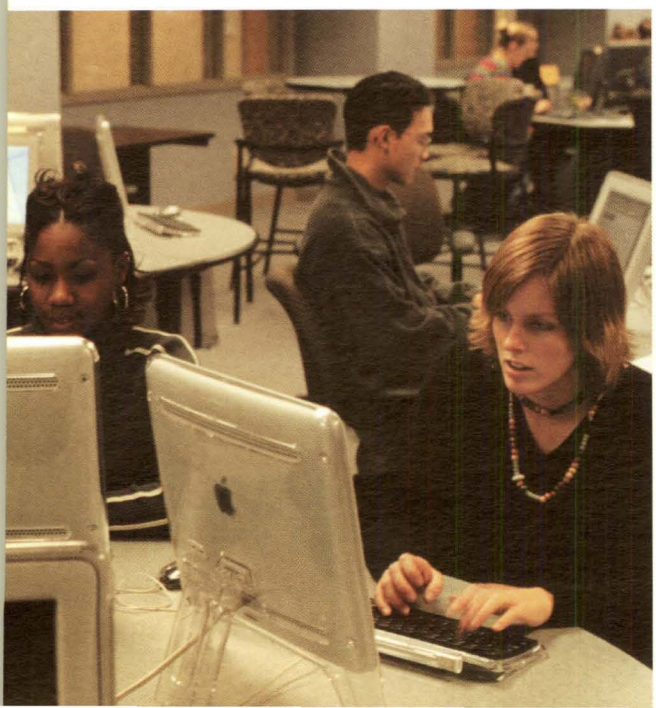
A digital broadcast studio is equipped with video editing features, plus cameras for student checkout.

The digital information resource center contains a library of both traditional and digital resources for integration into classes and use by students.

A focus group room will be available in the near future.

"It's very much like a professional setting."

—Joel Kramer, Senior Cowles Fellow and former publisher of the *Star Tribune*



Have funds, will travel

Enthusiasm for the new journalism school is huge. Since the initial infusion of money from the legislature for the new media initiative, there has been an outpouring of financial support. Gifts from private sources have literally doubled the initial investment from the state.

Hubbard Broadcasting's $10 million grant to the school leads the way. In addition to endowing the Institute for New Media Studies, the money provides an endowment to keep technology up to date and to finance new ways of teaching media technology and media research.

Stanley S. Hubbard, president and CEO of Hubbard Broadcasting, explained the gift: "Hubbard Broadcasting has been interested in the new ground that the journalism school has broken, in the way it prepares students for careers in today's high-tech, interactive media environment. We believe that this is the right path for the school to be taking, and this gift is intended to make that possible."

The state's investment put the school back on the road. Gifts from the private sector ensure the school will be in a leadership role for years to come.

This way? Or that way?

What is the best way to tell a story? How does a journalist's workflow and thinking process change to accommodate all the places that the work is going to be used? How does the medium change the message? Can a story be told better visually than with text? These are questions that journalism students learn answers to every day, sometimes in surprising ways.

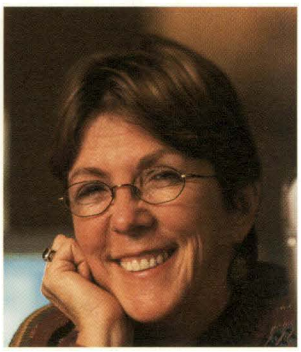
One day two geophysicists from the University came to a journalism class to talk about a multimedia presentation they had done with their own class.

The professors had previously given a presentation about the Ice Age, dividing their class into three groups. A third of the students received a written report, a third saw a CD presentation, and a third were allowed to work with the CD in a group.

When they were tested on the material, students who worked with the CD in a group scored highest, with the reading-only group scoring lowest.

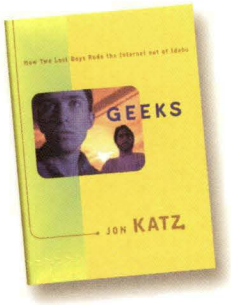
It's easy to see the best way to tell a story in this case. It's just one example, however. Our job is to explore other ways storytelling is changing, and to bring examples to our students.

Looking down the road



Under the leadership of Nora Paul, the Institute for New Media Studies will not only be on the lookout for what's new in media, but also for what's next.

The institute has begun to host a series of signature events designed to connect established members of the media community with people pushing the envelope.



When *Geeks* author and dot-com entrepreneur Jon Katz came to campus, student writers were exposed to someone who eats, breathes, and sleeps with new media on his mind.

A more recent workshop examined interactivity.

The workshop was on techniques for visualizing information that in the past would have been told in a two-dimensional form. The presenters came from a variety of discipllines and demonstrated how they use interactive computer design and presentation to make information more compelling.

For example, an architecture professor showed a 3-D graphics model of St. Paul. The viewer flies over the city, controlling the viewing angle and zooming in on areas of interest. This project was funded by the School of Architecture's Design Institute and is now being used for city planning, new construction bids, and tourism bureau promotions.

The one-day workshop also got a look at animated news, an inside view of personalized Web weather, and the latest interactive thinking on the Web. Future workshops will look inside the world of video gamers and examine new audio-video techniques.

The digital age is allowing changes to come faster and faster. The challenge for the institute is to strike a balance between what's useful today, and what might be useful a few years down the road.

ON THE VALUE OF THE NEW MEDIA INITIATIVE

"The professional community is now looking at the University and the School of Journalism and Mass Communication as a center for thought leadership in new media."

—Howard Liszt
Senior Fellow, School of Journalism and Mass Communication, and former CEO, Campbell-Mithun Esty

NEW MEDIA INITIATIVE

ARRIVING AT THE REAL WORLD

Murphy Hall is where University students have always come to learn storytelling—journalists Eric Sevareid, Carl Rowan, Harry Reasoner, and Harrison Salisbury are most notable.

But today's journalists have a completely new set of tools on the table.

In response to funding for the new media initiative, the University now has the same equipment as that found in state-of-the-art digital media studios: G4 computers, flat screens, linear video editing, fiber optics, and digital photography.

The tools alone show the job has changed.

Today's digital-age students learn how to tell a story in all forms of media, including print, broadcast, and online, with an eye on interactive opportunities.

In addition to honing their skills with uncompromising equipment, students broaden their perspective by hearing from dozens of visiting professionals who regularly share their expertise.

And more students are getting off-campus instruction—there's a news-reporting course at the *Pioneer Press* and a course on arts reporting at local theaters, like the Guthrie Theater.

If there's any doubt where journalism is heading, the school's Institute for New Media Studies will provide answers. The institute was established to explore emerging skills and trends, in part by inviting industry leaders and innovators to workshops and lectures on campus.

The idea is to open the doors of the school, to let the real world come in—for students to experience it first hand, before plunging into it.

WHAT NEXT ?

One objective of the Elwell farm is to test new and alternative crops. Above is a demonstration of field pea varieties, showing plots of peas with and without an intercrop of oats.

Organic farming on the move

The best friend of organic farmers—and a growing number of conventional farmers—may be the Elwell Agroecology Farm, which is part of the University's Southwest Research and Outreach Center near Lamberton.

It has about 120 certified organic acres used for research, more than any other land-grant university in the country. A lot of researchers and members of the public are eager to hear what they're learning at the farm.

International markets for organically grown products have been increasing by 20 percent annually. Small family farms are paying attention because the price of some organic crops, soybeans for example, is often two to four times more than the conventionally grown crop at harvest time.

To pass information on to growers, the Elwell farm hosts a field day every summer and seminars during the winter. One area of research at the farm is intercropping, or growing two crops at the same time.

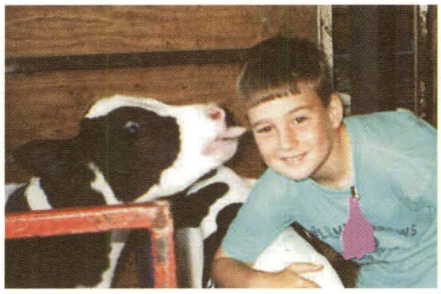
A grower can plant nitrogen-producing legumes, like clover or alfalfa, in between small-grain plants. The legumes add fertility, can help to control weeds, and can be cut separately after the small grain has been harvested.

Two crops in the space of one, with no chemicals: it's another way small farms are learning to be more profitable.

There's also another study that's likely to cause a stir at morning coffee.

Using 10 years of data from a study at the Elwell farm, University Professor Kent Olson shows that organic farming has equal or higher net profitability than conventional farming on a per-acre basis.

More than 15 different field crops are planted each year on Elwell's 120 organic acres. The University's Southwest Reseach and Outreach Center can be seen nearby.



Farmhands in the city

Twin City Farm Adventures is a weeklong day camp for urban kids who want to learn more about farm life. The camp—sponsored by the University and friends—brings K–8th graders up close to farm animals while teaching fun, farm-animal facts, the history of farms and ranches, plus food production and processing.

It all takes place in a safe, friendly, and controlled atmosphere on campus, with excursions to metropolitan farms.

Something in the air

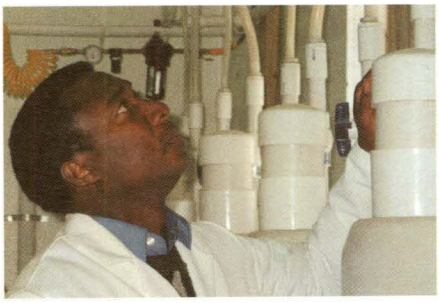
Two new University researchers are trying to answer an age-old problem: how to reduce pig odor.

Sam Baidoo and Jun Zhu have just started to answer questions in a state-of-the-art swine facility in Waseca.

Baidoo is a nutritionist who is trying to learn how diet can improve the odor of pig manure—how it affects the air. Zhu is a biosystems and agricultural engineer who is looking at the waste management aspect of manure—how it affects the soil and water.

The new 600-sow facility allows them to explore other valuable questions over time.

More economical feeds, alternative feeding methods, and manure processing methods will be explored. Differences between free-range and conventionally housed sows will also be evaluated.



Sam Baidoo is part of a team researching swine odor and waste issues at the Southern Research and Outreach Center in Waseca.

Mum's the word

This fall University horticulturists will introduce a new Minnesota-hardy mum called Autumn Gold. The maroon and gold perennial was started 12 years ago as a cross between a garden variety chrysanthemum and a wild species from Japan.

Because the researchers were looking for an extremely hardy flower, the plants that bloomed earliest were selected initially. Then, in subsequent years, plants that kept blooming long after the first frost were selected. Later the colors were developed.

Part of the reason the development has taken so many years is that the flower was tested in different soils and climates, including the five research stations in Minnesota, plus a number of sites around the world.

The plant, which grows in a shrub-like form, is about three to four feet tall and five to seven feet in diameter at maturity, with flowers filling all the way to the ground. A single plant can produce an amazing 5,000 to 7,000 flowers from mid-August to October.

Autumn Gold will be marketed nationally by Ball Horticulture Company under the My Favorite brand. The University expects that the mum will generate significant royalties.

"Nearly all of our undergraduates have multiple job offers."

—Chuck Muscoplat
Dean of College of Agricultural, Food, and Environmental Sciences

Predicting winners will be as simple as D-N-A.

Dean Compart and family members form one of the most successful hog-breeding supply companies in the country, Compart's Boar Store. At the beginning of this year their two favorite boars, Maroon and Gold, were ranked as the #1 and #3 best boars in the nation. In simple terms, the boars' genetic offspring grew fast and had the right amount of fat for today's market.

But the knack Compart and company have for picking the best of the litter will get a boost in the future. They will be assisted by a new gene study conducted by Compart's alma mater, the University of Minnesota. The project is out to establish a genetic fingerprint used to select pigs with characteristics that will produce good-eating meat in their offspring to meet consumer demand.

Genetic tissue samples and meat samples have been taken from more than 4,000 pigs in five different swine operations in the Upper Midwest, including many from Compart's operation.

When the genotyping is complete, a breeding supplier will be able to send in a simple blood test from a new pig to see whether it will be a future Maroon or Gold.

REINVENTING AGRICULTURE

WE'LL BE ON THE FARM, AND...

The University of Minnesota has always been part of rural Minnesota, but as demographics change, so does our role.

Tillage practices, land compaction, over-application of fertilizer—these are still issues that concern us, because the same amount of land is being farmed. But our focus has widened.

We take a systems approach to agriculture.

We now look at the vitality of the entire agricultural community. What makes us unique today is that we look at every dimension of agriculture, including rural entrepreneurship, water pollution, global warming, drainage, alternative farm choices, global trade, and food preservation, safety, and marketing.

We even look at rural life as it interacts with urban life—learning how to control swine odor, for example. And we have some new areas of expertise that we've added, including turf management and horticulture.

Another change is evident. Agriculture and food production is no longer a male-dominated world. This year 65 percent of our freshman class were women.

That's because we've adapted, reallocated, and reinvented ourselves.

Today a career in agriculture means food for human health, agricultural production systems, community vitality in rural Minnesota, and our environmental quality.

What hasn't changed is that we continue to teach it, research it, and bring it to the state through our many outreach programs.

WHAT NEXT ?

Getting a good start with research

Students at the University are encouraged to conduct an original research project under the guidance of a professor. Or, if students choose to assist a work in progress, they are shown how to carve out a unique piece of the research that belongs to them—not just do menial work in a laboratory.

It gives the student a chance to receive one-on-one mentoring. It also represents a challenge to write and organize the results into a presentation—essential skills in any profession.

Taking the ethical route

All undergraduate students take a course that meets a citizenship and public ethics requirement.

Media students, who may be confronted with tough choices, are taught to use today's technology in an ethical way.

What attracts students to the U

The current freshman class majoring in biological science has the best credentials ever: on average they were in the 92nd percentile of their high school graduating class.

Part of the draw is that research faculty also teach undergraduates. This is true all across the University.

You don't have to be a graduate or postdoctoral student to grab some knowledge from a person who may be on the brink of an earthshaking discovery.

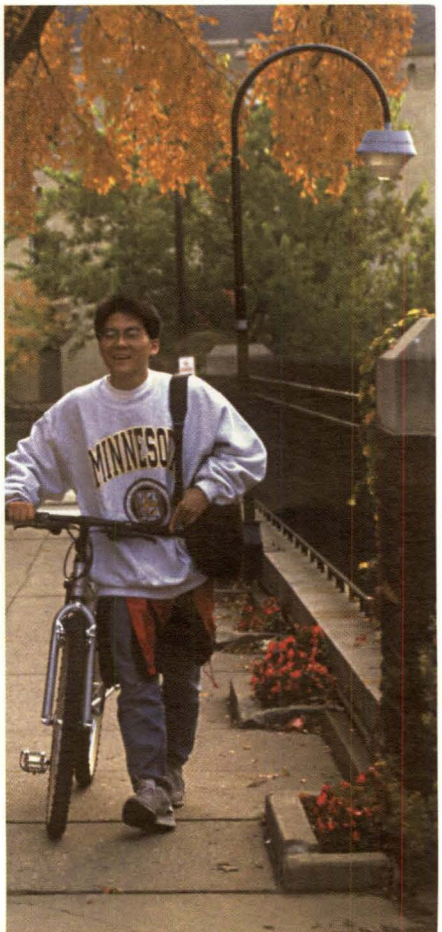
Advanced direction

The College of Liberal Arts has restructured the way it advises students. One way is to use technology more effectively, allowing advisers to be more accessible and more responsive to a student's needs. The idea is to help students understand their career goals and in turn advise them to select courses that are useful.

First trip out of the box

Every first-year student should participate in a freshman seminar. Freshman biology students go to Itasca Outreach Center for a short, intensive introduction to biology, providing small-group, academically rigorous interaction with senior faculty in this 30,000 acres of protected wilderness.

The students experience firsthand the energy, creativity, and intellectual inquiry at the heart of a research institution. For young biology majors, it's a phenomenal way to get their feet wet.



Going abroad

The ultimate way to see a bigger picture is to leave the country. Students gain international experience while improving language skills and becoming more independent and flexible in their decision making.

ON THE INTERDISCIPLINARY DESIGN MINOR

"This is a very good idea. It's created a population of undergraduates who may never go on to take a graduate degree in architecture or graphic design; but they at least emerge from their philosophy, biology, or other major with an appreciation of design at some level. And one day, they may find themselves in a position to advocate for design, or even commission it as a patron."

—Janet Abrams
Director, Design Institute

NEW UNDERGRADUATE STRATEGIES

CHANGING GEARS

We've been watching undergraduates to see why some succeed better than others. What we've learned has changed our approach in a few, but very important, ways.

First, we want all freshmen to take a seminar. The seminars are designed to prompt students to ask questions and arrive at their own conclusions—not just take notes and take a test.

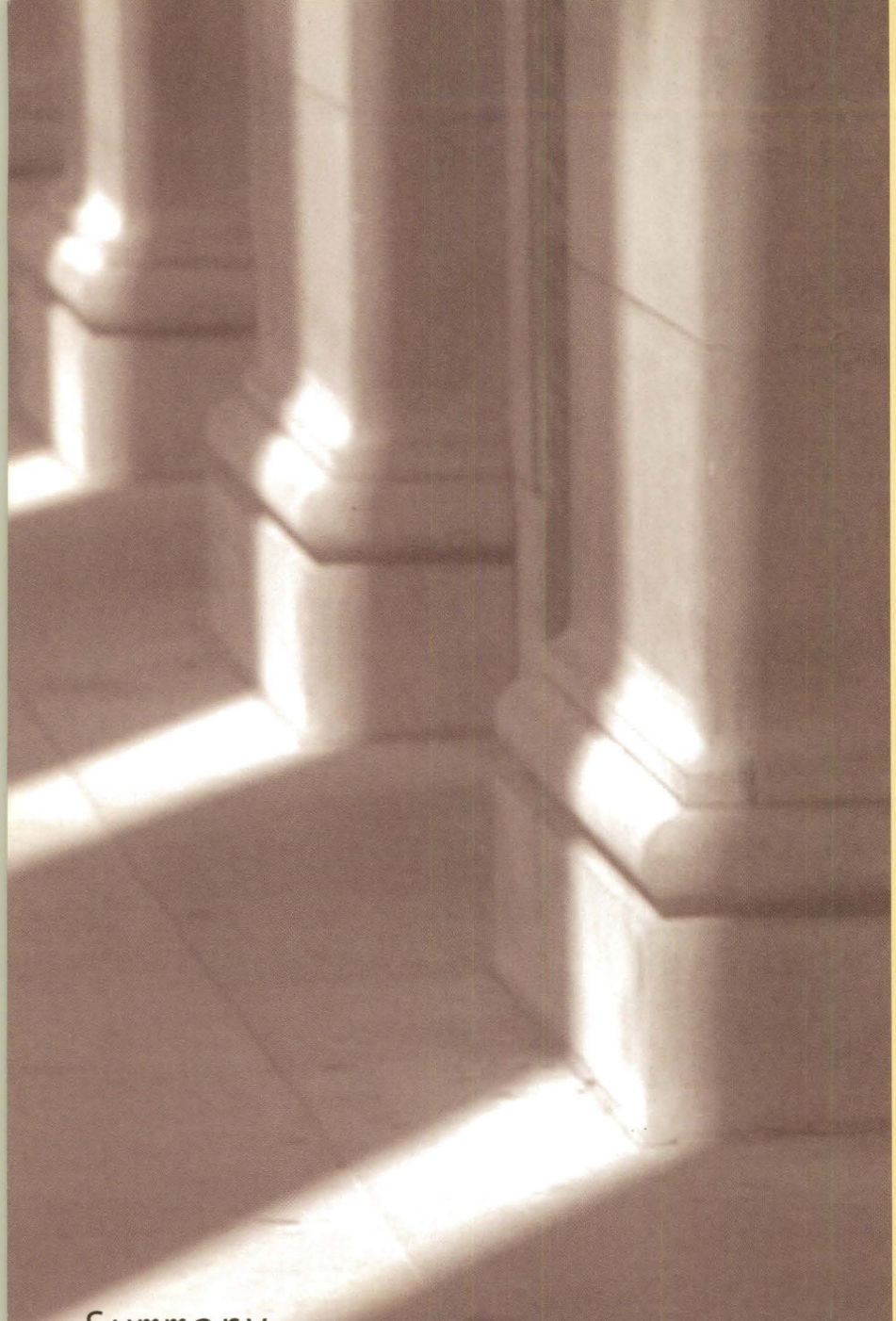
Second, the University sees writing as a critical life skill and provides many writing-intensive courses. These courses are available in many majors and involve writing papers that must go through a rewrite process. Teaching assistants are often brought in to lend writing advice.

Third, more than a dozen interdisciplinary minors have been established to help students broaden their perspectives and deepen their capabilities. Programs have already been established in information technology, global studies, leadership development, and design—with plans to expand into disability studies, new media, and nonprofit management.

Fourth, residential learning is an educational model in which students who have a common academic goal—such as business management, language study, or research—live together in the same building. The students' common focus, and special faculty planning, make this a productive and reassuring environment. More than 1,000 students currently live in academically focused housing.

Our goal is to send students into the world brimming with confidence, knowing they've geared up for their career correctly—by going through all the right steps and acquiring all the right tools.

WHAT NEXT ?



Summary

- $18.6 million 1998 state supplemental funds
- $9.4 million Internally reallocated funds
- $45.0 million External gifts and grants
- $201.0 million Capital grants and investments
- $87.5 million New faculty positions

Current

- 1,875 Students in freshman seminars
- 1,000+ Students who study abroad
- 440 Undergrad students engaged in faculty research
- 1,000 Students living in focused learning communities
- 87% Students who would "choose the U again"

For more information visit www.evpp.umn.edu/evpp/init.htm.

MINNESOTA ACADEMIC INITIATIVES

COME WITH US.

The University's success in creating innovation and breaking new ground through research will continue to be important for our state's economic growth.

The University of Minnesota's academic initiatives first funded nearly three years ago are at the heart of this promise.

Money appropriated by the state legislature has already brought star-quality researchers and teachers to our community.

New state-of-the-art facilities are in use, or on the verge of completion.

We're beginning to see new students with phenomenal high school credentials.

The University is gearing up to advance the genomics race—in hard science and ethics—while continuing to reveal promising medical breakthroughs for AIDS, diabetes, and strokes.

What has been most impressive is the outpouring of financial support that has come our way following the initial boost from the Minnesota legislature.

With new spaces, equipment, and vital faculty in place, the University has a new aura in the minds of donors and funding organizations.

In the past two years we've gained an additional $45 million in new money by leveraging the $18.6 million received from the state.

It's an investment that is obviously working. And working is what we do best.

Come along and see what happens next.

150 YEARS
1851 2001

UNIVERSITY OF MINNESOTA