ECONOMIES OF SCALE

FOR DECADES, THE PITTSBURGH REGION HAS BEEN TIED TO AN ECONOMY ILL-EQUIPPED FOR EXPANSION INTO HIGH-TECH INDUSTRIES. BUT LAST YEAR'S WORK OF THE ENDOWMENTS' ECONOMIC OPPORTUNITY PROGRAM CONTINUED A BOLD INVESTMENT WITH FOUNDATIONS, ACADEMIA AND GOVERNMENT IN NEW-ECONOMY INFRASTRUCTURE.

BY THOMAS BUELL, JR.
PHOTOGRAPHY BY TOM GIGLIOTTI

>>SEEGRID Corp. Chief Scientist Hans Moravec is the dream prototype for the new worker envisioned in Pittsburgh's two high-tech greenhouse incubators: part solidly grounded academic, part ground-breaking entrepreneur. He poses with one of the Homewood-based company's hottest products, a robotic device that uses stereoscopic cameras and 3D-mapping technology to navigate through warehouse, factory or office building.

In the lower levels of the SEEGRID Corp. lab in Pittsburgh's Homewood section sits one of the world's most technologically advanced robots, but you'd never know to look at it. At first glance, it looks more like the machine used to drag shopping carts from parking lot to store. In fact, that's exactly what it is. It's known as a tugger.

What makes this particular tugger so advanced is the piece of high-tech hardware attached to its top. A set of stereoscopic cameras linked to a computer allow the machine to create a digital map of its surroundings and navigate through a warehouse, factory or office building. It could carry a wagonload of parts from loading dock to production line, or deliver items between departments, all without human guidance. No wires, no lasers, no magnets.

The first products using SEEGRID's revolutionary technology will go on sale later this year in the unglamorous but enormous materials-handling equipment market, which by industry estimates tops $60 billion a year in the United States alone. Employment at SEEGRID is expected to grow from its current head count of nine to more than 200 people in the next few years, according to CEO and co-founder Scott Friedman.

A few miles away, in the Oakland facilities of Agentase LLC, employees are assembling a palm-sized plastic sensing device that resembles a shoe polish applicator, complete with a small sponge, and all under a transparent cover. Once again, looks are deceiving. This seemingly simple tool already is being used by U.S. soldiers in war zones and by emergency first-responders in this country to detect the presence of nerve agents. It's quick, reliable and relatively inexpensive.

Later this year, Agentase plans to release a kit of sensors with expanded capabilities to detect a full spectrum of nerve, blood and blister agents. Sensors containing other enzymes capable of detecting urine and spoiled seafood also are being marketed to the health care and food packaging industries. Sales are expected to jump from thousands of units per year to millions of units, and Agentase's employment could nearly triple by the end of next year from its current level of 25 people, according to CEO and co-founder Keith LeJeune.

By converting innovative ideas developed at the University of Pittsburgh and Carnegie Mellon University into commercially viable products, SEEGRID and Agentase have established themselves as two of many high-tech success stories in the Pittsburgh region.

They also represent the dream examples of two new industrial sectors establishing footholds in a region that historically has been more comfortable managing "same-old" manufacturing and service industries. Now, with the assistance of economic development programs supported by Pittsburgh's foundation community, including The Heinz Endowments, the region is learning to compete in new economic territory.

Robotics and biotechnology, along with advanced electronics, cyber security and regenerative medicine, have become important drivers of a new regional economy fueled by local universities and a growing community of entrepreneur–innovators. "Technology-based economic development is the best way to grow," says Brian Kelley, former director of the Endowments' Economic Opportunity Program, whose seven-year tenure was marked by funding the infrastructure for this new economic sector and supporting its growth.

The creation of this new sector, which has involved key partnerships with the Richard King Mellon, Claude Worthington Benedum, McCune, Alcoa, Hillman and Pittsburgh foundations, has been dedicated to breaking the region's economy from the downward spiral in traditional manufacturing and low-wage service economies.

Two of the most influential programs are the Technology Collaborative, formerly known as the Pittsburgh Digital Greenhouse, which was created in 1999 in response to efforts to build more sophisticated computer chips, and the Pittsburgh Life Sciences Greenhouse, founded in 2002, which uses a similar model to support business development in health care–connected fields.

The Technology Collaborative was formed through a merger with the Robotics Foundry, reflecting the interrelationship between advanced electronics and a growing cluster of local companies focused on all aspects of the robotics industry.

These nonprofit organizations were founded as collaborations among state government, private industry, foundations and three academic institutions—Carnegie Mellon, Pitt and

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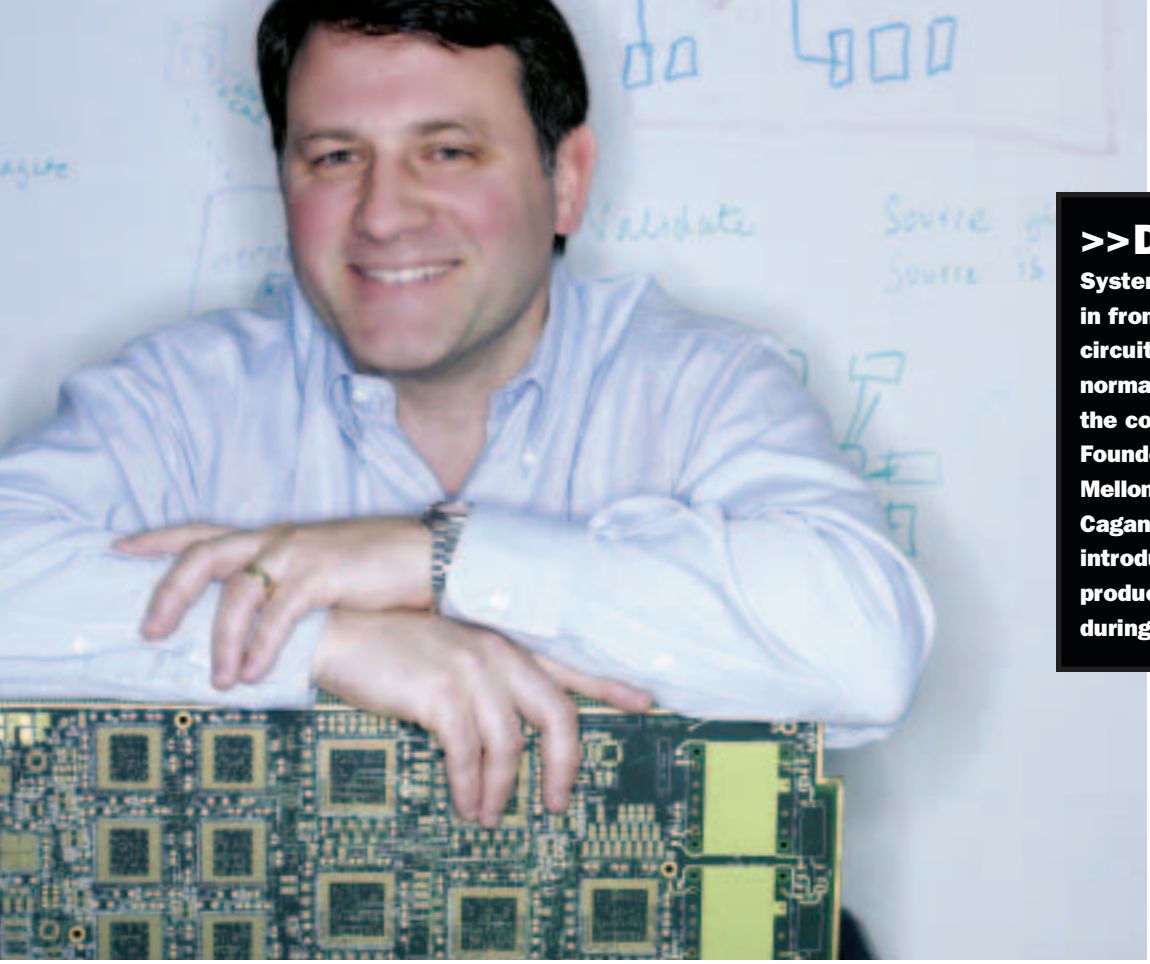

>>DesignAdvance
Systems CEO Randy Eager poses in front of an example of a printed circuit board produced in half the normal development time by way of the company's CircuitSpace system. Founded by Eager and Carnegie Mellon University professor Jonathan Cagan, DesignAdvance plans to introduce three or four other new products and add 130 workers during the next five years.

Pennsylvania State University. Also through Pitt, the region's largest medical research institution, the University of Pittsburgh Medical Center, was a key partner in life sciences. Each greenhouse is co-chaired by Pitt Chancellor Mark A. Nordenberg and Carnegie Mellon President Jared L. Cohon.

Providing the key resources are the foundations and state government. Since the creation of the Digital Greenhouse six years ago, state government has contributed $27.8 million and the foundations have awarded $5.2 million, with the Endowments supplying $2.6 million of that funding.

Since 2002, the state's contribution to the Life Sciences Greenhouse totals $33.3 million. In that same time period, the foundations have committed $48 million, which includes $16 million already paid by The Heinz Endowments.

The Greenhouses were designed to improve efforts by the universities to generate commercial ventures out of their research programs. Pitt conducts about $500 million worth of sponsored research annually, while Carnegie Mellon receives about $240 million in research funding. Both schools report that more than 120 new inventions or ideas stemmed from their respective research programs last year. Pitt spun off 10 new companies; Carnegie Mellon spun off four, but expects to add another 11 to the list this year.

"When you think about it, Pitt and Carnegie Mellon complement each other nicely because their respective strengths —Pitt in medicine and Carnegie Mellon in technology— combine to create all kinds of interesting opportunities," says Robert Wooldridge, director of Carnegie Mellon's Innovation Transfer Center. "I'm not aware of any other place that has an arrangement like that. It really makes for a stronger region."

The Technology Collaborative includes 46 member companies; the Life Sciences Greenhouse reports 27 members. Those lists include established companies with thousands of employees, as well as very small new companies with significant growth potential.

Both organizations provide seed money or matching funds for startups, and they fund innovation projects at universities and existing companies, if they see commercial potential. Investments usually range from $100,000 to $250,000, and often require internal or external matching funds. The greenhouses also oversee recruitment and professional development programs; they provide office and lab space for fledgling companies, and they link entrepreneurs with long-term investors and other sources of funding.

The Technology Collaborative has awarded a total of $15.9 million to nearly 100 research or technology commercialization projects, according to Collaborative records. The organization also has advised in the development of college programs to teach system-on-a-chip technology at the graduate and undergraduate levels, which has led to the hiring of 27 new faculty members and an equal number of support staff. Those programs have generated millions of dollars in new payroll, tuition and directed research funding. Sixteen new companies have started up in the sector, eight of which have received first funding or significant support from the Collaborative.

"We've figured out what we're good at and what markets we're going to serve, and we've really focused on those strengths," says CEO David Ruppersberger. "What we've done here in Pittsburgh is unique because of the particular strengths of the

MAKING CONNECTIONS

A key factor in Pittsburgh's leading the state's early success in advancing a new, high-tech employment center is the careful choices made in top leadership for its industry incubators. In picture, standing at left, is Technology Collaborative CEO David Ruppersberger, who helped orchestrate the merger of the Pittsburgh Digital Greenhouse with the Robotics Foundry. Next to him is Life Sciences Greenhouse CEO Doros Platika, a former neurologist at Massachusetts General Hospital and faculty member at Harvard and Albert Einstein Medical Schools, who branched off from medicine to form his own bio-tech company.

universities and the community. A lot of other cities have come looking to copy this, but they can't recreate it out of whole cloth because they don't have the assets that we do. They have their strengths, but they don't have our strengths."

Since its inception, the Life Sciences Greenhouse has invested $1.7 million in 18 companies, including six startups. Those companies leveraged those investments into more than $50 million in additional funding. The Greenhouse also invested $13.7 million in university research facilities, which has leveraged additional outside investments of $58 million.

"Our goal is to build on our new natural resources in the Pittsburgh region," says Doros Platika, president and CEO of the Life Sciences Greenhouse. "Instead of the coal and the limestone and the iron ore, today's natural resources are the universities that create the technologies and spin off the companies. Growing new industries, keeping graduates here and attracting new people are the steps that will reverse the cycle of decline. That is our challenge."

Dennis Yablonsky, who founded both the Digital and Life Sciences Greenhouses before taking his current post as Pennsylvania's secretary of community and economic development, says the two organizations will play an increasingly important role in creating new economic opportunities in the region.

"We've already seen some short-term results, and I think that will get bigger and bigger and spiral on us in a positive way," he says. "We know that the bulk of job growth comes from companies with 25 to 200 employees, and it would be great to have large baseline companies and use them as a base to grow from. Of course, those large companies often start out as small companies. You want to take a good, balanced strategy."

In addition to providing essential funding, the greenhouses also provide valuable connections to other local companies, suppliers or customers doing similar work, or industry experts and others who can advise on successful business strategies. Their goal is to create new industries and new opportunities, allowing Pittsburgh to develop successful economic alternatives instead of duplicating the outdated models and attitudes that have contributed to the region's decline.

SEEGRID grew out of advanced robotics research conducted by Hans Moravec, an adjunct professor at Carnegie Mellon's Robotics Institute and former director of the university's Mobile Robot Lab. He formed the company in 2003 by teaming up with Friedman, a medical doctor–turned-executive who had already started and sold a successful medical records software company.

How important was the Digital Greenhouse, now the Technology Collaborative, in SEEGRID's development?

"We would not be here without the Greenhouse," says CEO Friedman. "The guidance they gave us, especially in the other companies they hooked us up with, has made all the difference."

Friedman believes that the Pittsburgh region is ripe for growth in the technology sector. It's just a matter of making the connections between the people with ideas and the people with business experience.

"I know of 10 good new technologies in town that I think would make nice business opportunities," he says. "We just need 10 good business people who could make them successful. Technology startups require a different mindset, but that's starting to change here."

Agentase's core technology grew out of chemical engineering research LeJeune was doing with Dr. Alan Russell at the University of Pittsburgh, where LeJeune earned his bachelor's and master's degrees, and later at Carnegie Mellon, where he earned his doctorate. LeJeune and Russell co-founded Agentase in 1999.

Funding from the Life Sciences Greenhouse was an important addition to military research contracts used to launch the company, LeJeune says. "But they helped introduce us to a testing facility here in the area that could do work that we'd been having done in Missouri," he says. "And I've gotten tremendous benefit from their Executive-In-Residence program," which allows startup executives to work with veteran industry executives.

LeJeune believes that the momentum being built by the Greenhouses and the universities will continue to produce more technology success stories by reinforcing the region's credibility as a good place to start certain types of high-tech companies.

"If we get a reputation for creating models for the way technologies are developed into companies, that will bring great benefits to the region as a whole," he says. "People will see our success outside the old models, and we can then use that as leverage, which will have a dramatic impact on the number of new companies that start here."

Many local high-tech companies in Pittsburgh have stories about how the Technology Collaborative or the Life Sciences Greenhouse has made a difference in their growth.

Randy Eager, CEO and co-founder of DesignAdvance Systems, says a contact he made through the Digital Greenhouse proved to be the turning point in his decision to join Carnegie Mellon Professor Jonathan Cagan to start the company, which recently unveiled a program to cut in half the time required to design new printed circuit boards.

While attending a Greenhouse function, Eager met Ted Vucurevich of Cadence Design Systems, a world leader in electronic design automation technology based in California's Silicon Valley. It was also one of the founding companies behind the Pittsburgh Digital Greenhouse.

"He said if you can do these three or four things, then you have something," Eager recalls. "And that was my last day of due diligence, because I knew we could do those things. It was amazing. Everyone in Silicon Valley is standing in line to meet Ted Vucurevich, and I got to meet him in Pittsburgh, thanks to the Greenhouse."

DesignAdvance expects to introduce three or four new products over the next five years, and to boost employment to about 130 people.

Eager says his company's success illustrates how technology companies can take hold in places other than Silicon Valley.

"We're a poster child for what the Greenhouses and the universities are trying to do," he says. "We're taking a good new idea and commercializing it locally. If we were in Silicon Valley, we might be further along, but Pittsburgh was a great place to do this. We didn't even consider moving."

Yablonsky says it's companies like SEEGRID, Agentase and DesignAdvance that prove the importance of investment in the Greenhouses and other technology-related economic development programs.

"Pittsburgh has been blessed with a large and active foundation community dedicated to the region, and notably to the Greenhouses," he says. "Without foundation support, they would not be able to accomplish what they're doing. I think the payoff has really begun." *h*

>>Agentase CEO Keith LeJeune displays a tray of nerve gas sensors. The device, which employs enzymes to detect the presence of nerve agents, already is in use by the U.S. military and emergency first-responders. LeJeune, who received his doctorate from Carnegie Mellon University, predicts that the 25-member company will triple in size by the end of next year.