Testimony to the House Committee on Science and Technology
by
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July 26, 2007

Chairman Gordon, Ranking Member Hall, Members of the House Committee on Science and Technology… It is an honor to be here today and have an opportunity to discuss the impact on American universities of the globalization of R&D and innovation, and the university response to it. I am provost of the Georgia Institute of Technology, and have been asked to speak to the experience of my own institution in creating and operating international campuses.

The Georgia Institute of Technology, familiarly known as Georgia Tech, is a 120-year-old technological university that is consistently ranked among the nation's ten best public universities by *U.S. News & World Report*. The university is especially known for its engineering program, which is not only the nation's largest, but is also ranked among its very best. Georgia Tech's selectivity is reflected in the SAT scores of its incoming freshmen, which average among the top five public universities in the nation, and in the fact that the freshman class of 2006 contained a higher percentage of National Merit Scholars than any other public university in the United States. The quality of its faculty is demonstrated by the fact that Georgia Tech is among the nation's top ten universities in National Academy of Engineering membership and recipients of the Presidential Early Career Awards in Science and Engineering (PECASE), and second in the nation in recipients of National Science Foundation CAREER Awards. Among research universities with no medical school, Georgia Tech ranks among the nation's top five in volume of research, both overall and federally funded. It is home to or partner in 20 federally funded national research centers of excellence. Recognized by numerous studies as a leader in technology transfer, Georgia Tech launches twice as many start-up companies as the norm for its volume of research and is home to the nation's first university-based business incubator, which is also widely recognized as one of the nation's best.

Like business and industry, research universities are faced with the challenge of competing in a new global environment. History shows us that the arts, sciences and technology have always advanced the fastest in trading centers. In an economy in which knowledge has emerged as the most valuable economic asset, universities are the knowledge trading centers. Historically viewed as ivory towers elevated above the workings of the everyday world, universities are now called upon to adapt to new roles and challenges as drivers of innovation, economic development, and prosperity in a global economy.

Georgia Tech's international activities fall under the rubric of its aspiration and mission, which is to define the technological research university of the 21st century and educate the leaders of a technologically driven world. In today's economy, this goal becomes a matter of defining a new academic paradigm that is effective in driving innovation and promoting economic well-being. How do we conduct research that generates innovation and educate our students in ways that enable our graduates to succeed and thrive in this environment? How do we as a public university of the state of Georgia serve the needs and efforts of our state and the United States to

maintain and improve economic competitiveness? How do we contribute to solving seemingly intractable global problems that are critical to our well-being, from fresh water supplies to terrorism to global climate change? These are the motivating questions behind our efforts to develop a global university with a presence in strategic places around the world.

Like a number of American research universities, Georgia Tech engages in research on global problems and provides expanded opportunities and encouragement for its students to study abroad. Where Georgia Tech seeks to take a unique and more complex approach is with our international campuses. In short, we are shifting our mindset from a 20th century context focused exclusively on attracting the best talent to our home campus to a 21st century model of mutual exchange and partnership. Our goal is to build one of the world's few truly global universities.

The fundamental research that underlies innovation, which is conducted largely at research universities, thrives in an environment of openness and collaboration. Even researchers who are vying with each other to be the first to make a particular breakthrough discovery, often share information and are sometimes even collaborators. As developing nations establish world-class universities and research programs, breakthrough discoveries will occur in many locations around the world, rather than being concentrated in the United States and other developed nations. Georgia Tech's goal is to be present in those other locations – to be a partner and collaborator in discoveries that happen in other places, so that we here in the United States can leverage and benefit from the discoveries of others, just as others have and will leverage and benefit from discoveries made in the United States.

To achieve that goal, we are developing research and education platforms around the globe that are consistent with Georgia Tech's vision, mission, and strategic endeavors. In establishing these campuses, we look for a strategic advantage for Georgia Tech, a research-driven motive, and a clear educational benefit for our own students. We have been approached on numerous occasions by other nations looking primarily for a "provider" of engineering degrees to their citizens and have declined. While we believe that widespread educational opportunity is a good thing, we also recognize that there is a limit to the number of international initiatives that we as an institution can maintain, and we intend to be strategic and focused about what we undertake.

In selecting locations and developing formats for strategic international research and education platforms overseas, Georgia Tech observes a number of principles:

1. They are in the best interests of and to the benefit of Georgia Tech and our faculty and students, and they complement what we do in Atlanta.
2. They operate in accordance with the laws of the United States and the state of Georgia. This requirement is comprehensive, ranging from export controls to IRS rules, from the requirements of the Bayh-Dole Act to regulations regarding a drug-free workplace.
3. They operate within the laws and respect the culture of the host nation.
4. They operate in accordance with the rules governing Georgia Tech's accreditation.
5. They are consistent with Georgia Tech's charter, by-laws, policies, and academic and ethical standards. We will not sacrifice either quality or integrity.
6. They will operate in a self-supporting and revenue-neutral manner relative to our other operations. We do not undertake international activities to make money, nor do we invest any state or federal tax funds in the operation of these endeavors.

The Hearing Charter for this morning indicates that "Georgia Tech is building a campus in Andhra Pradesh, India, to offer master's and Ph.D. programs." I assume that this statement is based on news accounts in the Indian press, and I would like to respond by noting that from Georgia Tech's perspective, the description by the Indian press of this project was somewhat premature. What we have actually agreed to is non-binding discussions that could culminate in a potential research and graduate education platform in Andhra Pradesh. However, as indicated above, we have a list of significant conditions that must be met, and we will not go forward until all of those conditions are met in Andhra Pradesh.

So, I would like to focus this discussion on the three international research and education platforms that we already have in operation: Georgia Tech Lorraine in Metz, France; Georgia Tech's program in Singapore; and Georgia Tech Ireland. Georgia Tech Lorraine is the oldest, established in 1990, and the most fully formed. It includes graduate and undergraduate education programs, research operations, and a "franchise" of Georgia Tech's business incubator. Our program in Singapore is younger and smaller, with research and graduate programs in conjunction with the National University of Singapore and Nanyang Technical University. Georgia Tech Ireland opened in June of 2006 in partnership with the Industrial Development Agency of Ireland and in collaboration with seven Irish research universities. This newest international site has begun as a research program and as yet has no educational component.

The research strengths and interests of each of these locations align well with Georgia Tech's research strengths and interests, and the primary driver for establishing these international platforms is enhanced research opportunities that provide a strategic complement to the major research thrusts on which Georgia Tech is focused. These campuses are mutually beneficial partnerships. In each case, we are there because we were invited based on our own strengths and interests. In each case, we are given indigenous support and have access to research funding from indigenous sources. In each case, we stand to gain from the research expertise represented by these locations.

For example, France has a high level of expertise in aspects of network security. Georgia Tech's campus in Metz, France, is a research partner with Centre National de la Recherche Scientifique, the French National Center for Scientific Research, which is the largest and most influential research agency in Europe. Our unique joint international research unit with CNRS is focused on secure and high-speed telecommunications and provides us with rapid access to French research and technology that would otherwise not be available to Americans. Georgia Tech Lorraine has strong research connections to the main campus in Atlanta, and we stand to gain from what we can learn there to the benefit of the state of Georgia and the United States.

Georgia Tech Lorraine is an "affiliate" of Georgia Tech rather than a branch campus. It is supported by the governments of Lorraine and Metz and has partnerships with several national research organizations, ten other European universities in France and elsewhere, and several French corporations. Its graduate enrollment approaches 175 students, and it has granted close to a thousand master's degrees to date. The undergraduate program at Georgia Tech Lorraine began as a summer study program for our Atlanta-based students, offering engineering majors a unique opportunity to study abroad while keeping up with their curriculum. By summer of 2006, the

program had more than 150 students and 14 professors teaching dozens of courses. In the fall of 2006, we began a very small year-round undergraduate program in electrical and mechanical engineering and computer science, which we hope to grow to more than 50 students by 2008.

Similarly, one of the world's premiere locations for experience and expertise in logistics is Singapore. Georgia Tech has long been recognized as the top university in the United States in systems engineering and logistics, which have become increasingly critical as the economy has grown increasingly global. However, there are aspects of logistics – transportation, for example – in which Singapore as the world's busiest port is more advanced than we are. Again, Georgia Tech's program in Singapore has a very strong research connection to the Atlanta campus, and we stand to gain from what we can learn there to the benefit of the state of Georgia and the United States.

Georgia Tech's Singapore platform has a comprehensive supply chain research program and the first master's degree program in the region in logistics and supply chain management. In addition to research opportunities for Georgia Tech's faculty in systems engineering and logistics, it provides a critical component of Georgia Tech's executive master's degree program in international logistics, which is based in Atlanta. In Singapore, Georgia Tech also offers a THINK Series, which includes seminars, workshops, and short courses designed to bring together logistics experts, business executives, and academic leaders for discussion, knowledge dissemination, and thought leadership positioning. Georgia Tech's Singapore program is supported by five agencies in the Singapore government, with its primary research support coming from the Singapore Agency for Science Technology and Research (A*STAR).

Georgia Tech's international platforms are directly involved in the international economic development activities of the state of Georgia. Georgia Tech was created in 1885 by state law to give the state an economic base and workforce in science and technology, and we have been actively involved in economic development activities since our inception. Georgia's State Department of Economic Development is located on the edge of the Georgia Tech campus in Atlanta, adjacent to Georgia Tech's own business and economic development outreach activities, and there is close collaboration. In particular, Georgia Tech has a full-time international specialist on its staff of economic development advisors whose job is to help the state take advantage of the economic development opportunities presented by Georgia Tech's international activities. For example, in September of 2005, Georgia Governor Sonny Perdue and Lorraine President Jean-Pierre Masseret signed a formal agreement that opened the way for technology companies from both places to develop business relationships with each other. The lynchpin of the agreement is Georgia Tech Lorraine, which will help French companies make business contacts in Georgia and give Georgia companies a platform to develop operations in Europe. Similarly, within a year of the opening of Georgia Tech Ireland in June of 2006, Ireland President Mary McAleese had visited Atlanta and the Georgia Tech campus, and Georgia Governor Sonny Perdue had made an economic development trip to Ireland. The City of Atlanta has always been a transportation hub, and a 2001 Clusters of Innovation study of the city by the Council on Competitiveness helped the local business community better understand the economic opportunities presented by logistics. The Metro Atlanta Chamber of Commerce has now launched a logistics initiative aimed at expanding this sector of the city's economy, which is benefiting from Georgia Tech's presence in Singapore.

It is very important for our faculty to have an international perspective on their area of expertise, and many of our Atlanta-based faculty spend time on our international campuses. Their time abroad allows them access to international opportunities without disrupting their research or career trajectories, and allows us to help ensure a positive experience for their spouses and children. It simultaneously enriches them professionally and helps to assure the consistency and quality of the Georgia Tech reputation at our international locations.

Georgia Tech's international campuses also represent an important opportunity for our students. As the nation's largest producer of engineers and one of its best, we face the challenge of preparing our students to contribute to and compete in a global economy based on innovation. It is clear to us that it is in the best interests of the United States economy for our education programs to produce citizens of the world who are comfortable with diverse cultures, languages, and ways of thinking and solving problems. Although Georgia Tech is a global institution at both the graduate and undergraduate levels, most of the undergraduate experience is campus-based in Atlanta or Savannah, Georgia. The hands-on lab and practicum nature of science and engineering curricula make study abroad difficult to accommodate, but we have nevertheless developed a wide array of international opportunities for our undergraduate students. During the course of their studies, more than one-third of our undergraduate students study or work abroad, some of them more than once. Seventeen undergraduate degree programs offer an International Designator, in which a context of global economics, international affairs, and foreign language is added to the program of study. Almost 40 percent of Georgia Tech's undergraduates study foreign languages, despite their not being required for any major save one, modern languages. This level of international exposure for our students is sustained through our own study abroad and internship programs; through dual degree agreements with the Technical University of Munich in Germany, the Technical Institute of Monterrey in Mexico, Imperial College in England, and Shanghai Jiao Tong University in China; and through opportunities on our international campuses.

Feedback from alumni and strong employer interest in our students indicate the value of an international perspective to their education. In a 2005 survey, young alumni reported that the experience had helped them develop leadership skills, made them more comfortable in a culturally diverse environment, and enhanced their ability to resolve disagreements and mediate interpersonal conflict in teams or groups. We believe these are important skills for our graduates and increase their ability to thrive in a global economy. The value of our students' education is also reflected in the strong interest by the 550 corporate and government recruiters who came to campus to conduct nearly 10,000 job interviews during the past academic year. Some interviewed students as early as six months before they graduated in an effort to get a jump on the competition.

At Georgia Tech, we also believe that the technological research university of the 21st century will lead the way in improving the quality of life for all of the Earth's inhabitants, and our faculty and students are actively engaged in this endeavor. The nation of Liberia, struggling to recover from a devastating civil war, recently announced a new national information and communication technologies policy, developed with the assistance of Georgia Tech Public Policy Professor Michael Best and graduate students in public policy and computing. Civil and

Environmental Engineering Professor Aris Georgakakos has worked with multiple nations to develop water management plans for many of the world's largest river systems. Civil and Environmental Engineering Professor Joseph Hughes and his students are helping the nation of Angola with water resource problems, while Research Scientist Kevin Caravati led a student team in the development of a solar-powered dry latrine that can be made from local materials to promote sanitation in Bolivia. City Planning Professor Michael Elliott has trained environmental experts from both Israel and Palestine in methods of resolving conflicts over water, a critical resource that plays a role in the political tensions of the Middle East. These are just a few examples of many faculty and students whose efforts are making a difference around the world. We believe that quality of life and economic opportunity promote political stability, which is to the advantage of the United States as well as the nations we assist.

Finally, it is important to understand that the process of establishing international platforms is a two-way street, and Georgia Tech's international character is an important factor in attracting foreign research labs to Atlanta. For example, in 2005 the Samsung Electro-Mechanics Company located a research lab adjacent to our campus that is working on the next-generation radio-frequency integrated circuit. This lab is expected to become the company's primary North American research location. Later the same year, Milan-based Pirelli located a North American branch of Pirelli Labs, the company's advanced research center, adjacent to our campus, and then consolidated the rest of its North American corporate staff activities to the same location. These undertakings are consistent with data reported by the National Science Foundation in the *2006 Science and Engineering Indicators*. According to NSF, from 1997 to 2002, R&D investments made in the United States by foreign firms grew faster than R&D investments abroad by U.S.-based multinational corporations. In 2002, U.S. affiliates of foreign companies accounted for 5.7 percent of the total U.S. private industry value, but R&D conducted by U.S. affiliates of foreign companies accounted for 14.2 percent of the industry R&D conducted in the United States.

In summary and response to the specific questions posed:

1. What was the general motivation for your institution to establish branch campuses overseas? What factors did you consider in making the decision to expand overseas, especially in terms of locations, costs, staffing, and the impact on the home campus?

Georgia Tech's primary motivation in establishing overseas campuses is to enrich our research thrusts and leverage research expertise available in other parts of the world and prepare our students to thrive in the global economy. Our international platforms are mutually beneficial partnerships with high-quality international partners whose research interests align with ours. They benefit our university by enabling our faculty to operate in a global context and helping our students prepare to thrive in a global economy. They benefit the state of Georgia directly by serving as conduits for international economic development relationships. They are operated in accordance with the laws of the United States and the host country; accreditation standards; and Georgia Tech's own charter, by-laws, and policies. They are designed to be financially self-sustaining, so that tax revenues are not used nor are resources diverted away from other Georgia Tech programs. As a result, they are not technically "branch" campuses in the financial sense, because they will have no financial impact on the home campus.

2. What do you anticipate the effects of these overseas branch campus programs will be on the overall global science and technology enterprise, especially in terms of jobs available to your home and branch campus graduates? What sorts of data and information are you collecting to determine if the effects are matching your original goals?

Our overseas campuses offer us an opportunity to participate in research with partners whose expertise exceeds ours in particular areas and allows us access to international research opportunities and technologies that would otherwise be unavailable to Americans. Specifically in terms of our graduates, these campuses enrich our ability to produce citizens of the world, educated by professors who operate in an international context and presented with opportunities to study abroad that are not available to typical engineering and science students. The importance of these opportunities to our students is reflected in the strong interest by corporate and government recruiters in hiring them and in reports from our graduates themselves, who say that their international experiences as students contribute to their careers in significant ways.

3. How are you adjusting your home campus science and engineering to better respond to the increasingly globalized economy?

Georgia Tech aspires to be a truly global university that contributes to the economic competitiveness of Georgia and the United States through partnerships with other top international universities and research organizations that provide access to innovations and technology being developed in other parts of the world. The faculty and students of our home campus participate in these partnerships, and the knowledge and experience they gain enrich Georgia Tech's home campus and carry over into the relationships we have with American industries and with international partners who seek us out and create partnerships with us here in Atlanta. Georgia Tech is also committed to strengthening the international elements of the education we offer our students, and we have added an International Designator to many undergraduate majors, incorporating a global context into the course of study.