From Europe to Asia, in strategic locations around the world, the College of Engineering (CIT) has planted its flag. By cultivating partnerships with overseas governments and industry giants, in six years, the College has established education and research programs in Greece, Taiwan, and other countries that are the same caliber as what you would find in Pittsburgh. Creating these programs has not been easy because the quality standards we set for ourselves here in Pittsburgh must also be met abroad. With any venture that involves education, research, cultural differences, and large sums of money, there will be myriad issues to work through, logistics to work out, and sometimes bureaucracy to work around, yet CIT has demonstrated the capacity to do it. But the question remains: Why do we do it?
Taking a Closer Look at Our Global Efforts

"It Starts With a Vision.

From his corner office overlooking Oakland’s Panther Hollow, Dean Pradeep K. Khosla makes decisions that affect the College of Engineering’s reputation worldwide. Khosla, who is believed to travel abroad more than any person at Carnegie Mellon, is a self-proclaimed “firm believer in taking the American model of education and putting it in other countries.”

But what is the American education model? According to Khosla, in the aftermath of WWII, the U.S. government began funding research at schools that were traditionally teaching institutions. This support gave rise to the great American research university and helped give the United States the edge in technology development. “Countries around the world don’t have this notion of the great American, or in this case, the great Indian or the great Chinese research university,” says Khosla. Expanding his point, he continues, “If you look in the U.S., there are lots of technologies, industries, and even companies that came directly from university-funded research. This is not the case in the European Union, India, or China. I think if the rest of the world wants to take on positions of leadership in technology areas, then they have to follow the American culture.”

Although he’s driven to take the Carnegie Mellon cachet abroad, he’s aware of the concerns surrounding the implementation of our programs in foreign countries, as well as the fear that if we help others cultivate their technology, we may be eroding the university’s and even our nation’s dominance in engineering.

“My counter argument to that is this, ‘If we don’t help others abroad, somebody else might. And who said that other countries can’t figure out the merits of the American model and implement them on their own?’” says Khosla.

In his mind, the university has a choice. It can remain inert and watch the future unfold, or it can disseminate its knowledge and culture and help shape the future. Khosla advocates for the latter. “It’s not only about making the Pittsburgh campus great. It’s also thinking about how to make the world a better place,” he says.

On a more tangible level, Khosla affirms that having a presence in other countries gives the university greater visibility. “We have become a well-known name in a number of countries, and this means we get higher-quality student applicants. This is a big win from my perspective,” says Khosla.

Another big win is that the university is developing mutually beneficial relationships with foreign companies. Carnegie Mellon is accustomed to working with industry, but this is not the case for most foreign universities, where there is a disconnect between industry and academia. In this aspect, Carnegie Mellon’s international programs are shaking up the status quo. Carnegie Mellon’s first overseas program in Greece, Athens Information Technology (AIT), was founded by Socrates Kokkalis, the founder of Intracom Defense Electronic, Greece’s largest manufacturer of defense electronics products, systems, and applications.

“Now there’s a lot of synergy between the research that goes on at Intracom and
the AIT. They are working jointly, which was not the case before,” says Khosla. In Carnegie Mellon’s Portugal-based Information and Communication Technologies Institute, Portugal Telecom, the largest telecommunications operator in Portugal, has signed on as a research partner. A specific goal of this collaboration is to initiate, much like in Greece, collaboration between Portugal’s education and industry sectors.

Who Calls Whom?
Establishing programs in other countries takes tremendous effort, so how does CIT decide where to set up shop? “We could say that we want to be in places A, B, C because that is where the market is,” says Khosla, but that’s not how it works. “We are not in the mode of selling ourselves. When potential partners contact us, we evaluate if that partnership is right for us. We select countries that make sense,” he says.

“I think it is easy for people to say, ‘Why are we over there? We are diluting our time and resources.’ On a conceptual level, I would not argue with that statement because it seems to make sense,” says Khosla. “But for about six years now, we have invested the effort to create international programs, and they have made a big impact on the Pittsburgh campus. We get better-quality students, and we get access to resources that allow us to build up our faculty and our research enterprise here. If an international partnership doesn’t promise to make a positive impact in Pittsburgh, then the deal is not going to happen.”

Venturing into new turf is never easy, but back then, just like today, we adhered to the policy of carefully choosing our partners. “Our international model is to partner strategically with another institution to deliver our programs,” says Dena Haritos Tsamitis, the director of the INI. A key component of Carnegie Mellon’s model hinges on the spirit of collaboration. “We pick a university or academic institution that we feel is a capable, strong partner. We oversee the operation and delivery of education from Pittsburgh, yet we rely on our international partners to teach part of the program, provide student support services, and to take part in decisions,” she said.

Today, in addition to Pittsburgh and Greece, the INI has graduate programs in Kobe, Japan, launched in fall 2005, and Lisbon and Aveiro, Portugal, launched in fall 2007.

A Look at the Logistics
The need for a strong, capable partner becomes evident when you look at what it takes to provide a high-quality education to students who are thousands of miles away. According to Tsamitis, for each of the INI programs, each semester two core courses are taught from Pittsburgh and delivered in real time to the international location via distance learning technologies. The remaining courses are taught on site by Carnegie Mellon adjunct faculty. (Faculty from partner institutions have gone through a review process to receive adjunct faculty status, and they are reviewed every three years.)

“Our partners have expert faculty. They have strong leadership. They have state-of-the-art labs and facilities, and they provide the infrastructure in terms of student support services and physical infrastructure. We focus on delivering the education, including the administrative aspect that has proven to be very complex,” says Tsamitis. “Admissions, enrollment, requirements tracking, all of that happens here in Pittsburgh, and because different cultures have different timeframes associated with their academic cycles, we had to change the way we do things here.”

To accommodate prospective students from across the globe, for example, the INI lengthened its enrollment period from February to April to February through July.

In these international programs, Carnegie Mellon is holding up its end of the deal: We are delivering a high-quality education. “We have data that provide evidence that the degree earned in Greece or the degree earned in Kobe is equivalent to the degree earned here. We have a comprehensive educational assessment process throughout these programs that we will replicate for our new programs in Portugal,” says Tsamitis.

Although a Carnegie Mellon degree is prestigious regardless of where it is

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We’re Building a Community of Scholars.
In 2002, the Information Networking Institute (INI) partnered with Greece’s AIT to create a degree-granting program. This was one of the university’s first major moves into the global arena.
“Cultures are certainly touching and merging at some points. We have to understand the differences and then we can operate better.”

earned, there are differences in the student experience that are dependent on a student’s locale. We can’t guarantee that students at our international campuses will enjoy the full range of social and educational opportunities like those found in Pittsburgh.

“Our campus enriches the educational programs with the diversity that is present here. Our students come from around the world. Across our many colleges and departments, there is interdisciplinary research that takes place as well as an abundance of co-curricular activities. It is this Carnegie Mellon experience that we can’t guarantee at these remote campuses,” says Tsamitis. Cognizant of this matter, the INI offers an exchange program for students at partnering institutions. When students take part in the program, they benefit from all of what Carnegie Mellon has to offer. “The exchange program has been very successful in helping students reach both their educational and career goals,” says Tsamitis. “Students can do their master’s project here under the supervision of a Pittsburgh faculty member or take courses in CIT, School of Computer Science, the Heinz School or at Tepper. These exchange students have been hired by Oracle in California and Motorola in Chicago. Top companies, top salaries.”

As beneficial as the exchange program is, there are not enough resources to accommodate a large number of these international students, but that is not necessarily a negative. Retaining strong ties to the Pittsburgh campus is important for these students, but living in the context of a global society, all of CIT’s students and faculty around the world need to have access to each other. “We have been successful in establishing these remote programs in three countries. Now, the next phase in our model is to build bridges and establish a community among these programs and Carnegie Mellon so everyone feels like they are part of Carnegie Mellon,” Tsamitis says, “We’re building a community of scholars.”

Joint research efforts are happening among the remote campuses, but “we want to make interaction among students and faculty across all these programs seamless,” she says. “Last year, we had a course taught from Qatar to Japan. This year, we’re having an economics course taught from Australia to Japan.” When students are asked how distance learning affects their education, they say that they get a different perspective from their peers in other countries. Sometimes they see a completely different approach to solving a problem.

Other initiatives under way include fast-track programs. “Our first offering will be out of Qatar,” says Tsamitis. “The students who graduate from the computer science program there will have the opportunity to enter into a fast-track INI program at any of our international locations.” Because these students completed some INI requirements during their undergraduate program in Qatar, they will be able to earn their master’s in as little as 12 months instead of the normal 16 to 20 months.

Conferring degrees is obviously one of Carnegie Mellon’s goals, but we want to accomplish more. “We want students in these programs to say, ‘I’m a Carnegie Mellon student.’ We want our graduates to say, ‘My Carnegie Mellon education helped me achieve my career goals,’ and years from now, ‘I’m a proud alumnus of Carnegie Mellon,’” says Tsamitis. “We want people to feel a strong connection to Carnegie Mellon even though they may have never stepped foot onto the Pittsburgh campus.”

Opening the Door to Asia

When Tsuhan Chen was hired by the College of Engineering in 1997, he was collaborating with Taiwan’s Industrial Technology Research Institute (ITRI) on small, individual projects. Now 10 years later, an ITRI satellite lab has been established at Carnegie Mellon, and the university is heavily involved in Taiwanese-sponsored security research.

Creating fruitful research agreements in Taiwan wasn’t onerous, but it did take an understanding of cultural differences and a lot of time. Like a seedling taking root, the relationship between Chen and his Taiwan peers was carefully cultivated. This allowed confidence and camaraderie to flourish and pave the way for more ambitious collaborations.

“I personally have been working with ITRI for many, many years,” says Chen, who is now the associate department head of electrical and computer engineering. ITRI is the organization in Taiwan that attends to the technological needs of the country’s industrial development and it is an active member in the global industrial R&D community.

“In 2002, ITRI officials came to me and said, ‘Tsuhan, it seems like things have been going well, so why don’t we try to expand our efforts.’ I said ‘sure, but I am just a one-person operation. May I introduce other professors? Then we can form a research center that will be an ITRI satellite lab.’ They bought the idea.” In 2003, a high-ranking delegation from Carnegie Mellon went to Taiwan and met with Taiwan President Chen Shui-bian. A five-year contract for $1 million each year was signed.

“Globalization is happening, and we have to realize the difference between the two cultures,” says Chen. “For most Eastern cultures, it takes time to build a relationship, but once it is built, it is very difficult to end. Now, I think the Western culture is more about ‘OK, I like you this year. I may not like you next year. Oh, I will like you again in the third year.’ It is all very much based on the bottom line.”

“As it were, the cultures are certainly touching and merging at some points,” continues Chen. “We have to understand the differences. And then we can operate better.”
Why Our Collaborations Succeed

The ITRI lab that was formed at Carnegie Mellon is not made of bricks and mortar—it’s a “virtual lab,” and it’s alive with Carnegie Mellon and Taiwanese researchers. “This is so different from the current model that we use with most sponsors,” says Chen. He explains that typically, the sponsor’s role is primarily fiscal, and our researchers deliver what is specified in a contract. However, a key feature of the ITRI agreement is that their engineers and technical managers travel to Carnegie Mellon to work alongside our professors in their labs, and in turn, our faculty go to Taiwan.

The Taiwanese, of course, expect products from these collaborations, but what they deem as “most beneficial is that their people become educated during the process,” says Chen. “By education, I am not talking about getting a degree. By education, I mean really knowing how Carnegie Mellon researchers perform research. Their engineers come here to learn that. Likewise, our professors go there. I go there almost once a month,” states Chen.

As proof that the ITRI lab is achieving its goals, in October 2007, a Carnegie Mellon delegation that included President Jared L. Cohon traveled to Taiwan, where the ITRI contract was renewed for another five years. “It is important that our top administrators as well as our professors go to Taiwan. It shows Carnegie Mellon’s commitment to making this a long-term relationship,” says Chen.

Because the ITRI venture has proven successful, the National Science Council of Taiwan chose to expand its relationship with the university by partnering with Carnegie Mellon’s CyLab. In 2006, the International Collaboration for Advancing Security Technology (iCAST-Carnegie Mellon) was formed with funding of $1 million a year for three years. iCAST focuses on a variety of security issues, including the development of remote authentication tools, intrusion-detection systems, and secure video surveillance.

Carnegie Mellon is benefiting from these international arrangements in a number of ways. First, the obvious: The funding we receive allows us, along with the Taiwanese, to expand security research. Second, there is an increased awareness and understanding of cultural differences. “The Taiwanese see benefits of collaborating with Carnegie Mellon that go beyond technology. They see their people being in Pittsburgh, learning the culture and research philosophy and taking all that home as being very important,” says Chen. The same can be said for our professors who travel to Taiwan.

“I think the international collaborations that we have established in the past few years have resulted in funding, in the exchange of visitors, but more importantly, they impress our reputation into that region of the world,” says Chen. “Because of our presence in Asia, we’re attracting brighter international students.”

“We must understand that for many years, people in Asia have not been aware of Carnegie Mellon,” he says. “It wasn’t until 20 years ago that we realized that it’s important for us to go out. Now, because we are in Asia, people there think of Carnegie Mellon as one of the top universities in the United States. It wasn’t like that before. But even now, we are still struggling because we must compete against other top, well-recognized U.S. universities. We have to do more.”

Portugal: A Culmination of What We Have Learned

In Greece and Japan, the College of Engineering established graduate education programs. In Taiwan, we teamed with government, industry, and academic institutions to conduct research. Now, Carnegie Mellon is in Portugal, where we will apply all we have learned as we proceed into what is our most ambitious international collaboration to date.

“The CMU-Portugal Program is different from all of the other activities going on at Carnegie Mellon because of the diversity of programs and its sheer size. It is much broader and much larger than the other endeavors that the university has been involved in,” says Professor José Moura, who has been integrally involved in the Portuguese initiative since its conception.

The “Program” that Moura is referring to is the joint Information and Communications Technologies Institute (ICTI) that has poles in Portugal (ICTI@Portugal) and at Carnegie Mellon (ICTI@CMU). (Moura directs ICTI@CMU; in Portugal, Professor Victor Barroso is the director.) This long-term agreement, forged between Carnegie Mellon and Portugal’s Ministry of Science, Technology, and Higher Education, was signed in October 2006. The arrangement involves Carnegie Mellon faculty, researchers, and students from six colleges and a number of research centers and institutes. In Portugal, the agreement draws in eight Portuguese universities, several higher education research institutions, two governmental agencies, and various companies.

“It is a program that is around $80 million over five years. About $45 million of that comes to Carnegie Mellon and $35 million goes to our partners,” says Moura. “These funds are all committed by Portugal through the Fundação da Ciência e Tecnologia; several companies, like Portugal Telecom; and CITMA from the autonomous region of Madeira. We are in the first year of
“Carnegie Mellon is in Portugal, where we will apply all we have learned as we proceed into what is our most ambitious international collaboration to date.”

the project: $8.5 million are in place, and four professional master’s and several Ph.D. dual-degree programs were developed. Students were selected and recruited, and classes started last August. Joint research projects, teaming Carnegie Mellon and Portuguese faculty and Portugal Telecom personnel, have been launched.”

Having the resources secured is obviously important, but so is having clear goals and a smart plan for achieving them. Weighing in on that sentiment, Moura says, “I think what really drives this program is that it combines education and research, universities and companies.”

Why Carnegie Mellon?
A $45 million commitment to Carnegie Mellon is substantial and begs the question: Why us? The answer to that, according to Moura, hinges on the goals of the Portuguese government. “The government wants their universities to offer programs that are recognized as excellent in the international arena,” he says. They want to integrate into their education system areas of study that are hallmark strengths of Carnegie Mellon: information processing and networking; critical infrastructures and risk assessment; technology, innovation, and policy; and applied mathematics. Carnegie Mellon was selected because “we can help them achieve their goals,” says Moura.

One way in which we’re working with Portuguese universities to enhance their education system, and this is novel from what Carnegie Mellon has done thus far in Greece or Japan, is that we’re adding Ph.D. programs to our overseas education portfolio. Another difference is that graduates of these master’s and Ph.D. programs will receive dual degrees: one from Carnegie Mellon and the other from a partnering Portuguese university. The dual degrees are important in this relationship because they “demonstrate the level of commitment that Carnegie Mellon has put into this program,” says Moura. However, what does remain consistent among all Carnegie Mellon international education programs, whether they are in Portugal or Greece, is that they are the same caliber as what you would find in Pittsburgh. Carnegie Mellon students in Portugal must meet the same stringent admission and curricula requirements as their counterparts in the States.

“The master’s programs educate a large number of students in the information and communication high technologies areas, and the courses offered also form the basis for Ph.D. programs, one of our main targets in the long run. In both master’s and Ph.D. programs, the research to be carried out is not only of high quality as measured by international standards but will demonstrate relevancy to our Portuguese industrial partners,” says Moura. Making industry more involved with academia is one of the overarching goals of the Portuguese government.

The Corporate Connections
At the heart of the Carnegie Mellon-Portugal Program, inseparably intertwined with education is research—sophisticated research that has piqued the attention of Portuguese corporations. At the onset of the program, Portugal Telecom, the chief telecommunications operator in the country, along with other major technology-based firms, such as Nokia-Siemens Networks and Novabase, “have, at different levels, committed financial resources for five years, and this is not insignificant,” says Moura. To enlist the support of other companies, an industrial affiliations program is in place with approximately 20 members. An affiliate’s level of commitment may not necessarily be financial. These companies may send employees back to school to earn advanced degrees. Another option affiliates have is that they can send their researchers to work with academic counterparts. This option of being able to work with peers from different universities and companies is proving to boost enthusiasm in both the corporate and academic environments.

“Our faculty is enthusiastic about research in Portugal because they feel they have high-quality partners. They like the idea of having larger teams and more students. And then there’s the industrial connection,” says Moura. Our faculty is engaged with Portugal Telecom because they “see the opportunity to test their work in the real world. Experiments being discussed involve deployment on the Telecom servers. Our faculty can test things with real data, with real users.”

“The Portuguese program provides opportunities that are quite unique. I say this, with a little pride: The program is providing our faculty opportunities that they could not find with American partners,” states Moura.

The agreement that Carnegie Mellon has made with Portugal is indeed rich with opportunities and promise, but it also presents challenges that must be met in a very public forum. Because of the large financial commitment from Portugal, all eyes are on Carnegie Mellon. “We have very sophisticated partners, and they know what they want. They are part of the European community. So, there is a continuous exercise of reevaluating what we are doing,” says Moura. As expected, there are internal and external reviewing groups in place that monitor and determine whether the program is meeting its goals. (A major review of the program is scheduled for December 2007.)

“The Portuguese government wants their university teams that are in the program to run efficiently and with quality control like we run Carnegie Mellon,” says Moura. “They hope that other universities and teams in Portugal will look at this experiment and want to copy it. And if this happens, then they will have sown the seeds of change.”