building a community of innovation and entrepreneurship

Message from the Executive Director

Innovation is the engine of economic development. New ideas drive business growth and improvements in our quality of life. In this age of increasing global competition, major research universities such as Michigan are being challenged as never before to increase the transfer of knowledge and technology beyond campus boundaries. I’m proud to say that in Fiscal Year 2005, U-M Tech Transfer met that challenge—continuing our steady progress in transferring a record number of innovative technologies to the marketplace.

In FY 2005, we worked with U-M researchers on 287 new invention disclosures, completed 86 agreements with business partners—including 7 promising startups—and received $16.7 million in revenue, much of which is being reinvested in education and research. More importantly, our discoveries and new startups are having a major impact in the world, providing benefits and advantages to many people in many ways.

Last February, in a keynote address to the annual meeting of the Association of University Technology Managers (AUTM), U-M President Mary Sue Coleman issued a challenge for universities to facilitate innovation by transferring new discoveries and knowledge into the business sector, broadly and quickly. Taking up President Coleman’s challenge, U-M Tech Transfer is working to help create a community of innovators.

In the spring of 2005, as a bold first step, we worked with University leadership to launch Ann Arbor SPARK—a public-private partnership designed to accelerate the number of high-tech companies and jobs being created in the greater Ann Arbor region. You’ll find more information about Ann Arbor SPARK later in this report.

There are exciting and challenging days ahead for technology transfer at the University of Michigan. Working closely with academic, business and community leaders such as you, we will continue to bring the innovation, creativity and energy of our great University to the market. We invite you to join us in our quest.

Kenneth Nisbet
Executive Director
U-M Technology Transfer
technology transfer is the process by which research discoveries and inventions are transformed into valuable products and services that benefit society.

U-M Tech Transfer is comprised of specialists in licensing, new business development and law—all focused on providing professional, responsive services to our clients and partners. We work with inventors in every phase of technology transfer, from initial consultations and technology assessments in marketing, licensing and startup formation. We also aggressively cultivate a network of business partners to assist us in commercializing technology, building businesses and supplying capital and other resources.

We view our role as that of “innovation facilitators” who encourage creativity, supply and link resources, and guide discoveries to a successful market deployment. In these roles, we take pride in supporting the University’s mission by:

- Increasing the likelihood that new discoveries will provide tangible benefits to the general public.
- Helping to create a venue that attracts, develops and retains the very best students, faculty and researchers.
- Improving the flow of research dollars and resources to the academic community.
- Enriching the educational experience through student internship programs and other hands-on learning activities.
- Leveraging business partnerships to stimulate the regional economy.
- Enhancing the reputation and stature of the University.

“Our success in technology transfer reflects the investments and dedication of the entire University community. We take special pride in our contributions to the regional economy through new business startups, enhanced research relationships and employment opportunities for our students.”

— Fawwaz T. Ulaby
Vice President for Research
University of Michigan
Innovate or bust

On February 3, 2005, University of Michigan President Mary Sue Coleman presented a keynote address to the annual meeting of the Association of University Technology Managers (AUTM). Her topic was the role of American universities and university technology transfer in America’s future competitiveness. In her remarks, she challenged the audience to set a new course for moving knowledge and discoveries into the wider world. Here we offer some excerpts from that address—“Innovate or Bust”: 

I have a single message for all of us this morning: America’s wake up call is now.

Throughout our history we have defined our nation as the land of opportunity and exploration. We are the very icons of forward momentum, social progress and economic success.

But all of that is at risk. The rest of the world is catching up.

The race to translate research and technology into business opportunity is hotly competitive... We are no longer in that privileged position as the unchallenged powerhouse of productivity and ingenuity.

Along with education, the most important university contribution to economic development in the years ahead will be found in our research enterprises. Here’s why your role in tech transfer is so vital:

- Remarkable innovation is fostered when our faculty research intersects with a strong university commitment to disseminate that information broadly. Of course, revenue generation serves as an incentive. But first and foremost, tech transfer must serve our core mission: sharing ideas and innovations in the service of society’s wellbeing.

- All of you play a powerful role in our ability to make good on that promise. You help us make the world better, healthier, safer and more economically robust.

- Universities bring ideas to life. But it is technology transfer that gives them wings and lets them fly.

“Universities will be called on to be major players in economic development in the years ahead, bringing new challenges, new partnerships and new opportunities for us all.”

—U-M President Mary Sue Coleman addressing the 2005 Annual Meeting of the Association of University Technology Managers (AUTM)
“2005 has seen the successful IPO of a U-M startup company, Intralase, and another gain in the number of agreements with companies partnering with us to commercialize our technologies. With increasing numbers of commercialization partners, we’re helping more U-M technologies exert a positive impact on people’s lives.”

—Robin Rasor
Director of Licensing
U-M Office of Technology Transfer
THE YEAR IN REVIEW

Invention Disclosures

2005 Invention Disclosures

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<thead>
<tr>
<th>Medical</th>
<th>4</th>
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</thead>
<tbody>
<tr>
<td>Dermatology</td>
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<tr>
<td>Human Genetics</td>
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<td>2%</td>
</tr>
<tr>
<td>Internal Medicine</td>
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<td>37%</td>
</tr>
<tr>
<td>Mental Health</td>
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</tr>
<tr>
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</tr>
<tr>
<td>Ophthalmology</td>
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<td>5%</td>
</tr>
<tr>
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<tr>
<td>Pediatrics</td>
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</tr>
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<tr>
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<tr>
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ENGINEERING

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<tr>
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<tr>
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<tr>
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<tr>
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OTHER

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<tbody>
<tr>
<td>Dentistry</td>
<td>9</td>
<td>13%</td>
</tr>
<tr>
<td>Literature, Science and Arts</td>
<td>42</td>
<td>63%</td>
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<td>Music</td>
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<td>3%</td>
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<tr>
<td>Pharmacy</td>
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<tr>
<td>Public Health</td>
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<tr>
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<td>1.5%</td>
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<tr>
<td>Transportation Research (UMTRI)</td>
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<td>3%</td>
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<tr>
<td>U-M Dearborn</td>
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<tr>
<td>U-M Hospital</td>
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License Agreements

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<td>Other</td>
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<tr>
<td>Total</td>
<td>542</td>
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License Revenue (in millions of dollars)

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<th>Medical</th>
<th>237</th>
<th>38%</th>
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<tbody>
<tr>
<td>Other</td>
<td>182</td>
<td>28%</td>
</tr>
<tr>
<td>Total</td>
<td>419</td>
<td>100%</td>
</tr>
</tbody>
</table>

THE START-UP CLASS OF 2005

• McCreadie Group — Software for pharmacy applications
• Accuri Instruments — Research instruments measuring cell characteristics
• CF Imaging Solutions — Software for medical image visualization and quantification
• Mayaterials — Multifunctional organic/inorganic nano-composites for coatings and thin film technologies
• Xoran — Compact CT scanners for medical specialists
• ePoint — Detection of explosives and illicit contraband through the use of neutron backscatter technology
• ProSense — Multi-threat spectroscopic sensors to detect radiological and other environmental conditions
Disclosures listed by departments of lead inventors

Aerospace Engineering
- Method for Detecting/Indicating Poroelastic Response

Art Architecture
- A Reusable Microbial Fuel Cell
- Methods and Apparatus for Combustion in a Biphasic Reactor

Biological & Materials Science
- A Biodegradable Implant for Biomedical Engineering
- A CDNA Encoding Developmental Biology
- A Method of Producing Porous Materials
- A Particle-Containing Crosslinked Porous Material for Biologic & Materials Science

Biomedical Engineering
- Anesthesiology
- Rayleigh-Taylor Assisted Cracking Fabrication of Recon

Chemical & Materials Science
- Crosslinked Porous Material
- Particle-Containing Crosslinked Porous Material
- Porous Materials

Biological Chemistry
- Analysis of Free Zinc Ion for Intravascular Devices

Medical Engineering
- A Novel Reconfigurable Manufacturing System
- An Improved Method to Reduce Apparatus Size

Clinical Sciences
- Farnesyl Transferase Inhibitors
- Method and Composition for Use in Prevention of Acne Vulgaris

Emerging Medicine
- Dual-Band Reconfigurable Antenna
- A Method to Control the Register of Information
- A Method to Reduce Apparatus Size

Electrical Engineering
- A Method and Apparatus for Material and Component Screening
- A Novel, Fast Iterative Field-Corrected Imaging Device

Electronic Engineering
- A Memory System Having Fast and Tolerant SRAM Architecture
- A New Process for the Production of Highly Efficient Devices

Human Genetics
- Intron Inversion in Hemoglobinopathies

Industrial & Operations Engineering
- A Method of Examining Manufacturing Process and its Use in the Product Marketing

Internal Medicine
- A Novel Method for Detecting/Indicating Poroelastic Response

Pharmacology
- A Software Method for Conversion of Non-Invasive Measurements
- A Method for Detecting/Indicating Poroelastic Response

Physical Sciences
- A Novel Reconfigurable Manufacturing System
- An Improved Method to Reduce Apparatus Size

Protein Microarrays
- A Method for Detecting/Indicating Poroelastic Response

Reconfigurable Manufacturing System
- An Improved Method to Reduce Apparatus Size

Human Medicine
- A Novel Reconfigurable Manufacturing System
- An Improved Method to Reduce Apparatus Size
Two years ago, startup veteran Mike Crowley was looking for an MBA program that offered him not only a premier education but access to top-flight researchers and new business opportunities. So, while other applicants were contacting business school admission officers, Mike was calling university tech transfer departments.

“For me, U-M Tech Transfer was the deciding factor,” he says. “They were by far the most accommodating of all the technology transfer groups I approached.” Convinced that U-M was brimming with opportunities, he enrolled in the Stephen M. Ross School of Business.

To jump-start his quest, Crowley co-founded the Nanotech Commercialization Group (NCG), a team of business student consultants. It was through NCG that Mike did volunteer research projects for Tech Transfer and ultimately met his future business partners: U-M Professor of Bio-medical Engineering Shuichi Takayama and U-M Associate Professor of Obstetrics and Gynecology Gary Smith, who also directs a fertility counseling group within the U-M Reproductive Sciences Program. The basis of their research was an ingenious microfluidic device developed by engineering graduate student Wei Gu. With the addition of Braille-reading technology and nano-channels, the scientists were able to create tiny valves and pumps ideally suited for sorting sperm prior to *in vitro* fertilization.

While doing market research for Takayama and Smith, Crowley turned to U-M TechTransfer’s TechStart program to explore new applications for the technology (see p. 12 for more on TechStart). He and his TechStart cohorts discovered that the device could help fertilization clinics solve their biggest single challenge: selecting the healthiest embryos for transfer.

At summer’s end, Crowley initiated discussions with Smith and Takayama to form a business. He notes that Tech Transfer has been, and continues to be, extremely helpful in mediating, providing guidance, identifying funding sources and incubating the relationship. Five months later, in January of 2005, he became president of Incept BioSystems. The three have since optioned the technology and are presently working to bring their first products to market.

The three partners credit the entrepreneurial environment at the University of Michigan for much of their success. “At Michigan,” says Crowley, “there’s enough support in enough places to keep pushing an enterprise like ours forward.”
In 2000, Arbor Networks co-founders Dr. Farnam Jahanian and computer engineering doctoral student G. Robert Malan were hopeful that their unique network security appliance—developed in the University of Michigan Software Systems Lab—would make a mark on the world of cyber security. Today, their company has over 125 employees, projected annual revenues exceeding $40 million and major business centers in Ann Arbor, Lexington (MA), Washington (DC), London and Beijing. With over 70 percent market share, their security solutions to help clients detect, back trace and mitigate large-scale network attacks are deployed in the backbones of all the major service provider and Multi-Service Operator (MSO) networks across the globe, including Asia Netcom, AT&T, British Telecom, EarthLink, MCI and Sprint. And their research division, based in Ann Arbor, has added over 50 jobs and an estimated $20 million to the local economy.

“From day one, we were determined to keep our R&D group here in Ann Arbor,” Jahanian explains. “In fact, that provision was written into the agreement we negotiated with investors. We started with ten individuals and since then have recruited aggressively from the University of Michigan and major technical centers nationwide.” Jahanian notes that the company has received tremendous support from the local community, and that prospective employees are attracted to Ann Arbor’s overall quality of life.

In June of 2005, U-M Professor of Electrical Engineering and Computer Science Farnam Jahanian, co-founder of Arbor Networks, accepted the first-ever Governor’s University Award for Commercialization Excellence (ACE). Jahanian (pictured left) with U-M President Mary Sue Coleman and Lt. Governor John D. Cherry) was the top contender among universities with annual research expenditures exceeding $500 million. ACE is intended to recognize and encourage faculty entrepreneurship.

“Farnam Jahanian has designed valuable security products for the computer and communications industry, created well-paying, rewarding jobs for dozens of Michigan engineering graduates and helped grow the local Ann Arbor economy in the process. It’s a model that we’d love to keep replicating.”

—Dan Broderick
Director, Engineering-OTTIC
U-M Office of Technology Transfer
In 2002, the year it was founded, Molecular Therapeutics, Inc. (MRx) operated with a staff of 4 and generated minimal profits. Today, the company has 24 employees, annual revenues approaching $5 million and 3 subsidiaries. That kind of growth is remarkable for any start-up. What makes it even more remarkable is the fact that Molecular Therapeutics has accomplished all this without a single cent of venture capital funding.

It was MRx chairman and president, Dr. Prasad Sunkara, who initially suggested the go-it-alone strategy to his two partners and company co-founders Dr. Brian D. Ross, U-M professor of radiology and professor of biological chemistry, and Dr. Al Rehemtulla, associate professor of radiation oncology and radiology at U-M.

Currently, MRx—the parent company—is engaged in Phase Two studies on MRx1024, a small-molecule compound that holds large promise for cancer patients. In clinical trials, MRx1024 appears to protect normal cells from damage during chemotherapy and radiation, yet does not interfere with anti-tumor activity in cancerous cells. As a result, it prevents a number of side effects of cancer treatment such as oral mucositis, hearing loss and alopecia. The company is also continuing to develop nanosomes, a nanoparticle technology capable of delivering therapeutic agents directly to tumor cells, thereby reducing toxicity and damage to other body tissues. The patented nanoparticle technology is licensed from the University of Michigan.

To help support its R&D efforts, MRx has spun off numerous subsidiaries that offer everything from contract-based oncology assessments and preclinical evaluations of anti-tumor agents to compounds, magnets and equipment for scientists engaged in animal pharmacology. The company is also partnering with Cedara Software Corporation to develop the first turnkey workstation designed to help radiation and medical oncologists manage therapy for cancer patients.

“In 2002, a competitively-awarded $1 million loan from the Life Sciences Corridor—now the Tri-Corridor program—enabled Molecular Therapeutics to purchase an MRI unit and subsequently launch a new suite of services. Revenues are being used to support new product development, and MRx has paid back the initial loan, making those funds available once more to other promising early-stage Michigan companies.”

—Karen Studer-Tabeler
Associate Director
New Business Development
U-M Office of Technology Transfer
often, in the realm of scientific discovery, the biggest problem facing researchers isn’t too little information but rather too much—in too many formats and too many places. It was this conundrum that led U-M Professor of Pathology and Urology Arul Chinnaiyan and M.D./Ph.D. graduate student Dan Rhodes to develop Oncomine, a DNA microarray database now being used in 40 countries by more than 5,000 cancer researchers.

In the fall of 2001, Chinnaiyan and Rhodes began collecting data on prostate cancer and devising methods for analyzing data sets. Their goal was to make vast amounts of public-domain gene expression data readily available to the average biologist. In the process, they discovered two new genetic biomarkers involved in the development and progression of prostate cancer. They then extended their data collection model to all human tumors.

As Rhodes explains, “In its raw form, gene expression data isn’t really useful to the majority of biologists. We unify the data, normalize it, analyze it, and present it in such a way that any researcher with access to the internet can figure out what their gene of interest is doing across a collection of 10,000 or so independent tumor samples.”

At major pharmaceutical companies such as Amgen, Novartis and Celera, which have licensed the technology, Oncomine enables scientists to determine whether their target genes are activated in specific cancer tumors and to identify other disease populations that might merit investigation. The database, now in its third version, is available free of charge to researchers at academic institutions.

Initial R&D funding for Oncomine was provided by the U-M Comprehensive Cancer Center and the Department of Pathology. U-M Tech Transfer worked closely with the two researchers to facilitate the commercial licensing agreements.

Both Chinnaiyan (left) and Rhodes (right) can testify to the scientific value of their creation. In the fall of 2005, the two will announce what Chinnaiyan describes as “the identification of a new causal agent in prostate cancer—a discovery, he notes, that would have been impossible without Oncomine.”

“Securing patent or other intellectual property protection is often essential to facilitate commercialization. Our goal is to be creative and efficient in obtaining the most appropriate protection that adds value to partner agreements, such as those for Oncomine.”

—Rick Brandon
Assistant General Counsel
U-M Office of Technology Transfer
When graduate student Trushar Naik applied to the U-M TechStart program, he had high expectations. As a dual-degree MBA/MD student, he was interested in assisting with the business development of university-based innovations—evaluating concept technologies, devising entry positioning strategies and searching out potential markets and funding sources. But he was also hoping that his projects might have the potential of offering real benefits to patients.

As part of the TechStart team assigned to BioAvrion, a startup project with its roots in the U-M Kellogg Eye Center, Naik found exactly what he was looking for. Along with MBA student Jay Ng and law student Craig Komanecki, Naik was given the challenge of searching out promising applications and markets for the RetinoMetaboScope, a unique ophthalmoscope able to measure retinal cell metabolism.

Developed by Dr. Victor M. Elner and Dr. Howard R. Petty, both professors of ophthalmology and visual sciences at the U-M Medical School’s Kellogg Eye Center, the technology offers a completely new method for evaluating eye health. As Naik explains, “Until now, physicians have diagnosed and monitored diseases such as glaucoma and macular degeneration by looking at the physical characteristics of the eye and measuring visual acuity. This, of course, makes it difficult to detect...”
minute, short-term changes. However, Drs. Elner and Petty discovered that unhealthy retinal cells emit metabolites with altered electrochemical energies. By measuring those light particles, their scope can track even the smallest changes and revolutionize the way eye disease is monitored.”

Naik and his teammates began exploring potential applications for the technology. Their final recommendation: market the scope as a way of speeding up drug trials by quickly and accurately assessing the impact of experimental compounds on cells within the eye and then, leveraging that success, explore the roll-out of a diagnostic tool.

Observing the success of this project, TechStart Leader Mark Maynard points out that “TechStart exists to give our students real-world experience in commercializing early-stage technologies. Perhaps more importantly, however, it gives our researchers access to dedicated, top-notch talent with backgrounds in relevant industries. The process also serves as an introduction to Ann Arbor’s entrepreneurial community, giving some of our most promising students an opportunity to build networks which have led to local opportunities after graduation.”

After several years working as a software architect designing computer interfaces in California, U-M-trained engineer Linda Sanchez and her husband returned to Michigan to be near their extended families. Now pursuing graduate studies in Bio-medical Engineering, Linda has set a new long-term goal for herself—to develop medical devices and one day launch her own company.

Through TechStart, Sanchez was able to gain practical experience in the commercialization of technology. She worked on three separate projects: identifying potential applications for a U-M-developed technology for semiconductor manufacturing and testing; creating a market entry plan for a company with origins in the Departments of Surgery and Biomedical Engineering; exploring business opportunities for ClinfoTracker, a software program designed to enable primary care clinics to provide high quality, effective management for chronic diseases and preventive care.

“TechStart helped me in many areas,” she notes. “I gained contacts in the local entrepreneurial scene, learned more about the University’s biomedical research and became involved in the process of creating early-stage venture companies.”

“Most faculty innovators, like ourselves, are not expert in market research and analysis, nor do we have the time. The TechStart students spent time with us up front, learning about the product we’d developed. They kept in close contact throughout their work, and left us with a very professional market analysis and roadmap for getting our software into the commercial space. This was a positive experience in every respect for me and my faculty colleagues on the ClinfoTracker team!”

Donald Nease, MD
Associate Professor, U-M Department of Family Medicine, and co-creator of ClinfoTracker
Rick Snyder remembers the day when the concept of Ann Arbor SPARK originated. A successful venture capitalist and former President and COO of Gateway, Inc., Snyder serves on the National Advisory Board of U-M Tech Transfer. “The Board was discussing ways to encourage more technology transfer in the greater Ann Arbor area,” he recalls, “and we kept coming back to the role of the community. We knew that U-M Tech Transfer had grown to be one of the top ten organizations of its kind in the country, but we wanted to set our sights higher.”

That seminal discussion led to months of research, benchmarking and analysis of other leading regions of innovation. “Everyone told us the same thing,” says Snyder. “If you want to be great, then invest in your environment and enlist the entire community in a focused effort to encourage innovation-focused economic development.”

The concept was to enhance the strong foundation already in place through a process of convergence, focusing on five core areas: Business Acceleration, Early-Stage Funding, Talent Development, Business Outreach and Events/Marketing. Within a year, and with seed funding from the University of Michigan, Ann Arbor SPARK was officially underway.

Nearly two dozen organizations—including Eastern Michigan University, Pfizer Inc., the Dow Foundation, and Washtenaw County Government—joined U-M as partners of Ann Arbor SPARK. As partners, each provided financial support, talent and time. As a founding partner, the University of Michigan pledged up to $1 million over five years.

U-M Associate Vice President for Research Marvin Parnes sees this collaboration as a fundamental strength. “The University of Michigan is, in many ways, the engine of innovation for this region,” he notes. “But innovation on this scale has to involve public and private sectors, academia and business, big players and small.”

Today, Ann Arbor SPARK is building its infrastructure, expanding its partnership base, and recruiting resources. As Snyder explains, “Innovation-focused economic development is really a 20-year effort. We’ve started strong, and we intend to finish strong.”
National Advisory Board

Our U-M Tech Transfer National Advisory Board (NAB) has been an invaluable resource, guiding our plans and activities. Correctly recognizing regional infrastructure and resource enhancements as vital components for continued progress in technology transfer, it was the NAB that created the initial impetus for Ann Arbor SPARK (see story on p. 14). Drawing on their professional experiences and connections, this diverse set of advisors is helping us enhance our capabilities and plan for the future.

In 2005, members of the NAB include:

Thomas Bumol
Vice President
Research Technologies and Proteins
Eli Lilly

John Denniston
Chief Operating Officer
Kleiner, Perkins, Caufield & Byers

Richard Douglas
Sr. VP Corp. Development
Genzyme

Jan Garfinkle
Managing Partner
Arboretum Ventures

Thomas Kinneer
Executive Director
Zell Lurie Institute for Entrepreneurial Studies

Ed Pagani
Senior Director, Strategic Alliances
Pfizer, Inc.

Ken Pelowski
Managing Director
Pinnacles Ventures, LLC

Thomas Porter
Trillium Ventures

Doug Rothwell
President
Detroit Renaissance

Chuck Salley
Chief Executive Officer
CS Ventures

Rick Snyder
Chief Executive Officer
Arclabs

Michael Staebler
Partner
Pepper Hamilton LLP

Carl Sjorenfeldt
Battery Ventures

Jack Turner
Associate Director
MIT, Technology Licensing Office

Tom Washing
Sequel Venture Partners

Supporting Innovation Organizations

U-M Tech Transfer plays a vital role in many regional, state and national organizations involved in technology transfer and innovation. Our staff members serve on boards and committees of organizations such as:

- Ann Arbor IT Zone
- Ann Arbor SPARK
- Ann Arbor Area Chamber of Commerce
- Association of University Technology Managers
- MichBio
- Midwest Research University Network
- New Enterprise Forum
- Washtenaw Development Council
- Washtenaw Wireless

In furthering the University’s mission of outreach, U-M Tech Transfer staff members—individually and collectively—lead their support to various community groups and organizations. One example is our holiday gift collection for the Ann Arbor Ronald McDonald House, a “home-away-from-home” for the families of seriously ill children. Another was our day of service with Habitat for Humanity, a time when tech transfer specialists learned a “whole new set of skills” as part of our local Jimmy Carter Work Project.
The Tech Transfer Team

1. Wesley Huffstutter
2. Sally Ingalls
3. Sandra Moing
4. Robin Rasor
5. Andrew McColm
6. Linda Hamlin
7. Karen Studer-Rabeler
8. Tina Bissell
9. Rick Brandon
10. Ken Nisbet
11. Matt Bell
12. Mark Maynard
13. Debbie Watkins
14. Doug Hockett
15. Dan Broderick
16. David Ritchie
17. Mike Hallman
18. Greg Choiniere
19. Dennis Linder
20. Paul Graves
21. Lindsey Schek