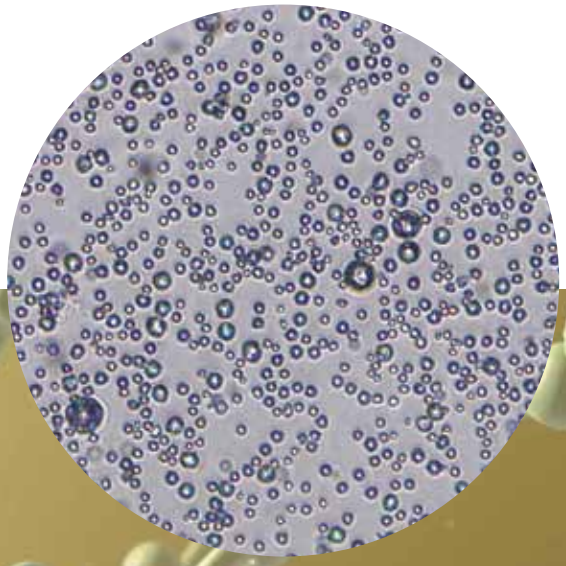
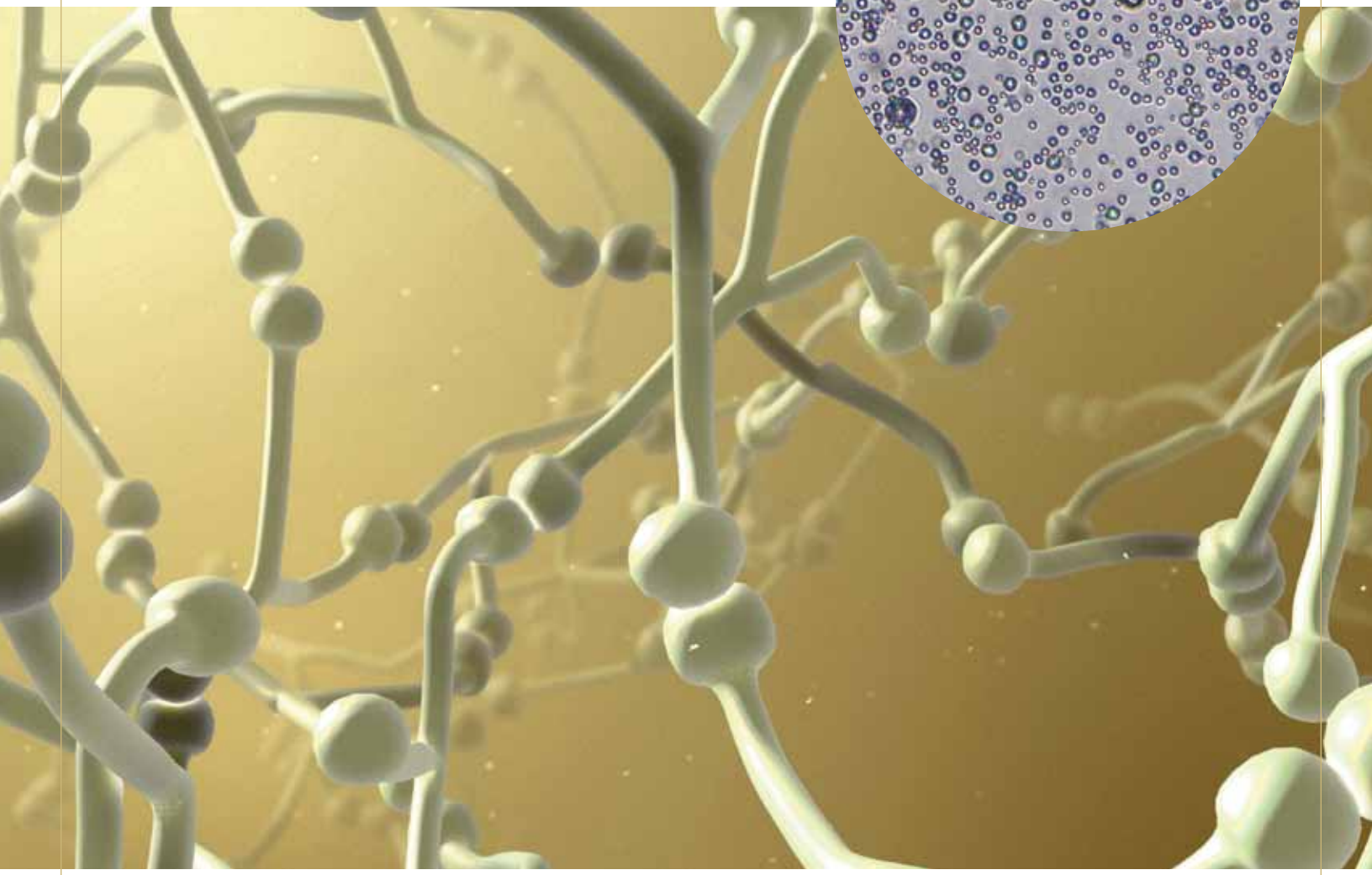
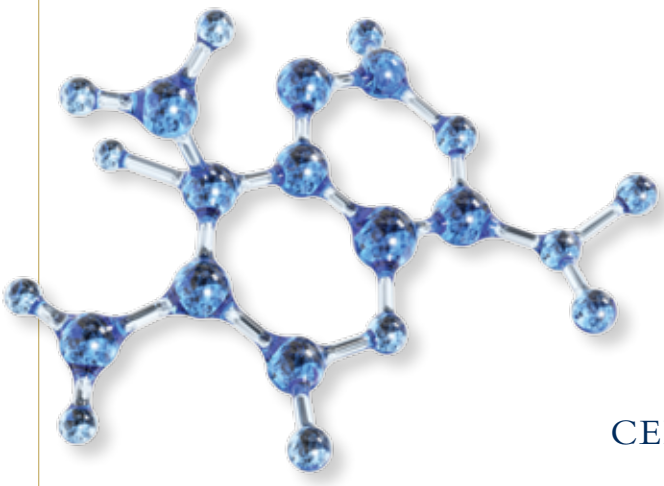
UNIVERSITY OF PITTSBURGH
OFFICE OF TECHNOLOGY MANAGEMENT







2011 ANNUAL REPORT

CELEBRATING 15 YEARS OF INNOVATION

Celebrating 15 Years

Taking the Long and Persevering Road to Commercialization Success

Fifteen years ago, the University of Pittsburgh formalized its technology commercialization efforts with the establishment of the Office of Technology Management (OTM). That year, OTM convinced research faculty members to submit 46 invention disclosures for commercial consideration of their innovations—a humble beginning, perhaps, for a university that since has emerged internationally as a research powerhouse. But it was just a beginning.

Thanks to several evolutions of infrastructure development, customer service and marketing strategies, lots of educational programs, and a changing academic culture, Pitt Innovators since then have submitted another 2,276 invention disclosures, received 441 U.S. patents for their innovations, and helped OTM to launch 80 new companies.

I would describe our efforts to lay the groundwork for successful technology commercialization at Pitt—and the Pitt community's change in culture to embrace such efforts—as nothing short of transformational. But, from our perspective, we're really just getting started.

I'll never forget 2006, for instance, when we jumped from 165 invention disclosures submitted the previous year to 246—a huge milestone in our transformation. To us, that demonstrated a dramatic new level of success in our efforts to actively engage more Pitt researchers in the technology commercialization process. That also meant lots of additional innovations to cultivate and mold into licensable technologies and start-up companies—exciting for us, but full of new challenges.

And it has meant continued infrastructure building to support such growth, whether via new employees, improved vetting processes, or even more aggressive partnership development activities. Our goal ahead is to surpass 300 invention disclosures a year as well as to continue our growth in licensing and start-up activities.

As you will read in this annual report, we continue to introduce new programs and strategies to elevate the success of the University's technology transfer endeavor, from interactive events and a new mentoring program to an expanded Partner with Pitt campaign and commercialization guide.

You will read, for example, about our new executive in residence program, which has allowed us to strengthen our start-up venture opportunities in the areas of computer software development and medical devices. We also highlight some of our most ardent commercialization supporters—veteran Pitt Innovators who are dedicating considerable time to cultivating innovations from their research and sharing their enthusiasm with others.

But I also hope to convey that 15 years in commercialization terms represents a very short period when it comes to the actual process of

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developing new ideas, particularly in the life sciences, and building successful companies around them. We measure success, therefore, in milestones along this long journey to commercial success.

When our start-ups identify and create strong management teams, we take notice. When they raise their first rounds of serious angel or even venture capital, we commend them. And when they successfully complete any of several phases of clinical trials, we celebrate—though we know that they still have to face the approval of the U.S. Food and Drug Administration, customers, and even insurance providers before reaching commercial success.

That's why we celebrate with the likes of Cohera Medical, Inc., and ALung Technologies, Inc., both of which are featured in this report. Both companies have taken years of fundraising, technology development and testing, and serious business planning to get where they are today: poised to enter the marketplace with products that began as ideas in Pitt labs quite a few years ago. We see them as representative of the investment of time, talent, and funding crucial to achieving start-up success.

That's also why we forge ahead with lots of patience and perseverance. We have learned over the past 15 years that we have to continue to push, bend, change, network, sell, and improve as we try to build and adapt an infrastructure that can give the necessary attention to our growing community of Pitt Innovators and the best of their ideas. And we must allow plenty of time to nurture those ideas.

In the meantime, we continue to value the development of new relationships with entrepreneurs, investors, economic development agencies, and potential industry partners looking to leverage the expertise and innovations of Pitt Innovators and their research. We continue to do our best to promote and foster strong, collaborative, multidisciplinary relationships across the Pitt campus and beyond that might lead to new innovation development, commercialization, and companies.

To me, 15 years is the short amount of time it has taken for Pitt to reach a critical mass that has begun to position Pitt as a true leader among its academic peers in this endeavor. Fifteen years is how long it has taken for the effective convergence of Pitt Innovators, campus administrators, entrepreneurs, investors, and industry partners necessary to assist OTM in driving long-term success to this point. This is why I feel we're just getting started.

I'm very excited about our next 15 years. I think you'll see some great opportunities emerge even in the near future from efforts conceived and nurtured by OTM, the Office of Enterprise Development, and Pitt Innovators in the past. Many thanks to our senior administrators, staff, commercial partners, and Pitt Innovators for their patience, perseverance, guidance, ideas, and other support for the University's technology commercialization efforts over the years. We look forward to working with all of you in seeking commercialization success this year and in the years to come.

Respectfully,

Marc S. Malandro
Associate Vice Chancellor for Technology Management
and Commercialization
University of Pittsburgh

15 Years in Review

This past year, the University of Pittsburgh once again hit a new record in total research expenditures. Surpassing $800 million in fiscal year 2011, Pitt continues to affirm its status as a research powerhouse across a diversity of academic disciplines, solidifying its role among the top research universities in the country.

Just as impressive, though, is the fact that many of the researchers behind this record number likewise are putting forth as much effort in transforming that research funding—and the world-class research supported by that funding—into innovations with commercial potential. Without question, this has been a record year for Pitt Innovators and the Office of Technology Management (OTM) as more and more faculty, staff, and students—with the assistance of OTM and the Office of Enterprise Development (OED)—committed to making the commercialization process an integral part of their academic experience. It's a success story that has been 15 years in the making.

Since its establishment 15 years ago, OTM has undergone several impressive evolutions for the sake of effective technology commercialization, including strengthening its infrastructure, becoming more service oriented and faculty friendly, and helping to elevate this activity to a much higher level

of acceptance in academia. Call it a cultural shift, if you will. We're not only seeing more faculty, staff, and students jumping into the commercialization fray, we're also working more formally with a growing number of departments, centers, and institutes to foster more collaborative innovation commercialization and entrepreneurship.

This shift has taken time to emerge, largely one Pitt Innovator and one innovation at a time. Our hope, of course, is to continue forging ahead in effecting such a shift across campus, fueled by strong research and commercialization collaborations among academic disciplines, investors, entrepreneurial leaders, regional economic development organizations, and industry partners.

As this annual report documents, the positive cultural shift—led by the University's top leadership, OTM, and its affiliate OED—drove technology commercialization performance to new heights in fiscal year 2011. Perhaps even more impressive, though, are the cumulative figures of the past 15 years, which simply affirm a strong and still-growing commitment to this noble endeavor of transforming research into commercial products and processes for the benefit of the University, its innovators, the community, and humankind. Consider the following:

Invention Disclosures

Despite the uncertainties of the economy, Pitt Innovators stepped up their commercial development efforts in FY2011, submitting a record 257 invention disclosures to OTM for commercial consideration. That's also up more than 14 percent from FY2010.

Since 1996, Pitt Innovators have submitted 2,322 invention disclosures, with more than half of them being submitted in the last five years alone. The increase can be attributed partly to greater formalized collaboration between OTM and a number of centers and institutes in the health sciences schools and the Swanson School of Engineering to cultivate ideas from research and identify the most promising commercial applications for those ideas. The challenge now is to effectively vet this growing number of ideas and manage the resulting portfolio of innovations available for licensing.

To facilitate that effort, OTM licensing managers have teamed up even more actively with interns from Pitt's business, law, engineering, and other schools to provide market research, competitive analysis, value proposition development, and business planning. Also supporting the effort has been OED, with its business development team, and two new executives in residence, who are helping to develop ideas in computer software and medical devices with start-up potential.

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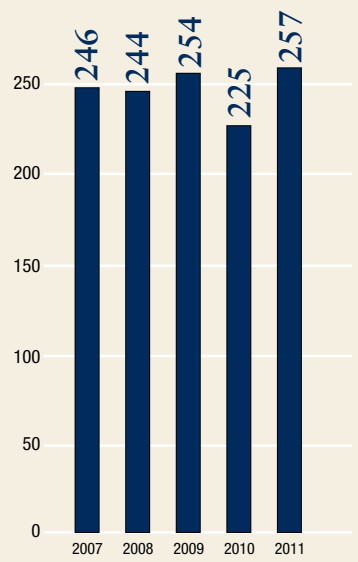
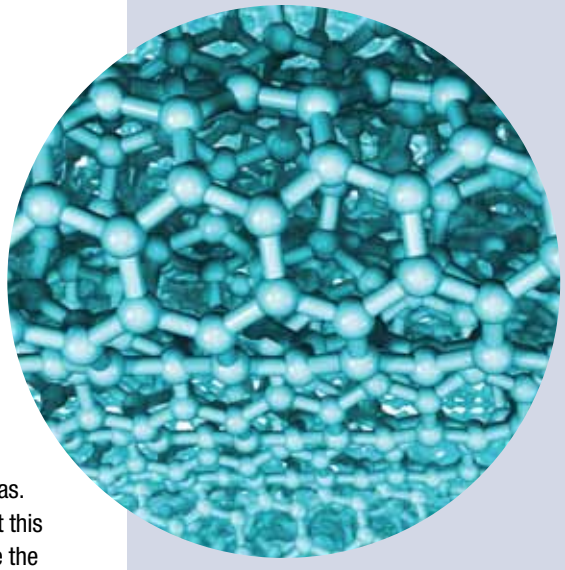
Invention Disclosures





Nano-sensing Asthma Danger

Alex Star, assistant professor of chemistry, developed a way to use tiny carbon nanotubes as sensors to give asthma sufferers an earlier alert to an attack. Consequently, the patient presumably can respond more calmly and quickly and with less medication to reduce the respiratory inflammation. The sensors are designed to measure nitric oxide, which increases in the body with the onset of an attack.

Training Teachers

A team of researchers at the Learning Research and Development Center (LRDC)'s Institute for Learning, led by now-retired director Lauren Resnick, turned years of cognitive learning research into a package of instructional content for training and inspiring teachers. The resulting product and services ultimately have been licensed over the years to many large school districts across the country. All told, the innovation has become one of the top generators of licensing revenue for Pitt and an ongoing source of substantial research funding for LRDC.

Image of Success

Paul Chang, a former professor of radiology at Pitt, developed a computer system in the late 1990s that could efficiently store, manage, and distribute digital radiology images throughout hospitals. The innovation led to the formation of Stentor Inc., which in 2006 was acquired by Royal Philips Electronics for an estimated $280 million. The deal netted Pitt, an investment partner in the venture, a return of about $10 million.

Licenses/Options

OTM licensing managers, with help from OED to identify potential commercial partners, had a very active deal-making year, yet again pushing performance to a record level. Total executed licenses and options climbed to 105 in FY2011, marking a 31.3 percent increase over the previous year's deals.

That includes 59 regular licenses/options, two sublicenses, three amendments, and 41 licenses that fell under interinstitutional agreements in which the University was not the lead institution in the deal. Since 1996, OTM managed to execute 685 licensing/option deals, not including the sublicenses, amendments, or interinstitutional licenses led by other institutions that weren't counted in the official totals prior to FY2010.

Among the more successful licensing efforts this past year was a Learning Research and Development Center program for training and motivating school teachers and administrators that is licensed by large school districts across the country. Licenses for that program grew almost 67 percent in 2011 from the previous year.

U.S. Patents Issued

Despite facing the potential for serious patent reform from the U.S. Congress, the U.S. Patent and Trademark Office (USPTO) stepped up its patent-issuing activities with the University of Pittsburgh this past year. While backlogs have continued, USPTO issued 37 patents to the University for innovations developed by Pitt Innovators—an increase of 12 percent from 2010. That brings the five-year total to 159 patents issued. All told, commercialization activities at Pitt since 1996 have led to 441 U.S. patents.

All the while, OTM remained busy this past year with new patent filings. The University filed 87 new U.S. patent applications in 2011 on behalf of Pitt Innovators—a 26 percent increase in filing activity over the previous year. That brings the cumulative total to 961 new U.S. patent applications filed for innovations emerging from research at Pitt.

OTM continues to work hard to make judicious decisions in determining commercial merit for Pitt innovations, ensuring better cost-effectiveness in patent expenses.

Total Revenue

The increase in commercialization activity this past year generated an increase in licensing and other revenue for the University. Total revenue for FY2011 was $6.17 million, up slightly from the previous year. That includes $3.82 million in licensing revenue as well as $2.28 million in legal fee reimbursements. Equity sales totaled $18,724 in 2011. Over the past 11 years alone, commercialization activity has generated nearly $67 million in total revenue.

Start-up Activity

Together, OTM and OED stepped up their efforts in 2011 to foster start-up activity based on Pitt technologies. Staffers identified a number of technologies with so-called platform potential—that is, innovations with enough potentially profitable applications to warrant starting companies.

In an effort to cultivate more start-up activity, OTM this past year launched a new executive in residence (EIR) program that targets computer software and medical devices (see related feature on page 8). EIRs are veteran technology entrepreneurs with extensive start-up experience.

MORE THAN
$800
MILLION IN RESEARCH
EXPENDITURES IN FY2011

This past year yielded two new start-ups, with several others under development. During the past 15 years, the University has spun out 80 start-up companies. Meanwhile, we are watching two Pitt-based start-ups—Cohera Medical, Inc., and ALung Technologies, Inc.—closely as they quickly progress toward commercialization of their products (see related feature on page 16).

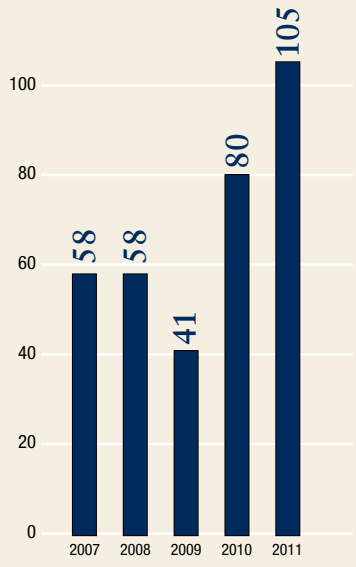
The following two start-ups were established in 2011:

Ortho-Tag, Inc.: This start-up company is based on radio-frequency identification (RFID) technology developed by Marlin Mickle, the Nickolas A. DeCecco Professor in the Swanson School of Engineering at Pitt, and his research team for tracking and monitoring prosthetic joints such as hips and knees. The tiny RFID tags, which are attached to the implanted prostheses, will allow orthopaedic doctors to obtain specific information about the joints by waving a wand specially designed to capture the recorded data using radio-frequency energy over the joint area.

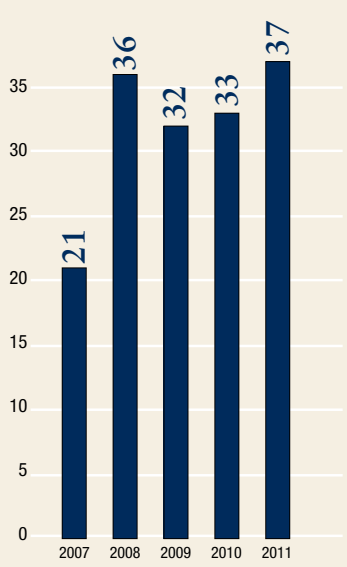
LINC Design LLC: Linda van Roosmalen, a visiting assistant professor in the Department of Rehabilitation Science and Technology in Pitt's School of Health and Rehabilitation Sciences, along with research collaborator Michael Turkovich, developed a new barrier system to contain wheelchairs and restrain wheelchair-seated passengers when they are traveling in large accessible transit vehicles. The technology forms the basis of this new local start-up company.

Pitt continues to affirm its status as a research powerhouse across a diversity of academic disciplines, solidifying its role among the top research universities in the country.

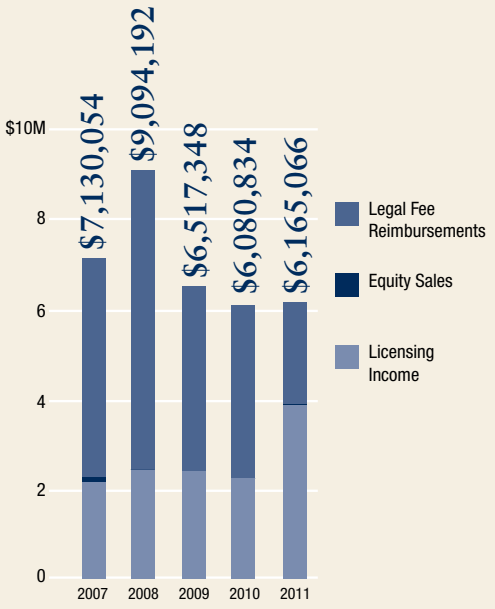
Licenses/Options



U.S. Patents Issued



Total Revenue

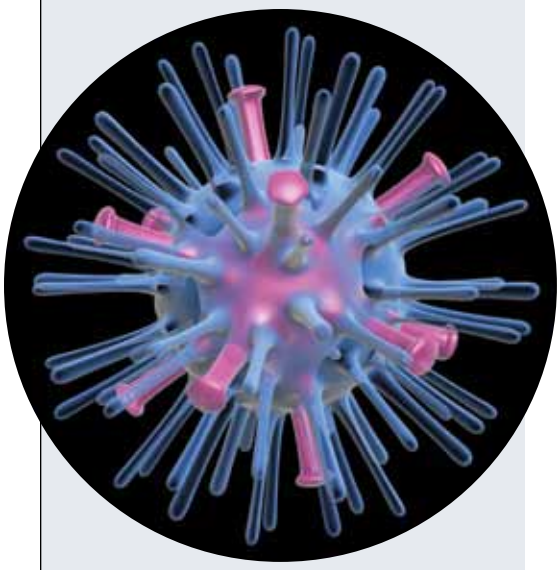


IN THE PAST 15 YEARS

2,322
INVENTION DISCLOSURES RECEIVED

441
U.S. PATENTS ISSUED

685
LICENSES/OPTIONS EXECUTED



An Avian Flu Fix

Andrea Gambotto, an assistant professor of surgery and codirector of the vector core facility at Pitt's Center for Biotechnology and Bioengineering, responded to the avian, or bird, flu pandemic with the development of a new genetically engineered live-virus vaccine. His research team's new vaccine was designed to be produced more quickly than traditional vaccines.

Hypothermia as a Tool

A research team in the Department of Critical Care Medicine and its Safar Center for Resuscitation Research, led by Professor Patrick Kochanek, developed a medical procedure that uses radical cooling, or emergency hypothermia, to put trauma victims in a temporary state of suspended animation, effectively preserving the patient for delayed treatment. Start-up company EPR-Technologies, Inc., currently is working to further develop the treatment as well as catheters and other related tools to enable the procedure.

Executive in Residence Program

New Executives in Residence Bring In-house Entrepreneurial Leadership and Expertise to Pitt

Every successful new company starts with a great idea. Of course, such success also often requires a lot of money to develop that idea into a commercially viable product or service and no small amount of business acumen to build a large, profitable organization.

The University of Pittsburgh, one of the nation's top research universities, offers a hotbed of great ideas, groundbreaking research, and innovation. The region surrounding Pitt also supports a growing network of venture capitalists and other investors who, despite the current economic climate, continue to seek promising technologies in which to invest. So the first two requirements of start-up success are relatively easy to come by here. But finding experienced leaders who know how to build a company around an idea and take the resulting product to market is another story. It's probably the most daunting challenge for a community that depends on new venture development for economic prosperity in the region.

In 2011, Pitt's Office of Technology Management (OTM) took steps to fill that leadership void by bringing entrepreneurial leaders on board and launching its own executive in residence (EIR) program.

"Pittsburgh and this University are technology-rich areas," says Michael Lang, one of two EIRs hired in early 2011 to help launch the program at Pitt and, ultimately, to spin off their own new companies based on Pitt technologies. "Nobody doubts that we're prolific technology generators. But a researcher's job is to discover. He or she needs help in quantifying a discovery's potential, refining it into a useful product, taking a company through the start-up phase, and operating it until it's on firmer footing.

"We're here to identify opportunities and start companies," he adds, "and do it in a way that's also positive for the University so it will want to repeat the process."

Using EIRs to lead commercialization efforts offers advantages at every point along the start-up continuum, Lang says. Their experience in specific industries and as serial entrepreneurs enables them to spot and evaluate a technology or product's potential, and they often can recommend shifts in research or product development to make an idea more commercially viable. Their track records also make them known quantities for venture capitalists when it comes to raising capital for the start-ups. EIRs also understand and have experience in product development, regulatory processes, building management teams, and recognizing and avoiding potential stumbling blocks.

Here's a look at the program's first two EIRs.

Lang's career in the medical device industry has spanned more than 30 years and has included hands-on experience in technology

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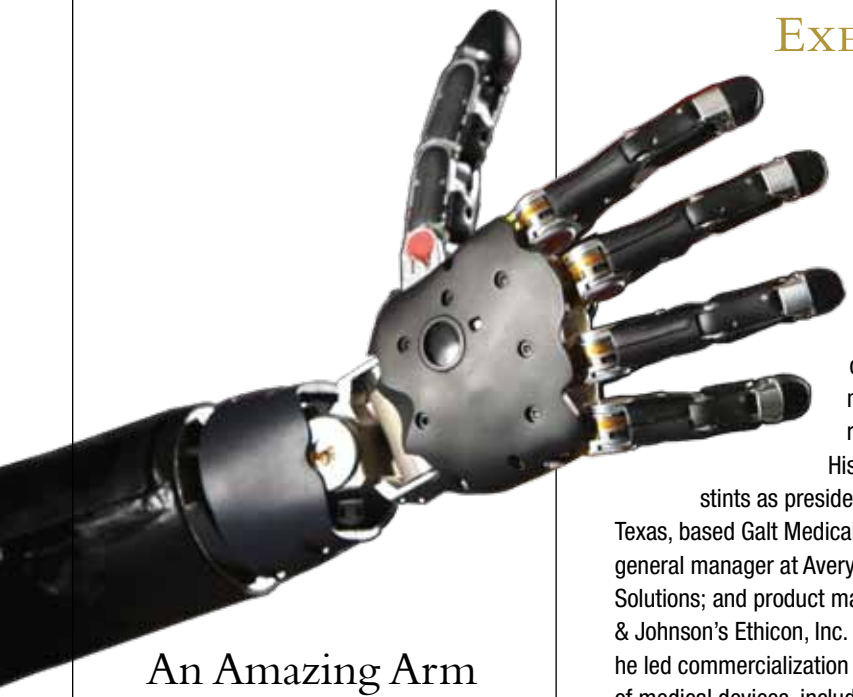
New executives in residence Gregory Coticchia, left, and Michael Lang, right, are on the lookout for technologies to transform into new companies.



An Amazing Arm

A robotic arm—amazing because the system translates thousands of neurosignals from the brain into commands that control the robotic arm. Leading this research, which one day could radically change the lives of people who have lost limbs or have paralysis, is Andrew Schwartz, a professor of neurobiology. His research team already has been able to train monkeys with restrained limbs to use the robotic arm to reach for food and grab it. His technology currently is undergoing a Phase I clinical trial with the U.S. Army.

Cord Cultivation

Bridget Deasy, an assistant professor of the Department of Orthopaedic Surgery and director of Pitt's Live Cell Imaging Lab, found a way to isolate and obtain a high yield of phenotypically defined umbilical cord stem cells for use in regenerative medicine. Her methods allow her to obtain 3.5 x 10^5 cells per gram of cord tissue. Her vision is to harvest and stockpile ready-to-use replacement cells for use in treating diseases related to cartilage, bone, muscle, and tendons, and ligaments.

assessment, product development, marketing, and regulatory affairs. His résumé lists stints as president of Dallas, Texas, based Galt Medical Corp.; division general manager at Avery Dennison Medical Solutions; and product manager at Johnson & Johnson's Ethicon, Inc. During his career, he led commercialization efforts for a variety of medical devices, including cardiovascular catheters, laparoscopic instruments, and specialty biomaterials.

Working with OTM and the Office of Enterprise Development (OED), Lang is focusing his attention on potential medical devices that may emerge from research across campus—and across academic disciplines.

Pittsburgh native Gregory Coticchia, meanwhile, is well known in the local technology community, where he has worked with a variety of computer technology firms over the years, including Legent (now CA) and AXENT (now part of Symantec Corporation). A quintessential serial entrepreneur, he has participated in 10 start-ups during his career, led the launching of two others, and raised nearly $50 million in venture capital for companies under his leadership. Over the past 15 years, the exit valuations of companies he founded or managed have averaged eight times earnings and 16 times investment.

Coticchia is focusing his efforts on computer software and information technology coming out of the Department of Computer Science, the School of Information Sciences, the Swanson School of Engineering, the health sciences schools, and a diversity of others.

In addition to his EIR duties and consulting work, he also teaches marketing and entrepreneurial leadership at Pitt's Joseph M. Katz Graduate School of Business, where he also earned his MBA. The school recognized Coticchia's achievements in 2006, naming him a Distinguished Alumnus Award recipient.

Both Lang and Coticchia define their goals simply: find an idea with potential, secure funding, build a company around it, and take it to market. In meeting those goals, they see themselves as filling a variety of roles along the path to commercialization, including acting as sounding boards for ideas; mentoring budding entrepreneurs; developing, clarifying, and focusing business plans; developing and refining presentations for fundraising; creating new business models, identifying and prioritizing market opportunities, and defining the go-to-market plan; and planning for long-term growth and even investor exit strategies.

As part of their vetting process, Lang and Coticchia serve on an advisory board that meets regularly to review promising medical and other technologies emerging from Pitt research, gauging their commercial potential and recommending next steps. If there's one thing they do have, it's plenty of diverse ideas to review. A recent review session, for instance, introduced the following:

- A force-sensing instrument for use in microsurgery
- A polymer than can bind with drug molecules for use in sustained-release medication therapies
- A cancer-detecting microscope that uses specialized optics and algorithms

- A software application that can be used for real-time monitoring of patient compliance with prescribed regimens and therapies
- An extracellular tissue matrix that could be used to create prosthetic cartilage for treating conditions such as TMJ

To some extent, Coticchia says of his search for software development opportunities, his role as an EIR requires a bit of an internal sales effort just to make Pitt Innovators aware of the help available through OTM and OED for commercialization of their innovations.

"Pitt's reputation is stronger in the life sciences and medical device fields," Coticchia acknowledges. "But there's also great technology development work being performed throughout the University. Developers are not bringing their ideas forward as readily as we'd like, but we're working on changing that.

"One of my tasks," he adds, "will be building relationships, not just in the computer and information sciences but also in various life science areas—wherever people are creating new technology and writing software."

Many entrepreneurs thrive on bird-dogging new product ideas, and Coticchia admits that he is no exception. During his first year on the job, he has uncovered a variety of promising technologies. Take, for instance, the novel application that links health care databases to smartphones, enabling health care providers to access information remotely, or the software application that converts data into universal formats for use in multiple devices, such as a viewer that ophthalmologists can use on an iPad. He also found a researcher who developed an application that identifies trends and patterns in large databases and can be used to predict database failures and trigger preventive maintenance.

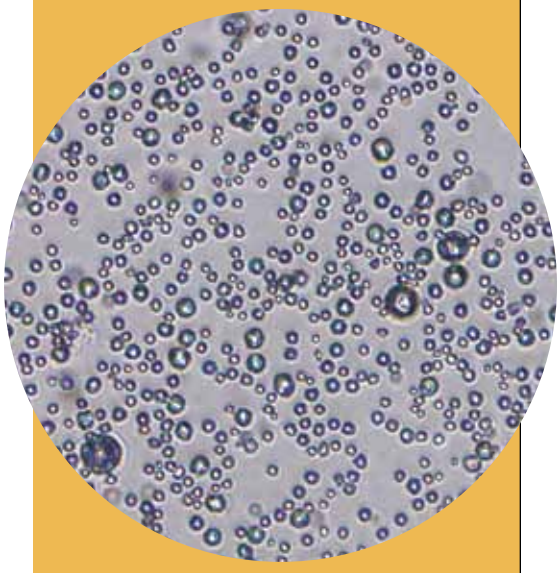
Coticchia describes much of the software he's seen so far as "technology looking for a problem." Moreover, he notes, some of the ideas he has discovered on campus might find a useful—and profitable—home via licensing to an established company, but they may not merit the creation of a company dedicated to commercializing that technology.

"Some of it is raw technology," he says, "but that's why we're here. It's my job to find a fit; figure out the path to commercialization; and spin these developments out into companies that sell products, make money, and employ people. I'd love to find one with the right potential, raise the money, and make it happen."

> "It's my job to find a fit; figure out the path to commercialization; and spin these developments out into companies that sell products, make money, and employ people."
>
> Gregory Coticchia

Tiny Bubbles

Cardiologist Flordeliza Villanueva, an associate professor of medicine, and her research team in the Center for Ultrasound Molecular Imaging and Therapeutics have found ways to use tiny microbubbles as unique contrasting agents to detect cardiovascular disease during an ultrasound and as therapeutic delivery vehicles in the bloodstream. Other potential applications include diagnosing chest pain in the ER, detecting arterial plaque, pinpointing microscopic blood vessels generated by new tumor growth, and delivering stem cells used in therapies.



Electrode with a Twist

When a patient receives an electroencephalogram, or EEG, a technician typically has to shave patches of scalp to connect electrodes to it, but not with Mingui Sun's novel skin-screw electrode. Sun, a professor of neurological surgery, bioengineering, and electrical engineering, solved this problem of time and inconvenience with a fingertip-sized metallic electrode that literally screws onto the skin and around any hair without requiring preparation. His electrodes contain tiny teeth on one end that lightly but firmly grip the outer layer of skin when twisted onto it. Research collaborator Xinyan Tracy Cui, assistant professor of bioengineering, also developed an electrode made from conducting polymer hydrogel, which facilitates the conversion of a signal from ionic to electrical.

When we talk about 15 years of innovation at the University of Pittsburgh, we certainly are talking about our Pitt Innovators and the many great ideas that have been commercialized over the years. But we're also talking about our own innovation—that is, what it has taken over the years for the Office of Technology Management (OTM) and Office of Enterprise Development (OED) to creatively engage Pitt Innovators in the process; educate them; and facilitate meaningful, productive interactions with industry, entrepreneurs, investors, and the economic development community.

OTM and OED have had to practice what they preach for the past 15 years as they faced the ongoing challenge of effecting a transformed campus culture that supports and encourages innovation commercialization. We learned early on that such a transformation takes patience, persistence, and perseverance—and healthy doses of innovative new initiatives and marketing strategies to facilitate a pattern of success in this academic endeavor.

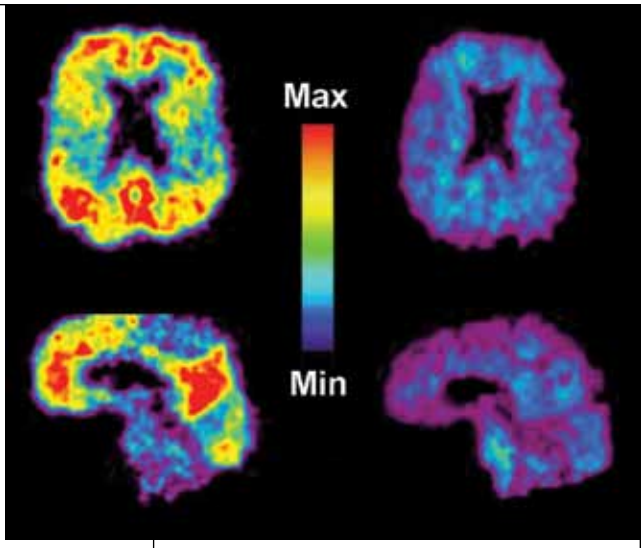
The efforts are paying off, with substantial increases in new innovator participation, oversubscribed educational courses, greater efforts to foster new start-up companies, and a growing number of events here and across the country that put Pitt Innovators in front of some of the world's most influential potential commercial partners. Moreover, some of our initiatives are being emulated or even copied by our academic peers, demonstrating our growing leadership role in the realm of technology commercialization.

Five New Initiatives

This past fiscal year has been no exception when it comes to innovation aimed at enhancing our innovation commercialization efforts. Consider the following:

Life Science Start-up Accelerator Program: OTM, in partnership with the nonprofit Idea Foundry and the Urban Redevelopment Authority of Pittsburgh (URA), launched this program to help early stage life sciences companies with Pitt-based technologies to bridge the gap between the initial research and commercialization. The initiative, housed in the Idea Foundry's Oakland offices at the edge of the Pitt campus, is being funded with a $200,000 grant from the Greater Oakland Keystone Innovation Zone and URA.

Mechanical engineering and materials science professor William Clark, with his Pitt Innovator Award at the 2010 Celebration of Innovation, shown with, from left to right, Arthur Levine, senior vice chancellor for the health sciences and dean of the School of Medicine; Provost and Senior Vice Chancellor Patricia Beeson; and Chancellor Mark Nordenberg.



Executive in Residence (EIR) Program: This program leverages the business expertise of veteran technology-based entrepreneurs who are hired to proactively identify start-up-worthy technologies at Pitt and, ultimately, to take one of those opportunities to market (see related feature on page 8). So far, two EIRs have been hired—one focused on computer software and information technology and the other on cultivating medical devices, regenerative medicine, and other health care-related opportunities.

Coulter Translational Partnership: OTM has been working this past year with the Swanson School of Engineering and the schools of the health sciences to apply for this extensive commercialization-driven partnership with the Wallace H. Coulter Foundation. Consequently, the University recently was awarded a $3.54 million grant from the foundation. The five-year grant will fund collaborative translational research projects between engineers at the Swanson School and clinicians in the schools of the health sciences. OTM and OED will facilitate the commercialization of those products.

Mentoring and Other Start-up Initiatives: OED established this program in an effort to provide more formal support to Pitt Innovators who want to take their innovations out of the lab and into the marketplace. The initiative, funded in part by a Pennsylvania Innovation Partnership grant, began with close to a dozen veteran technology entrepreneurs and investors who agreed to work with Pitt Innovators to nurture their start-up opportunities.

The mentoring program is designed to support the ongoing efforts of OTM and OED's own Commercialization Advisory Committee, which reviews the value propositions of innovations with start-up potential and counsels Pitt Innovators on how to improve those propositions. The committee is made up of entrepreneurs, investors, Pitt alumni, and local economic development leaders.

Wells Student Health Care Entrepreneurship Competition: Launched this past July with funds from the Michael G. Wells Entrepreneurial Scholars Fund, this new initiative promotes innovation development and entrepreneurship among health sciences students at Pitt. The competition's inaugural finalists were paired with business mentors to prepare for their participation in October 2011 in the University's Science2011 Technology Showcase. The winner is set to receive a $10,000 Michael G. Wells Entrepreneurial Scholars Award, which is to be used for commercialization efforts.

OTM and OED's Innovative Tradition

The five new initiatives simply add to a growing stable of innovative programs from OTM and OED designed to foster greater faculty participation in innovation commercialization, promote entrepreneurship, and develop relationships with potential commercial partners. Here are some of the most successful and innovative OTM/OED initiatives:

Pitt Innovator Initiative: The main focus of this initiative, which was launched in 2002, was the introduction of a so-called Pitt Innovator community, an elite community of Pitt faculty, staff, and students who have submitted their innovations via invention disclosures for commercial consideration. Many OTM and OED programs have been developed since then and have been aimed specifically at educating and nurturing this group.

Educational Courses: In 2001, OED introduced its 10-week Benchtop to Bedside: What Every Scientist Needs to Know course, which helps health sciences-oriented faculty,

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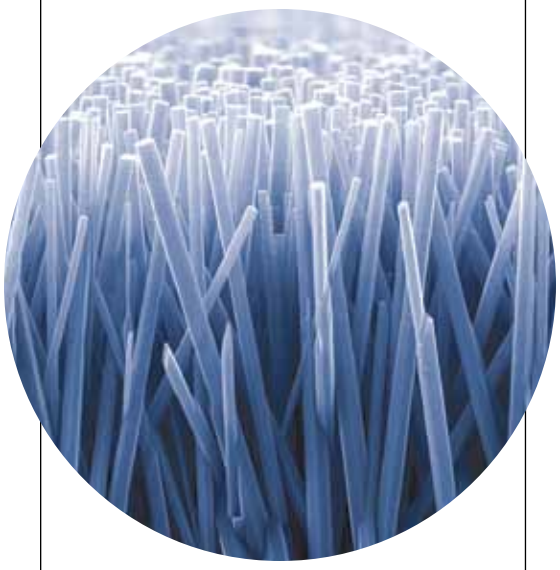
Diagnosis: Alzheimer's

Before Professors William Klunk from the Department of Psychiatry and Chester Mathis from the Department of Radiology pioneered an imaging agent for the early diagnosis of Alzheimer's disease, doctors could only confirm a diagnosis postmortem. Their radioactive compound, called Pittsburgh Compound-B, allows doctors using a positron-emission tomography, or PET, imaging scan to spot beta-amyloid deposits in the brain—a telltale sign of Alzheimer's—early in the process and then, ultimately, helps them to monitor the disease's progress in patients, including the results of potential new treatments. GE Healthcare licensed the innovation from Pitt and is in Phase III clinical trials with a product developed from the innovation. Meanwhile, Klunk and Mathis earned the American Academy of Neurology's Potamkin Prize (known as the "Nobel Prize of neurology") for their research.

Engaging Pitt Innovators and Partners



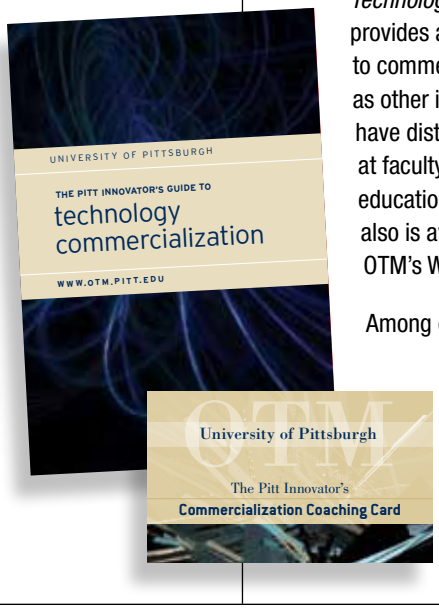
Cold, No Ice

If Di Gao, an assistant professor and William Kepler Whiteford Faculty Fellow in the Swanson School of Engineering's Department of Chemical and Petroleum Engineering, has his way, electric power companies no longer will have to deal with power lines damaged by freezing rain. Gao and his research team developed a superhydrophobic coating of nanoparticles with tiny air pockets that stops water from collecting on the surface and thus prevents it from freezing. Other potential applications include windmill blades, airplanes, and oil drilling platforms.

staff, and students to understand the process of technology commercialization, including starting a company and navigating the regulatory approval process. OED has attracted at least 30 attendees annually to its spring course.

In 2002, OTM, in partnership with the Office of the Provost, launched a seven-week course, **Academic Entrepreneurship: The Business of Innovation Commercialization**, which focuses on the earliest stages of innovation development, including application development tools, business opportunity development, market research, and communicating the right message to potential commercial partners. This course, which typically is conducted in the fall, likewise has attracted 25–30 participants annually. Both courses also encourage participants to bring their real ideas into the classroom to develop them further as part of the process.

Educational Materials: In an ongoing effort to provide educational tools to Pitt Innovators, OTM and OED have developed a number of materials that have been well received both internally and among our academic peers. In 2010, we published our first-ever *Pitt Innovator's Guide to Technology Commercialization*, which provides a comprehensive introduction to commercialization at Pitt as well as other important considerations. We have distributed hundreds of copies at faculty orientation sessions and educational events so far. The guide also is available electronically on OTM's Web site, www.otm.pitt.edu.



Among our standout new materials has been our Pitt Innovator's Commercialization Coaching Cards, which offer 10 things to remember when attracting industry or investors to one's innovation. The three-panel business card-sized tools not only have been distributed by the hundreds on campus, but at least six other research institutions across the country have asked for permission to copy the content and adapt it for their own use.

Technology Showcases: OTM and OED take every opportunity available to showcase Pitt innovations at poster receptions, both internal and across the country. OED hosts its Technology Showcase reception at Pitt's annual Science conference, attracting an estimated 250 attendees.

This past year, OTM and OED also participated in a national showcase event as part of the Association of University Technology Managers' annual meeting in Las Vegas, Nev., which attracted close to 500 attendees. And this past September, the University joined forces with Carnegie Mellon University and the Pittsburgh Venture Capital Association to host the first-ever Technology Showcase Luncheon as part of the 3 Rivers Venture Fair in Pittsburgh. The program allowed Pitt and Carnegie Mellon innovators to make three-minute "elevator pitches" to 350 investors and entrepreneurs on business opportunities surrounding their early stage innovations.

Innovator Speed Dating: Perhaps one of the most successful interactive programs developed by OED and OTM has been their Innovator Speed Dating programs. As the name suggests, Pitt Innovators and potential commercial partners are brought together in each session for a series of well-coordinated, prescreened "speed dates" organized and facilitated by OED. As a result of efforts at Pitt, OED has been asked on several occasions to introduce the concept at national conferences to peer universities and potential commercial partners in attendance.

Partner with Pitt Initiative: To better market Pitt innovations to potential commercial partners and promote long-term relationships with industry, OTM and OED developed a multifaceted Partner with Pitt theme that includes a general capability brochure as well as a series of exhibit booth banners used to promote Pitt Innovators at conferences and local events. This initiative also includes the ongoing development of capabilities brochures that showcase and promote specific areas of collaborative research and innovation development at Pitt. This past year, OTM and OED published brochures focusing on medical imaging, energy, and vaccine research.

This past year, the initiative has provided additional assistance for OTM and OED staff members by facilitating meetings with a wide spectrum of potential commercial partners. Meetings in 2011 included discussions with Johnson & Johnson; Ambu Inc.; Athersys Inc.; Sanofi Pasteur SA; Abbott Laboratories; Life Technologies Corporation; Novartis AG; Millipore; Alcon, Inc.; Bayer HealthCare; and Boehringer Ingelheim Animal Health, among others. Some of those discussions led to collaborative research agreements, sponsored research, potential clinical trials, technology licenses, and option agreements.

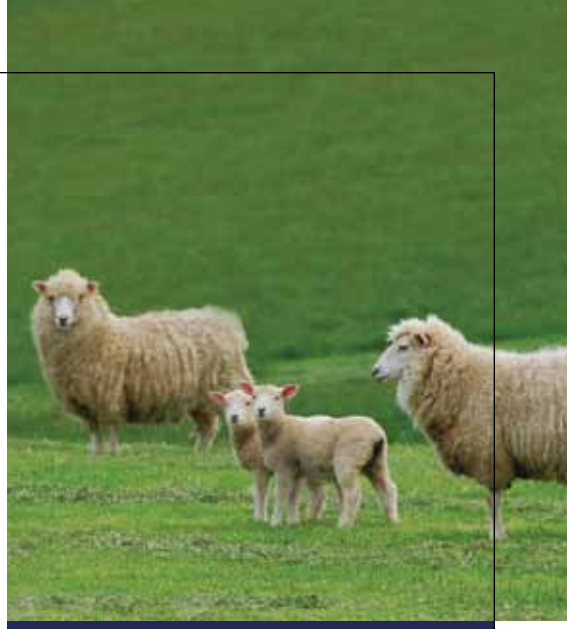
Alejandro Hoberman, left, the Jack L. Paradise MD Endowed Professor of Pediatric Research, participates in an Innovator Speed Dating session.

Celebration of Innovation: Among OTM and OED's most successful initiatives aimed at elevating the status of technology commercialization as an academic activity has been our annual Celebration of Innovation event, which includes the Pitt Innovator Awards. Pitt Innovators who submitted invention disclosures for commercial consideration during that given year are invited to this recognition program cohosted by the Office of the Provost, and awards are given to those whose innovations were licensed to industry or start-up companies during that year. This exclusive reception is going into its seventh year.

What to Expect Ahead

In fiscal year 2012, look for even more innovative new programs as OTM and OED continue to improve and refine their initiatives. For example, look for even greater emphasis on fostering new start-up companies from Pitt innovations and several new initiatives to support that focus.

Also, OTM and OED will be introducing a new Web site with a significantly increased emphasis on educating Pitt Innovators using new electronic tools and resources. The site also will be designed to more effectively facilitate the marketing of new technology licensing opportunities, particularly in the areas of computer software, novel research tools, and start-up ventures.

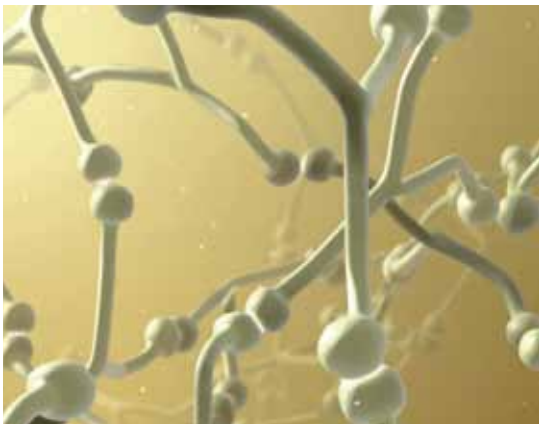


Better than Counting Sheep

Twenty years of sleep research by Eric Nofzinger, professor of psychiatry and director of the University's Sleep Neuroimaging Research Program, led to a novel medical device for the treatment of insomnia. His device cools the front part of the brain and reduces metabolism during sleep. In 2010, Nofzinger spun out a new company, Cerève, to commercialize his innovation.

Vein Graft Girdle

That's how former Pitt student researcher Lorenzo Soletti and his colleague, Mohammed El-Kurdi, describe the biodegradable, polymer-based temporary wrap they helped to develop to provide support for arterial vein grafts while they were doctoral students at Pitt. Their research team, led by surgery professors David Vorp and William Wagner, also developed both a technique and a machine that uses electrospinning to wrap veins that are being prepared for grafting. The pair left Pitt in 2009 to help cofound Neograft Technologies, Inc., located in Pittsburgh's Oakland neighborhood.



A molecular view of Cohera's new TissuGlu medical adhesive, based on technology licensed from Pitt

Patience, Persistence, and Perseverance in the Pursuit of Two Start-ups That Are Heading to Market

University of Pittsbugh professors Eric Beckman and William Federspiel know all too well about the patience, persistence, and perseverance required to succeed when it comes to technology commercialization and the entrepreneurial pursuit. Over the years, they've lived and breathed it, wrestled with it, obsessed over it, grown with it, and fought the good fight, all the while balancing life among the lab, classroom, and commercial marketplace.

And out of their long-term commitments to academic research and development have arisen two local life sciences companies with significant funding—and promising commercial products that now are ready for market.

"We are the picture of perseverance," Federspiel deadpans as he remembers a bumpy journey that has included many years of research with his research collaborator, the late Brack Hattler, and the rest of his Pitt research team followed by challenging fits and starts in the entrepreneurial realm that recently were conquered by new technology advancements, aggressive leadership, and private investor funding support.

We share their stories here because we believe that they are representative of the kind of creative, entrepreneurial drive really required to become successful Pitt Innovators with aspirations of both academic achievement and entrepreneurial success built around technologies that emerge from Pitt research. Both also illustrate how great ideas are just the first step on a much longer road that requires years of research and refinement, as well as patience and pragmatism, to make it to market. An "overnight" success in this endeavor can take years.

All told, innovations developed by a wide spectrum of Pitt Innovators have become the basis for 80 start-up companies since the Office of Technology Management (OTM) was established in 1996. And in many of those cases, Pitt Innovators have maintained active roles in the development of those technologies and sometimes in the companies themselves. In any case, as both will attest, success still depends on a commitment to adopt an entrepreneurial mind-set, buck the naysayers, tackle the technological and business hurdles, and keep educating the masses—including themselves.

Here are their stories.

Cohera Medical, Inc.

Beckman, the George M. Bevier Professor of Engineering in the Swanson School of Engineering, and Michael Buckley, a former associate professor of oral and maxillofacial surgery at the University of Pittsburgh School of Dental Medicine, developed a novel polymer-based adhesive with potential surgical applications in the early 2000s. Working with OTM and the Office of Enterprise Development, Beckman ultimately spun out a company around the technology. In 2006, he founded Cohera Medical, Inc.; negotiated an entrepreneurial leave of absence from the University; and became senior scientist at the new venture—and not its CEO.

As Beckman is quick to point out to other aspiring scientists turned entrepreneurs, "There's no reason to expect that if you can do the science, you can do anything—such as running a company. The smartest thing Michael [Buckley] and I ever did was realize that we're not CEOs and that a serious company needs a real business team."

Cohera quickly recruited a seasoned start-up veteran, Patrick Daly, who was tasked with giving the company direction and raising capital. Beckman and his product development team then set to work transforming the adhesive innovation into a biocompatible, biodegradable surgical adhesive called TissuGlu.

TissuGlu provides surgeons with an alternative to stapling, stitching, or less-effective surgical wound sealants currently used to close large tissue flaps resulting from abdominoplasties (tummy tucks) and other procedures. Compared to other options, TissuGlu seals large-flap wounds more effectively, reducing fluid buildup and potentially the need for drains and offering a number of other advantages, including a lower risk of postoperative complications arising from drain use.

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Left to right: Patrick Daly, president and CEO of Cohera Medical, Inc., and Pitt professor Eric Beckman, company cofounder

Diagnosing GERD

A unique questionnaire by emeritus professor Susan Orenstein of the Department of Pediatrics for diagnosing gastroesophageal reflux disease (GERD) has become a diagnostic hit over the years with both medical clinicians and pharmaceutical companies. This validated diagnostic tool, called the Infant Gastroesophageal Reflux Questionnaire, or I-GERQ, not only helps to assess the symptoms of GERD in infants but also tracks changes over time. The original questionnaire was revised in 2004, and shorter versions are available today in a number of languages.

Beckman says he had to learn quickly that if the company was to commercialize a product within a reasonable amount of time, he had to get over the temptation to keep adjusting the formula and making it better. Every change, in fact, would have made the time to market longer.

"It just means you can't always go for 'optimal' " in the academic sense, Beckman says. "It would have been great to have had more time, but in business, time is the enemy. The regulatory runway is what matters."

Daly, meanwhile, vigorously pursued funding and ultimately raised $41 million in private placement capital to facilitate the clinical trial and regulatory approval processes.

Cohera completed European clinical trials for TissuGlu in spring 2010 and received a CE mark certifying its conformity to European Union health standards in July 2011. The product was launched in Germany in September 2011, supported by an EU-based staff of five people. Cohera also will petition the U.S. Food and Drug Administration (FDA) in October 2011 for permission to conduct the required efficacy trial at five sites in the United States, a necessary step that could accelerate approval in this country.

Because TissuGlu is categorized as a Class III medical device by FDA, it requires premarket approval—a rigorous process to verify its effectiveness and safety. Cohera's management team decided early on to pursue both approvals in parallel, Beckman says, in part because FDA's process takes far longer.

"While we're moving through the regulatory process here, we still need to generate revenue as quickly as possible to show we're for real and establish our credibility with customers and our investors," Beckman says.

The regulatory strategy is about to pay off after only five years, thanks to Beckman, Daly, and a growing employee team that now numbers 27. The company generated its first European sales on September 14 of this year.

"TissuGlu isn't a predicate device based on existing technology," Daly says. "It's truly unique, and to come as far as we have in such a relatively short period of time is rock star quick."

Daly also attributes success so far to the company's deliberately sharp product focus. It focused on getting a single product to market even as it acquired dozens of patents and moved into development of additional products, including a sealant for use in bowel surgeries—a product with significantly larger sales potential. A third product, an adhesive for use with surgical mesh, is in development as well.

"Many start-ups flounder when they get pulled in too many directions," Daly says. "While the bowel sealant has great potential, we never veered from our core objective of bringing TissuGlu to market. We'll get to the additional products eventually, but right now we need

Cohera's new TissuGlu surgical adhesive applicator

> It would have been great to have had more time, but in business, time is the enemy. The regulatory runway is what matters.
>
> Eric Beckman

to just put one foot in front of the other and move forward, and that's our approach."

But for Beckman, who is now back at Pitt, commercial sales don't represent his biggest milestone. "It's not the money," he says. "The big milestone was the first human surgery in December 2009. That was the biggest rush. It was really amazing."

ALung Technologies, Inc.

William Federspiel, William Kepler Whiteford Professor in the Departments of Chemical and Petroleum Engineering, Surgery, and Bioengineering and director of the Medical Devices Laboratory at the McGowan Institute for Regenerative Medicine at Pitt, and his research collaborator, the late Brack Hattler, a cardiothoracic surgeon, conducted research for many years trying to develop artificial lung technology that would provide respiratory assistance to patients by removing carbon dioxide and delivering oxygen directly to a patient's bloodstream using a novel intravascular catheter device.

The problem Federspiel says he was trying to solve was the number of potential complications created by traditional mechanical ventilation systems for patients with severe respiratory problems or lung failure. While lifesaving, the traditional systems exact a steep price—that is, the need for sedation, risk of pneumonia, and other potential complications from intubation or tracheostomy.

But Federspiel and Hattler got hung up on the development of the catheter, particularly its size. Federspiel says he first researched alternatives to larger, more unwieldy catheters in 1997 under a state-funded Ben Franklin Technology grant.

In 2001, he helped to found ALung Technologies, Inc., along with Nicholas Kuhn, who became the company's president. Federspiel remained at Pitt but served as the head of the fledgling company's scientific advisory board.

As Kuhn began to raise capital from private angel investors to commercialize the intravascular respiratory catheter, Federspiel continued his research on and development of improved artificial lung technologies. Among his technical challenges, which took a number of years to overcome, was reducing the catheter to a small enough size to allow a respiratory assist device to be used and adopted by pulmonary intensivists without the need to involve surgeons for catheter placement. In 2005, his laboratory—and the University—formally spun out a new respiratory assist device, the Paracorporeal Respiratory Assist Lung, which used a much smaller catheter, to ALung, which then undertook the considerable product development work required to bring the device into human clinical trials.

The resulting device was the Hemolung Respiratory Assist System. Hemolung removes carbon dioxide and delivers oxygen directly to a patient's blood via a small catheter inserted into the jugular or femoral vein. Because a catheter is less invasive than intubation or mechanical ventilation, the treatment has several advantages. For

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Measuring Mortality

Analysts trying to calculate cancer mortality risk estimates across demographic, geographic, and work history determinants will find the University's unique Occupational Cohort Mortality Analysis Program quite useful. Today, the software is marketed as the premier tool for the study of mortality and cancer incidence in relation to occupational factors, such as chemical exposure. The computer software package, which continues to attract software licensees, was developed by Gary Marsh and Ada Youk, professor and assistant professor, respectively, of biostatistics in the Graduate School of Public Health.

Radiation Vaccine

Joel Greenberger, a professor of radiation oncology, and his research team certainly have gotten the attention of the U.S. Department of Defense and others with what Greenberger describes as a potential vaccine they developed against ionized radiation exposure. The team created a drug compound that offers a synthetic protective screen for cells and even complete organisms—humans included—against potentially lethal doses of radiation. The compound, currently being tested, emerged from research on damage caused by radiation therapy among cancer patients.

Left to right: Pitt professor and ALung Technologies, Inc., cofounder William Federspiel and start-up veteran Peter DeComo, chair and CEO

example, patients can eat and talk while connected to the Hemolung device, and it gives their lungs more time to heal. Using the device also reduces the length of ICU and overall hospital stays, and it can be operated by a pulmonary intensivist instead of a surgeon, further simplifying treatment and lowering costs.

"We call the process respiratory dialysis because it's similar to renal dialysis in many ways," says Peter DeComo, who joined ALung in 2008 as chair and CEO after successfully starting, growing, and then selling Renal Solutions Inc., which developed a novel and portable kidney dialysis device for home use. Under his guidance, ALung raised an additional $17 million in funding that was used to eliminate debt, build staff, further refine Hemolung's design, and move it into clinical testing in Europe.

Today, Hemolung is poised for a successful launch in Europe by the end of 2011 and will begin U.S. trials in 2012. The device is garnering favorable reviews and was named one of the top 10 new medical devices of 2010 by Medgadget, an online journal of emerging medical technologies.

Hemolung also represents one of the McGowan Institute's first bench-to-bedside success stories. Both Federspiel and DeComo call it a prime example of the way technology transfer and commercialization should work. And both credit University resources such as OTM with enabling the licensing and commercialization process.

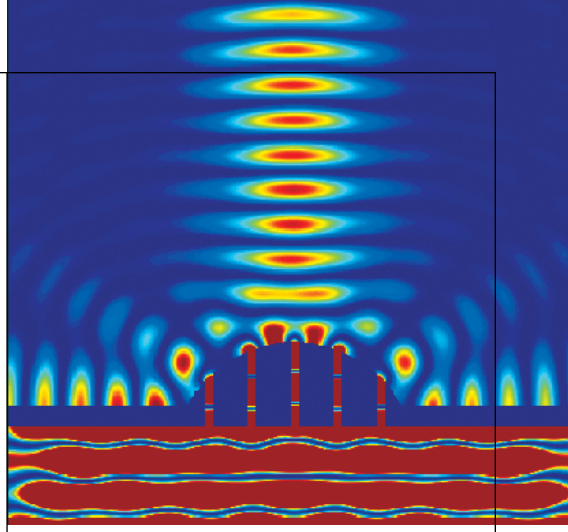
"With less mature companies, you often see them getting hung up on license or technology transfer fees without really understanding how much additional work goes into commercialization, and the result is unrealistic expectations about compensation and sharing risks," Federspiel notes. "But OTM understands this process and helped to create arrangements with ALung that are both fair and realistic for everyone."

"The bottom line is this is Pitt's technology and the result of Bill's work," DeComo says. "Pitt is in the business of early stage development, and the royalty fees we pay will fuel even more new technology and products in the future. We didn't get into this for just one product—we hope that we'll be the logical choice to license other developments that come out of Bill's lab and other labs at the McGowan Institute."

DeComo and ALung clearly see the potential; Federspiel estimates that more than half of his lab's current research has commercial potential. Toward that end, ALung recently awarded a $70,000 gift award to the Medical Devices Laboratory at the McGowan Institute, which enabled Federspiel to add an additional postdoctoral researcher to his team.

"The benefit to us is clear: Without Bill and our relationship with the University, we'd need a much, much greater investment in internal R&D," DeComo says pragmatically. "And by the time the new researcher finishes his work in Bill's lab, he may be a good hiring candidate for ALung."

ALung's new "respiratory dialysis" device, called the Hemolung



Small Spectroscope, Big Plans

Hong Koo Kim, professor of electrical and computer engineering and codirector of the Petersen Institute of NanoScience and Engineering, always has had big ideas for a new platform technology he developed that basically transformed a tabletop-sized spectroscope into a light-sensing device no larger than the size of a thumbnail. The tiny spectroscope analyzes the color components of light to measure and analyze the makeup of objects. The Pittsburgh-based start-up company NanoLambda is now developing its Spectrum Sensor, a nanoscale spectrum analyzer on an integrated circuit. Potential products include mobile/wearable glucose sensors and wearable devices that can detect multiple toxic gases and other hazardous materials.

Making a Difference

These Pitt Innovators, Driven to Innovate and Help Others, Are Leading a Culture of Innovation Commercialization at Pitt

Sonic Flashlight

Many years of research and sheer tenacity have allowed George Stetten, a professor of bioengineering, to develop a commercially viable handheld ultrasound device that provides real-time tomographic images from beneath a skin surface and reflects them onto the surface. Called the Sonic Flashlight, the device allows a medical professional to more accurately locate a vein in a patient's arm or hand for needle placement. The technology, whose evolution has included at least eight different prototypes over the last 10 years, has been licensed to a start-up company called Insituvue, Inc., which now is working to take the device to market.

Marlin Mickle arguably could be called the most active Pitt Innovator at the University of Pittsburgh. He has built up a large portfolio of patents, licenses, and options around his innovations mainly by finding new ways to leverage ambient, or radio-frequency (RF), energy in the air.

Mickle, the Nickolas A. DeCecco Professor in the Department of Electrical and Computer Engineering and an engineering faculty member since 1962, has submitted more than 124 invention disclosures since 1996 to the Office of Technology Management (OTM) for commercial consideration—more than half of them since 2006 and more than double the next-highest number of submissions by a single innovator. So far, Mickle has received U.S. patents on 24 of his innovations, and at least seven start-up companies have been launched around his technologies.

Mickle, while in a class of his own when it comes to innovating, is one of a growing number of Pitt Innovators making technology commercialization on par with other academic priorities. He and his most innovative peers are transforming more and more of their research into innovations with commercial potential even as they continue to make new inroads in their research fields, publish their findings, and provide hands-on education to their students.

"I like to make new things—things that nobody else has done," says Mickle of his RF research. "But I try not to get caught up in the technology itself. I just want to keep it simple—and useful."

Adds Rory Cooper, FISA/Paralyzed Veterans of America Endowed Chair and Distinguished Professor in the School of Health and Rehabilitation Sciences and another active Pitt Innovator, "I work with a team, and the team deserves credit. Part of our responsibility is to train students to be creative, analytical, and innovative."

As part of our celebration of 15 years of innovation commercialization at OTM, we talked to Mickle, Cooper, and three other Pitt Innovators who are leading the way at Pitt in fostering innovation commercialization. Our goal is to better understand what motivates them and drives their desire to participate in this rigorous process. Is it fame or fortune? Do they want to help people? Or do they simply need such a process to more effectively manage the seemingly endless flow of new ideas that emerge from their research? Here's what they had to say.

Fostering Collaboration

For radiation oncology professor Joel Greenberger, technology commercialization is a necessary part of the research endeavor and leads to meaningful collaborations with both other researchers and industry. He says he first got involved with the process while serving as a faculty member at Harvard University and later at the University of Massachusetts.

He joined Pitt's faculty in 1993 and has submitted 29 invention disclosures to OTM for consideration since 1996. He has received 10 U.S. patents, and his innovations have led to six licenses and options, including two to start-up companies.

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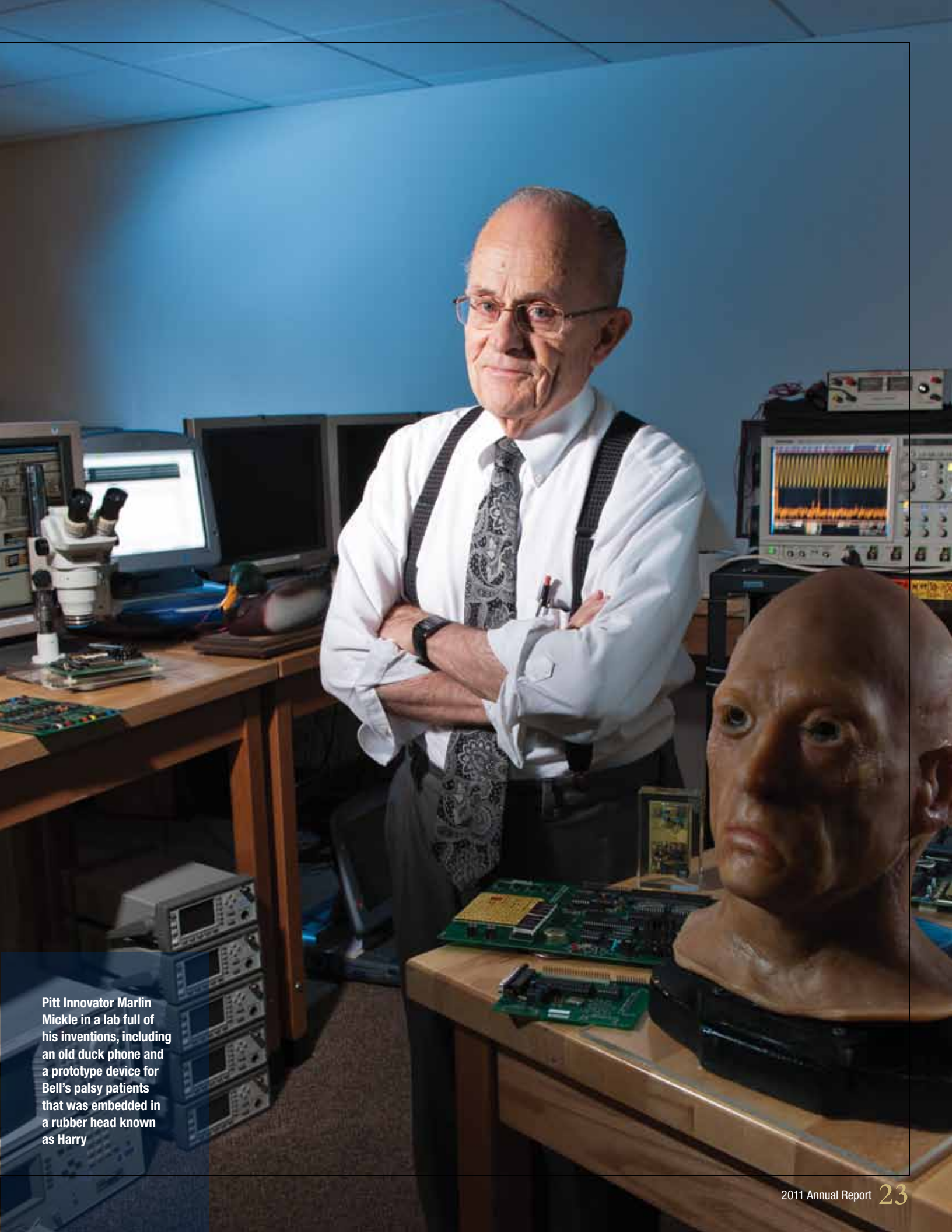


Pitt Innovator Marlin Mickle in a lab full of his inventions, including an old duck phone and a prototype device for Bell's palsy patients that was embedded in a rubber head known as Harry

Wireless Charge

Marlin Mickle, Nickolas A. DeCecco Professor in the Department of Electrical and Computer Engineering, developed a platform technology that harvests radio-frequency (RF) energy out of the air for use in recharging batteries without plugging them into an electrical socket. His technology became the basis of local start-up Powercast Corporation, which has gone on to win a number of industry design awards for its variety of RF-based energy harvesting products.

Disaster Dynamics

Pitt researchers Ken Sochats and Carey Balaban, codirectors of Pitt's Center for National Preparedness, were an unlikely research duo when they came together to develop what would be called the Dynamic Discrete Disaster Decision Simulation System. The system helps to train first responders in effectively managing the many first response dynamics of a changing disaster situation. It's no surprise, though, that the system runs like a complex neural network, which has to continue to adapt all along the network even as one network factor or situation changes. That's what you get when you combine the information systems expertise of Sochats with Balaban's neuro-science research background.

"The process here has been spectacular and has allowed me to blossom [as a scientist]," says Greenberger, who is chair of the Department of Radiation Oncology in the School of Medicine. "It has allowed me to collaborate and put together lots of inventions and strategies—and all of these inventors get credit."

Greenberger and his collaborators have been studying ways to provide clinical radiation protection and, therefore, to eliminate the toxicity caused by radiotherapy to cancer patients. As a result of that research, his team has developed what Greenberger describes as a potential radiation vaccine—a drug compound that offers a synthetic protective screen for cells and even complete organisms against potentially lethal doses of ionized radiation exposure. While originally developed to aid in cancer therapies, Greenberger and his team also are targeting the protection of people facing so-called dirty bombs and other radiation-based forms of terrorism.

Greenberger offers sage advice to other Pitt researchers: "Use the technology transfer office frequently and aggressively. Get to know them, because they are your friends. Three cheers and a thank-you to the tech transfer system here."

The Accidental Innovator

Sanford Asher, Distinguished Professor of chemistry, says he most enjoys basic research but then can't seem to avoid the temptation of commercialization.

"I go from a fundamental discovery to asking, 'What is it good for?' " Asher jokes. "I don't do that on purpose, but when I do that, I end up having this little thing on the side for developing useful products. I'm too stupid to know better."

Nonetheless, Asher has proven himself a veteran Pitt Innovator over the years, generating 36 invention disclosures that have netted 23 U.S. patents and 13 commercial licenses and options. His ideas also have led to the establishment of three start-up companies.

Asher's team has focused largely on the development of crystalline colloidal arrays made from nanoscale and mesocsale quantum dots, colloids, macromolecules, and molecular recognition molecules. From that basis, Asher has developed glucose sensors that are formed into contact lenses, hydrogel sensors for detecting metals in water, and even paint additives that change color with light.

But to make any of those innovations useful and helpful to society, Asher explains, "You have to interact with people who have a very different agenda. I have great science, but if you want to help society, you've got to work with people whose interest is to take your innovation and commercialize it."

Responsibility to Change Lives

As the founding director of the University's world-renowned McGowan Institute for Regenerative Medicine, Alan Russell is used to forging his own pioneering path to innovation, and he has instilled that passion in the many researchers affiliated with the institute, all for the sake of changing lives.

"Part of our responsibility as innovators is not just how to come up with ideas but how to use them," says Russell, Distinguished University Professor of surgery, bioengineering, and chemical engineering, who recently stepped down as director after years of cultivating collaboration in regenerative medicine. "I think it's always necessary to continually reevaluate how to translate ideas into things that can change people's lives. But I most prefer to build a path rather than follow a path."

Russell has continued to pursue his own research as well, which has led to the development of numerous innovations,

> If you want to help society, you've got to work with people whose interest is to take your innovation and commercialize it.
>
> Sanford Asher

including self-sterilizing padding material that makes its own antimicrobial substance, enzyme creatine biosensors, multifunctional materials for the decontamination of chemical and biological warfare agents, and surface-active antifungal polyquaternary amine coatings, among others. All told, he has submitted 34 invention disclosures, which have led to 16 patents, 11 licenses and options, and two start-up companies.

Hands-on Innovation

Cooper, meanwhile, is the first to admit that he constantly innovates as he identifies problems and possible solutions in mobility for fast-paced, athletic wheelchair users like himself.

"For me, it's trying to help people," says Cooper, who has submitted 20 invention disclosures for consideration over the years and has obtained four U.S. patents for his innovations. "With my clinical and research programs and my own disability, I get lots of exposure to the needs of [wheelchair] users."

Rory Cooper

Cooper has developed a modular, injection-molded pediatric chair designed to "grow" with the child; a wheelchair sensor system that assesses chair speed and traveling distances as well as vibrations, shocks, and even emergency situations; sport wheels for athletes in wheelchairs; and even a process to enhance supervised evaluations of an individual's vehicle driving capability.

"I try to explore some of these concepts and bring them to reality," he says, "and success builds success. I think it's being connected [to clinical programs at Pitt] and having a curious mind as well as a large and talented research group here."

Always at Work, Observing

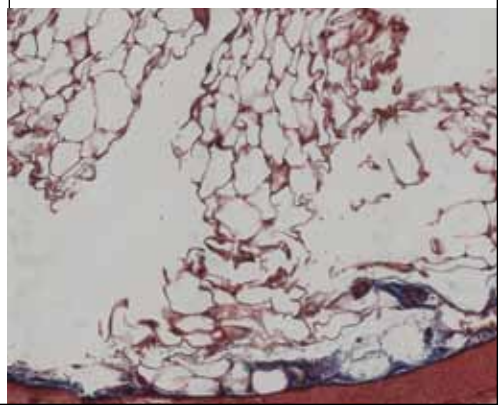
Then there's Mickle, who seems to live and breathe innovation development. Mickle, who also is executive director of Pitt's RFID Center of Excellence, and his research team have found novel ways to capture the energy needed to recharge batteries. They have developed a burst switch that preserves battery power when a device isn't in use. They have invented devices that use RF energy to provide deep-brain stimulation and others that provide miniature informational tags on prosthetic hips and other implants that are activated externally by doctors seeking implant data. One of his research projects, in fact, used RF technology to power a device that connects to the functioning eye of a patient with Bell's palsy. As the functioning eye moves, the device allows the paralyzed eye to move in concert.

Mickle works closely with his students to instill in them the discipline to observe everything around them for problems to solve as well as potential, but simple, solutions. "People need to see a bunch of stuff," he says. "They need to get out and observe. It allows you to look at things in different ways. I kid with students, telling them I want to get their time when they're stopped at a red light.

"But don't get caught up in the technology," Mickle advises other innovators. "Sometimes you just want to keep it simple."

Cementing Bone Growth

What do you get when you bring together a materials scientist interested in bone regeneration and a dental biologist interested in cleft palate and traumatic facial injury? How about a unique bone cement that not only replaces damaged or missing bone but also cultivates regeneration and renewal of the bone itself? That's what Charles Sfeir, an associate professor and director of the School of Dental Medicine's Center for Craniofacial Regeneration, and Prashant Kumta, Edward R. Weidlein Chair and professor of mechanical engineering and materials science, chemical and petroleum engineering, and bioengineering, developed out of calcium phosphate and nanostructured calcium phosphate-based materials. The new cement is capable of carrying proteins, cells, plasmid DNA, and drugs—all to support the regeneration of the bone itself.



University of Pittsburgh

Office of Technology Management

412-648-2206
www.otm.pitt.edu

Daniel Bates
Strategic Relations Manager
412-624-4474

Michelle Booden
Technology Licensing Manager, Life Sciences
412-648-2220

Brian Copple
Technology Licensing Manager, Physical Sciences
412-648-2208

Carla Crawford
Executive Assistant to the Associate Vice Chancellor for Technology Management and Commercialization
412-383-7665

Alexander Ducruet
Senior Technology Licensing Manager, Life Sciences
412-648-2219

Sandy Latini
Business Manager
412-383-7664

Jessica Lindsay-Green
Intellectual Property and Licensing Associate
412-648-2225

Marc Malandro
Associate Vice Chancellor for Technology Management and Commercialization
412-624-8787

Kelly Mertz
Financial Analysis and Reporting Manager
412-383-7139

Stacey Peace
Accountant
412-648-2226

Martania Penn
Intellectual Property Assistant
412-648-2201

Susan Rudzki
Government Compliance Administrator
412-648-2203

Lisa Spano
Technology Licensing Assistant
412-648-2206

Harold Swift
Technology Licensing Manager, Physical Sciences
412-648-2236

Jenifer Tarasi
Associate Director, Intellectual Property
412-648-3220

Stacey Thomas
Accountant
412-648-2241

Maria Vanegas
Technology Licensing Associate, Life Sciences
412-648-4004

Carolyn Weber
Technology Marketing Manager
412-383-7140

Office of Enterprise Development, Health Sciences

412-624-3160
www.oed.pitt.edu

Michele Honko
Marketing Associate
412-624-3152

Paul Petrovich
Assistant Director, Technology Commercialization
412-624-3138

Amy Phillips
Business Development Manager
412-624-3150

Andrew Remes
Assistant Director, Business Development
412-624-3134

Karen Zellars
Administrative and Program Coordinator
412-624-3160

Executives in Residence

Gregory Coticchia
Executive in Residence, Computer Software and IT
412-624-3170

Michael Lang
Executive in Residence, Medical Devices
440-725-5902

The 2011 OTM annual report
is dedicated to our Pitt Innovators,
whose imagination, ingenuity, and
innovation are changing the world.

University of Pittsburgh

Office of Technology Management
200 Gardner Steel Conference Center
Thackeray and O'Hara Streets
Pittsburgh, PA 15260

www.otm.pitt.edu

Office of Enterprise Development, Health Sciences
101 Gardner Steel Conference Center
Thackeray and O'Hara Streets
Pittsburgh, PA 15260

www.oed.pitt.edu