

IDEAS

With a new vice provost for entrepreneurship, Rensselaer is working to infuse **the spirit of entrepreneurship** across campus and in every student

BY JODI ACKERMAN FRANK

IN ACTION

ROBERT CHERNOW first ventured into the world of entrepreneurship in 1970 during his Peace Corps mission in a poverty-stricken village on the Brazilian coast where he started a successful fishing cooperative that still operates today. “That was a true venture,” says Chernow, vice provost for entrepreneurship. “I had an idea and had to bungle my way through a different culture to make it work.”

It is this entrepreneurial spirit—trusting an idea, taking risks, plunging into the unknown, and harnessing innovation to turn a concept into a thriving enterprise—that Rensselaer wants to instill in every student, from the freshman to the Ph.D. candidate.

“College campuses are idea incubators where people learn skills and forge work habits and relationships that serve them all their lives,” says Chernow. “We know there’s an entrepreneurial spirit sweeping across college campuses today, and I am thrilled to build on this momentum so that entrepreneurship becomes a natural and vital aspect of the Rensselaer experience.”

“Our plan for entrepreneurship education encompasses every aspect of the Rensselaer experience,” Chernow says. “We plan to integrate existing courses and develop new ones, provide more experiential learning opportunities, new seminars, a speaker series, and networking opportunities for all our students.”



ON THE LEADING EDGE OF A NATIONAL TREND Colleges and universities around the country are increasingly taking a similar approach, with significant growth in entrepreneurship education in the last two decades, according to the Ewing Marion Kauffman Foundation, a national philanthropic organization based in Kansas City, Mo., that promotes entrepreneurship education.

“Entrepreneurship across the curriculum is the fastest-growing field of study,” says Paul Magelli, a Kauffman scholar-in-residence who compiled the “Census of the Status of Entrepreneurship in American Higher Education: 2006.”

According to the foundation, more than 1,600 colleges offer courses in entrepreneurship, up from 1,050 in the early 1990s, and from 300 schools in the 1980s. At least 300 four-year higher education institutions now offer courses designed for students not enrolled in the business school.

Fostering entrepreneurship is one of the main thrusts of *The Rensselaer Plan*, the Institute’s blueprint for success. The plan calls for infusing understanding and encouragement of entrepreneurship throughout all five academic schools and student programs, and cultivating a campus culture that motivates students and graduates to pursue commercialization and enterprise-building activities.

Chernow joined the Institute in January as its first vice provost of entrepreneurship to lead the efforts in integrating the study, research, and practice of technological entrepreneurship across the curriculum.

A highly seasoned entrepreneur, Chernow formed the first of two companies, Corporate Health Strategies in New Haven, Conn., after his fishing co-op venture in Brazil. The move would take him into a 21-year career in the health-care industry, where he specialized in developing new technologies for data analysis. By the time he sold

the company to Metropolitan Life three years later, it had 500 employees and had grown to \$50 million in revenues.

Chernow also was founder and president of Educational Services for Entrepreneurship, a nonprofit organization established in 2004 that assists universities in shaping their entrepreneurship initiatives. He served as senior vice president and head of entrepreneurship programming at the Kauffman Foundation, where he worked with more than 30 universities around the world, as well as women and minority organizations and venture capitalists, to expand programs.

“I’ve worked with a number of schools around the country that were interested in cross-campus entrepreneurship, and after also interviewing hundreds of entrepreneurs as part of my research, my perspective has been greatly expanded to view entrepreneurship as an integral, campuswide activity,” Chernow says.

“No campus program is likely to be successful without support at the highest levels. In this regard, Rensselaer is leading the way by having created an entrepreneurship position at the provost level.”

Chernow defines entrepreneurship at Rensselaer as a process by which an individual develops an idea and applies creativity, initiative, and innovation to transform that idea into something that creates new value, which in turn creates new opportunities. Widely practiced at Rensselaer, it is reflected in commercial, scientific, technological, social, and cultural achievements. “It’s a way to think, a way to learn, and a way to succeed,” he says.

By leveraging its core strengths in innovation and creative thinking across all schools, Chernow believes that Rensselaer will become the premier university in technological entrepreneurship with global reach and impact.

Chernow has been impressed by the breadth of entrepreneurship activities already taking place in the classrooms on campus. Through programs such as Product Design and Innovation (PDI) and the O.T. Swanson Multidisciplinary Design Lab (MDL), and courses like *Inventor’s Studio* and *Introduction to Engineering Design*, the spirit of creativity and innovation exists at Rensselaer. The vision, he says, is to link and coordinate them.

“The PDI program is one of many opportunities, offered by the School of Engineering in collaboration with a number of other schools and departments, that gives students the experience of a professional engineer,” says Alan Cramb, dean of engineering. “Engineers today need to understand not only classical and novel engineering principles, but also aspects of management, business, and economics.”

The Lally School of Management and Technology, which has traditionally served as the academic center for entrepreneurship at Rensselaer, is working to help expand entrepreneurial activities across the disciplines. “The walls between Rensselaer’s departments and schools, certainly compared to other academic institutions, are very low,” says David Gautschi, dean of the Lally School. “And so, we have consciously worked with this to build formal collaborations across campus with the goal of eliminating these walls altogether.”

This year, for the first time, students in any major during their sophomore or junior year will be able to apply for a five-year master’s program in technological entrepreneurship and commercialization.

“The main concept behind this new multidisciplinary model is for students to have a background in management and at least one technical or scientific field,” Gautschi says. “To compete in today’s world as a technological entrepreneur, students have to acquire a breadth of skills as well as a depth of knowledge in a particular discipline so that the basis of product development is firmly planted.”

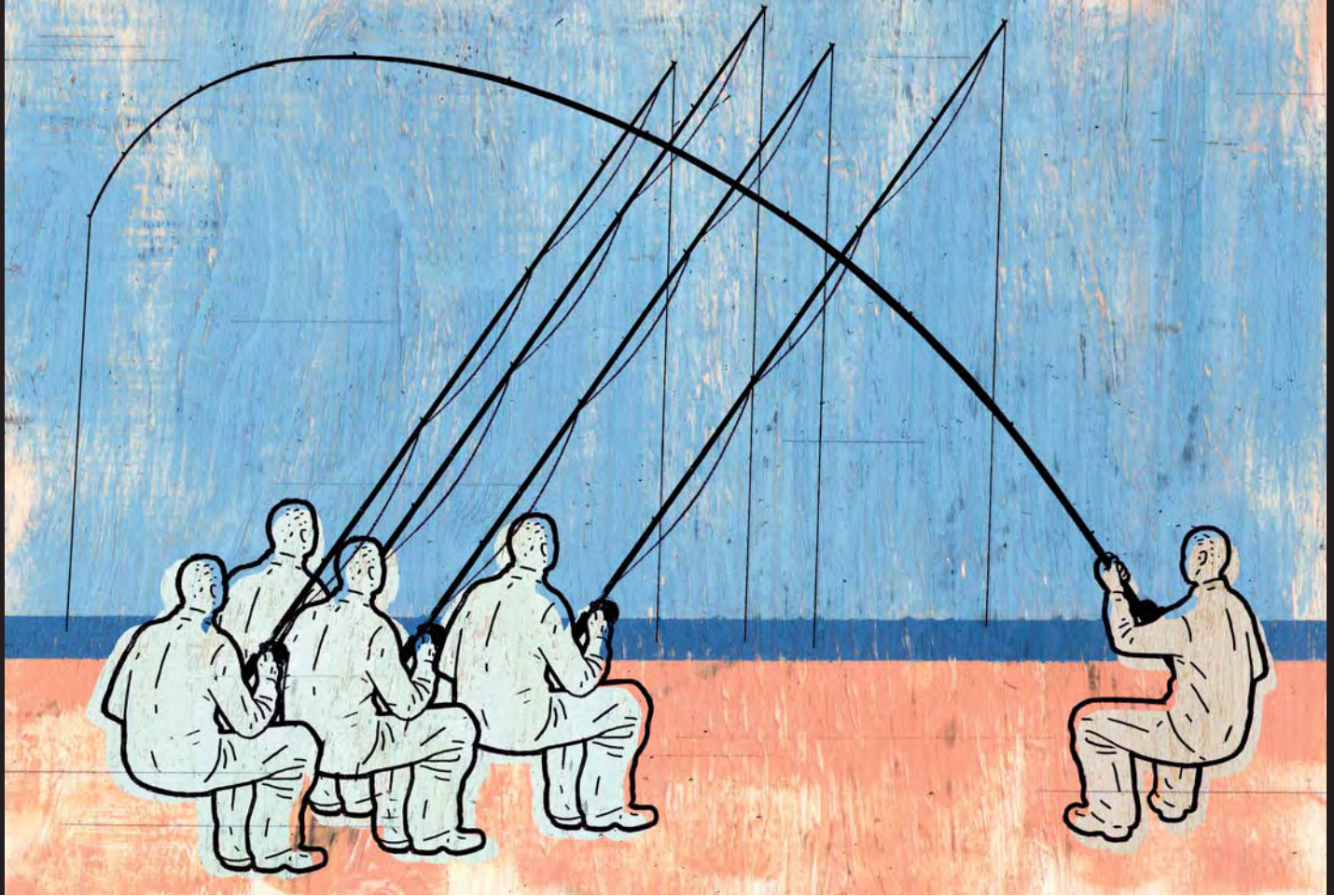
Initially, the program began as a collaboration with the School of Engineering, but rapidly expanded as a campuswide initiative. “Every single school wanted to be involved in this program,” Gautschi says.

Since its founding in 1824, Rensselaer has been known for its entrepreneurial drive and success. With rapid technological change and a global marketplace transforming the world, Rensselaer is adapting to stay true to its original purpose of transferring scientific discoveries and advancing technologies into practical applications—which translate into sustainable enterprises and lucrative business opportunity.

The university’s world-class incubator, the Rensselaer Technology Park, and the Severino Center for Technological Entrepreneurship continue to be national models. Together, they provide resources for those who strive to combine technological know-how with business savvy.

“Rensselaer has a strong track record of students across disciplines working together to combine their creative passion in devising new technologies with business concepts in class,” says Gautschi. “They then move on to create new companies and products in the incubator. As they gain traction in the marketplace, many eventually move their businesses to the Rensselaer Technology Park, where they can continue to take advantage of educational, research, and other university resources.”





That's what longtime entrepreneur and Rensselaer Trustee Paul Severino '69 was motivated by when he and his wife, Kathleen, contributed \$5 million in 1999 to endow the center, which was established in 1988. An engineer and computer-networking pioneer, Severino launched Interlan, one of the nation's first local area network companies, in 1981 and Wellfleet Communications in 1986, also one of the first market-leading Internet router companies. He now serves as chairman of the Massachusetts Technology Development Corporation, a Massachusetts economic development venture capital firm.

"The Severino Center in conjunction with the university's technology and research base along with the incubator is an entrepreneurship model that works very well for Rensselaer," Severino says. "With the Center for Biotechnology and Interdisciplinary Studies now in place and the tremendous increase the Institute has seen in funded research, we continue to build on that model."

"It's the same model that has worked for Silicon Valley, and has worked for the MIT-Boston area. It works for Austin, Texas," he adds. "It's a model of a very strong technological university that generates opportunities for entrepreneurs. And, that attracts investment and venture capital for not only Rensselaer but for the entire Capital Region."

Working closely with the Incubator and the Technology Park, the Severino Center acts as the academic bridge between students and business opportunity, providing the infrastructure and advice to start, run, and finance new high-tech ventures.

Among its robust array of courses, internships, and practical experiences are the popular Tech Valley Collegiate Business Plan Competition for Rensselaer and other area college students, and an annual venture forum that brings in venture capitalists and senior-level executives to hear presentations by early-stage companies in the incubator. There's

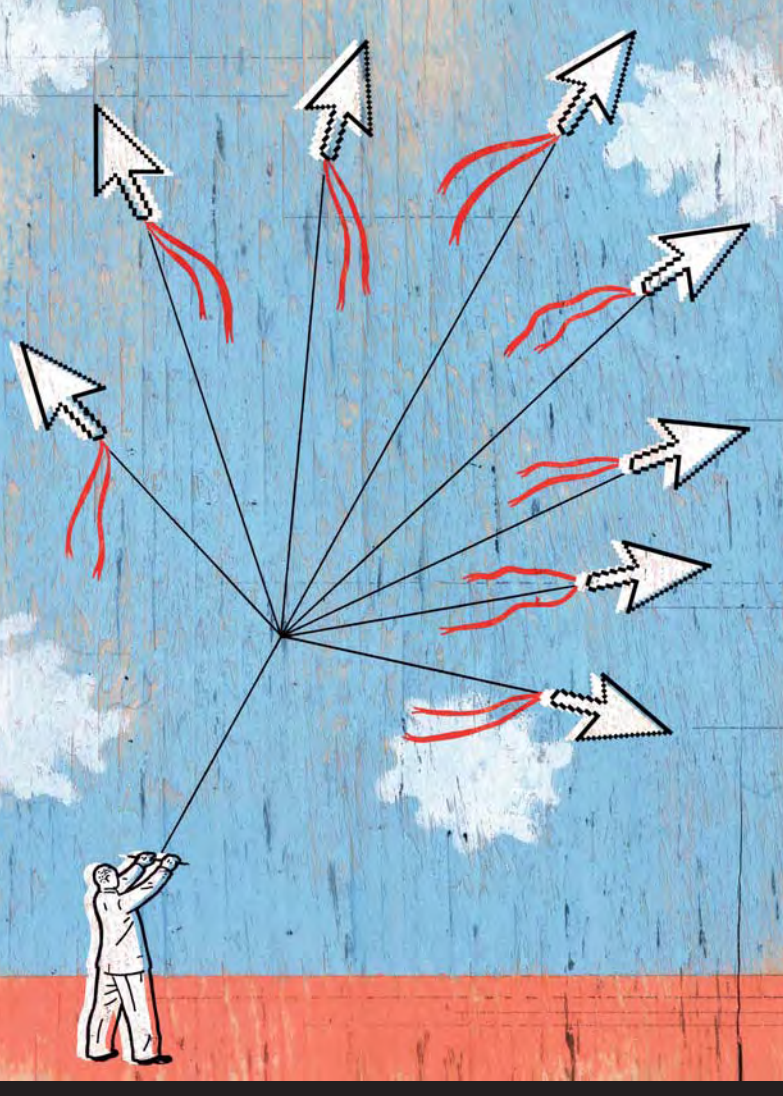
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also the Biotechnology Management and Entrepreneurship Seminar Series and the annual William F. Glaser '53 Entrepreneur of the Year celebration. Through the center, the university also offers the Herman Family Fellowship for Women in Entrepreneurship.

Today's entrepreneurs at Rensselaer are building on the Institute's tradition of innovating businesses across the disciplines. For Mark Cafaro '06, multidisciplinary programs such as the Product Design and Innovation (PDI) courses, offered jointly by the School of Engineering and the School of Humanities and Social Sciences, gave him and his partner, Benjamin Smith '06, the boost they needed in jumpstarting their new company, Weardian. Both PDI majors graduated this year with their bachelor's degrees.

In fact, their company was born while the pair was completing the



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this year, and six more have joined as virtual members. The new tenants have specialties in areas that range from advanced speech recognition to terahertz technologies.

“Weardian is a perfect example of what can happen when coursework, research, and commercialization all merge in the same direction,” says Michael Tentnowski, director of the Incubator Program.

To help fledging companies succeed, Tentnowski pulls from academic, research, and administrative resources across campus as well as connecting tenants to the greater business community of intellectual property attorneys, accountants, angels, and venture capitalists.

The incubator, established in 1980 and one of the oldest university-based business incubators in the country, has a long track record of success, from MapInfo and Albany Molecular Research to the hundreds of smaller companies and entrepreneurs it has served. More than 60 percent of the companies housed in the incubator have evolved from research at Rensselaer or have been started by alumni.

“As all of these companies succeed, they serve as examples and models to the university, stimulating additional research with a renewed focus on commercial application,” Tentnowski says.

Being an entrepreneur today compared with 10 years ago has changed “dramatically,” with a climate of competitiveness more fierce than ever before, Severino says. Corporate scandals have brought an onslaught of new governmental oversight that has made the stakes higher for any company entering the market. But, perhaps the biggest challenge, says Severino, is the new high-performing competition from China and India.

“They have got the bug for entrepreneurship. They’re starting companies, and they’re doing very well,” he says.

When Severino started his companies three decades ago, there was no competition from those countries and very limited competition from Europe and even Japan.

“If you look at all the entrepreneurial activity through the ’70s and ’80s, and even in the ’90s, around computer networking and information technology, it was a totally American phenomenon,” he says. “Now, there’s a tremendous amount of competition coming from places overseas where there is a lot of talent, engineers, and scientists. There is even growing competition for American venture capital.”

With this in mind, the Lally School is enhancing and creating new courses and collaborations focused on technological entrepreneurship with an international component at both the undergraduate and graduate levels.

“To be a competitive business leader today, you have to think globally,” Gautschi says.

Inventor’s Studio, a PDI class that focuses on problem solving, concept generation, and business strategy. A third partner, Meredith Blumenstock, also a PDI major, recently joined the team as she completes her undergraduate degree.

“It was through this course that we identified the need for a chemical-free artisanal gold mining device,” Cafaro says.

Small-scale—or artisanal—gold-mining operations depend on the use of mercury, a well-known neurotoxin, to extract gold from sediment. In the process, dangerous amounts of mercury escape into the air as well as leach into the water and ground, polluting the local food and drinking supply. While the use of mercury for mineral extraction processes has been virtually eliminated in developed countries, its use for gold mining in the developing world has increased exponentially.

“Weardian is utilizing an age-old process of gold extraction through centrifugal force to capitalize on gold’s high density for extraction instead of its chemical properties,” Cafaro says. “While this operation has been traditionally used in large-scale mining operations, we have invested in the idea that it can be used to fit the needs of artisanal miners.”

The company, which has filed for a provisional patent, recently secured a \$17,500 grant from the National Collegiate Inventors and Innovators Alliance to further develop their product while they search out additional mentors and venture capitalists with firsthand knowledge relating specifically to the targeted Brazilian commercial market.

Today, the Incubator is hopping with new activity. Weardian is one of eight new technology companies that set up headquarters at the facility

As part of that mission, the school has identified four areas of the world with which to pursue collaboration. These include China and India, the world's two most rapidly expanding major economies, and Ukraine, the R&D center of the former Soviet Union. The fourth focal point, the Maghreb region, includes Tunisia, Algeria, and Morocco, three countries in northern Africa that, because they are geographically close to Europe, have accelerated their technological progress.

In pursuing connections in Ukraine, the Lally School has begun collaborating with a company, Archimedes Group, geared toward commercializing Ukrainian technologies. The company, which recently moved into the incubator, was founded by George Markowsky, a visiting professor of management and technology. "Our plan is to help build new companies around specific technologies," Markowsky says.

Three interns, one from the Ukrainian company Yuzhnoye and two from Rensselaer, will be working for Archimedes beginning this fall. Yuzhnoye (pronounced Yush-noi), which once built all the intercontinental ballistic missiles for the Soviet Union, now specializes in civilian spacecraft technologies. Through internships and other opportunities, Archimedes will work with Yuzhnoye and other Ukrainian corporations to commercialize many of the spin-off technologies that were developed for specific uses within these companies but can be expanded for a host of other purposes.

"This is the model we would like to build off of to give our students opportunities for experiential learning in an international atmosphere," Gautschi says.

The concept of entrepreneurship is often narrowly defined to only relate to starting a business. Although entrepreneurship is the fastest growing sector, in fact, not everyone will start a for-profit business. The hope is that entrepreneurship education will enable all students to add significant value to any working environment.

Chernow believes those with an entrepreneurial mindset tend to be more productive in whatever they pursue. They run nonprofit organizations more smoothly, are more proficient educators, and become better writers and artists.

"It's not critical that everyone needs to become an entrepreneur, but they should know how to think like one. I can't think of a single discipline that cannot benefit from an entrepreneurial outlook," Chernow says. "The skills embodied in entrepreneurship are really life skills—some would say survivor skills—required in today's global, hypercompetitive world."

"Social entrepreneur" also has become a popular term to describe those who are focused on helping developing countries become more sustainable in solving their own problems.

"The challenges facing the world are, unfortunately, often left to politicians and other liberal arts majors to solve," says Sean O'Sullivan '85, who founded JumpStart International, a non-governmental organization created to focus on reconstruction in war-torn Iraq and in the Gaza Strip. "In fact, many problems in today's world are quite simple but require good engineering solutions to improve a situation. I know Americans in general want to help improve the condition of life on the planet, but since the status quo isn't sufficient, entrepreneurship is the way forward," O'Sullivan says.

Support for Entrepreneurship Education

Rensselaer alumni, foundations and support programs, and industry have played significant roles in building new Institute entrepreneurship programs and opportunities over the last several years.

In 2001, Rensselaer Trustee Mike Herman '62 and his wife, Karen, gave \$1 million in start-up funds to make the Institute one of the first technological universities where students in all fields learn the principals of entrepreneurship. As a result, the topic has been embedded into the First-Year Experience program. It also has become a critical component of the capstone experiences that require students to solve a significant, open-ended design problem, and show competency in assessing market opportunities and executing business plans.

"Our family is very excited with the hiring of Rob Chernow as vice provost to enhance Rensselaer's commitment to entrepreneurship across the curriculum," says Herman, past president of

the Kauffman Foundation. "The Board of Trustees strongly backs Dr. Shirley Ann Jackson's vision, in *The Rensselaer Plan*, that the Institute will be a force in the arena of entrepreneurship."

Last year, Sean O'Sullivan '85 donated \$1 million to create the "Change the World Challenge." Designed to stimulate creativity, innovation, and entrepreneurship, the competition is open to all undergraduate and graduate students at Rensselaer.

"I hope this contest will inspire a stream of innovation," says O'Sullivan, a founder of Map-Info, the world's leading producer of desktop mapping software.

For the competition, students select a topic from a list of challenges and offer a new, long-term, sustainable solution. In addition to the idea competition, in which a group of winners each receive \$1,000, additional support is given in recognition of the "best of the best" ideas to assist students in pursuing patents.

Earlier this year, with significant support from the Lemelson-MIT Program at the Massachusetts Institute of Technology, Rensselaer established the \$30,000 Lemelson-Rensselaer Student Prize to reward student inventiveness. The competition, offered to undergraduate seniors and graduate students beginning next year, will be awarded annually to a student who has created or improved a product or process, applied a technology in a new way, redesigned a system, or demonstrated remarkable inventiveness in other ways.

"Inventiveness—generating ideas and solutions to problems—is a critical component in entrepreneurship," Chernow says. He plans to establish programs to narrow the gap between the real world and the classroom by connecting the stories, wisdom, and resources of entrepreneurial alumni with the spirit, drive, and creativity of entrepreneurial students, faculty, and staff.